United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Grants Pass Resource Area
2164 N.E. Spalding
Grants Pass, Oregon 97526

IN REPLY REFER TO:

1790 (ORM070)

MAY 06 2014

Dear Interested Party:

The Douglas Fire Complex Recovery Project is one of several post fire projects located in Southwest Oregon following the summer 2013 wildfire season. The Southwest Oregon Fire Recovery team, consisting of Medford and Roseburg BLM management has actively engaged interested public and stakeholders following the aftermath of the fires.

The Grants Pass Resource Area is releasing the Douglas Fire Complex Recovery Project Environmental Assessment (EA) for a 30-day public comment period. The EA, project Reader's Guide and maps are available electronically on the Medford District BLM web site at http://www.blm.gov/or/districts/medford/plans/index.php

The EA documents this project within policies set forth in the National Environmental Policy Act (NEPA). The project area is located within sections of Township 32 South, Range 7 & 8 West; and Township 33 South, Range 6, 7 & 8 West, Willamette Meridian. You have been contacted because you live within approximately one half mile of the project area, you have requested updates from the Grants Pass Resource Area or Roseburg District BLM, or you have expressed interest in the ongoing Southwest Oregon Fire Recovery efforts.

The Douglas Fire Complex Recovery Project EA analyzed the following proposed activities on Medford District, BLM administered lands:

Proposed Activities within the Matrix LUA		**Alternative 2**	**Alternative 3**
Harvest Summary	Road safety and fire planning units within economic recovery harvest units	556	556
	Economic Recovery harvest units	1113	1113
	Total Harvest	**1669**	**1669**
Operations Summary	Ground Based	307	264
	Cable/Skyline	1105	924
	Helicopter	257	481
Road Construction Summary	Temporary Routes	6.59 miles	3.23 miles
	Permanent Road	0.32 miles	0.32 miles
	Maintenance	180.2 miles	180.2 miles

Salvage is not proposed in Riparian Reserves, 100 acre Northwest Forest Plan northern spotted owl (NSO) activity centers and 0.5 mile northern spotted owl nest patches.

Public Involvement

The 30-day comment period for this EA will begin when the legal notice is published in the *Grants Pass Daily Courier* and the *Roseburg News Review* newspapers on May 7, 2014. Any comments you may have regarding this project must be received at the address below by June 6, 2014 to be considered in the final decision making process. Please send hardcopy or email comments to Leah Schofield, Planning and Environmental Coordinator, at the addresses below. Question about this project may also be directed to Leah Schofield at (541) 471-6504.

The GPRA would like to invite you to participate in a public meeting and field tour. The EA public meeting will be held on May 15, 2014 from 5:45-8 p.m. at the Grants Pass Interagency Office, 2164 NE Spalding, Grants Pass, OR 97526. The field tour will occur on May 31, 2014. The location and time of the field tour will be announced at the public meeting. If you cannot attend the public meeting but would like information regarding the field tour please write to the address above or send your interest via email to: blm_or_md_douglas_fire_complex_recovery@blm.gov.

All comments will be made available for public review. If you would like your information withheld from public review or disclosure under the Freedom of Information Act, please state this clearly at the beginning of your written comment. All comments received from organizations or officials of organizations, businesses, or government agencies will be made available for public inspection in their entirety.

Thank you for your continued interest in the Douglas Fire Complex Recovery Project. I look forward to your engagement and participation on public land management projects.

Sincerely,

Allen Bollschweiler
Field Manager
Grants Pass Resource Area

BLM

Grants Pass Resource Area

Environmental Assessment

DOI-BLM-OR-M070-2014-006-EA

Douglas Fire Complex Recovery Project

May 2014

Prepared by:
U.S. Bureau of Land Management
Medford District Office – Grants Pass Resource Area
2164 NE Spalding Ave
Grants Pass, OR 97526

Table of Contents

Preface 1
Chapter 1 Introduction 2
1.1 Document Structure 2
1.2 Project Area Vicinity 3
1.3 Purpose and Need for Action 5
1.4 Decisions Framework 6
1.5 Conformance with Law, Regulation & Policy 7
1.6 Public Involvement 8
1.7 Issues 9
1.8 Alternative options considered but not analyzed in detail 10
Chapter 2 Alternatives 13
2.1 Alternative 1 No Action 13
2.2 Alternative 2 13
2.3 Alternative 3 16
2.4 Project Design Features and Best Management Practices 16
2.5 Seasonal Restriction Table 27
2.6 Summary of Environmental Effects by Alternative 28
Chapter 3 Environmental Effects 30
3.1 Vegetation 30
3.2 Fire & Fuels 53
3.3 Wildlife 66
3.4 Soils - Productivity and Compaction 114
3.5 Soils – Sedimentation and Erosion 128
3.6 Hydrology 150
3.7 Fish 172
3.8 Cultural and Paleontological Resources 181
3.9 Botany 196
3.10 Noxious Weeds 209
3.11 Recreation and Visual Resource Management 217
Chapter 4 Preparers, Consultation and Coordination 222
Chapter 5 References 225
Appendix A – Compliance with Aquatic Conservation Strategy 238
Appendix B – Definitions 245
Appendix C – Cumulative projects for consideration 251
Appendix D – Review of Elements of the Environment Based on Authorities and Management Direction 254

List of Figures

Figure 1: Douglas Fire Complex Recovery Project Vicinity Map 4
Figure 2: Mountain pine beetle attack and subsequent woodpecker activity 32
Figure 3: Impacts of the flatheaded fir borer on Douglas fir 33
Figure 4: Post-fire shrub vegetation in the Klamath-Siskiyou Ecoregion, Southern Oregon. Sourch: Hibbs and Jacobs 2011. 40
Figure 5: Wolf Pup Timber Sale thinning unit received little to no crown scorch from the Douglas Complex..... 45
Figure 6: Examples of moderate/high severity burn areas..... 58
Figure 7: Examples of low/very low severity areas..... 58
Figure 8: Douglas Complex burn severity map 59
Figure 9: Biscuit Fire - Three years post-fire photos..... 61
Figure 10: Soil Burn Severity 123
Figure 11: Soil Burn Severity Photos - Top row from left to right: Units 15-2, 10-1WP, 13-A; Bottom row left to right 12-4, 13-B, and 27-5..... 123
Figure 12: Example of a tractor yarding unit where tops and limbs are left for equipment to walk over and mix into soil for nutrient cycling..... 123
Figure 13: Hydrologic Unit Code 10 and 12 Watersheds in the Planning Area..... 151

List of Tables

Table 1: Affected Ownerships within the Douglas Complex 1
Table 2: Douglas Fire Complex Recovery Project - Acre Assessment 2
Table 3: Proposal Summary of Alternatives 2 and 3 15
Table 4: Disturbance Distances from Various Activities for northern spotted owls 24
Table 5: Units with Minimum of four snags per acre..... 25
Table 6: Summary of Seasonal Restrictions and Operational Periods 27
Table 7: Vegetation Classes in the Medford BLM Douglas Complex 31
Table 8: Short Term Vegetation Effects (0-10 years) of the Proposed Action Alternatives 50
Table 9: Long Term Vegetation Effects (11+ years) of Proposed Action Alternatives 51
Table 10: Fire History – Number of Fires 55
Table 11: Relationship of surface fire flame lenght and intensity to suppression actions..... 56
Table 12: Fire Behavior Fuel Models with Flame Lengths 57
Table 13: Burn severity by land jurisdiction within the Douglas Fire Complex 57
Table 14: Pre and estimated post-fire behavior models on Medford District BLM administered lands within the Douglas Fire Complex..... 60
Table 15: Total tree bole weight (tons) of wood and bark of individual trees based on whole tree volume..... 62
Table 16: Site Potential Fuel Loading for Managed and Natural Stands (tons per acre) 62
Table 17: Comparison of Road Safety, Ridgeline and Economic acres in Alternative 2 and 3 ... 63
Table 18: Snag Recruitment in Harvest Units for Managed and Natural Stands (tons per acre) . 64
Table 19: Burn Severity on Hazardous Fuels Reduction Treatment Acres from 2003 to 2013 ... 66
Table 20: Wildlife Special Status Species Known, Suspected or Habitat Occurs in the Project Area..... 67

Table 21: Environmental Baseline of NRF Habitat Pre/ Post Fire Known for Northern Spotted Owl Sites 72
Table 22: Critical Habitat Baseline Critical Habitat Subunit KLW-1 78
Table 23: Approximate Treatment Acres and Effects by NSO Sites 89
Table 24: Post Fire NSO NRF/PFF Habitat on BLM managed land 91
Table 25: Northern Spotted Owl Sites Potentially Not Adversely Affected 100
Table 26: Affects (acres) to CHU Sub-unit KLW-1 105
Table 27: Pre and Post Treatment NRF and PFF Habitat Amounts within 500 Acre Buffers ... 105
Table 28: Reserved/Withdrawn Timber Harvest Programmed Lands (NWFP ROD 1994 p. 24-29) 112
Table 29: Northern Spotted Owl and Critical Habitat - Cumulative Effects 112
Table 30: Reforestation TPCC classifications 116
Table 31: Unit Acres Proposed on Non-Fragile Suitable Woodland TPCC Withdrawn 126
Table 32: Timber Productivity Capacity Classification (TPCC) in the Douglas Complex Recovery Planning Area 129
Table 33: Road Construction in Relation to TPCC Classification 139
Table 34: Proposed Road Construction with Soil Classifications 146
Table 35: Planning Area Watershed Information 152
Table 36: Road Acres by Subwatershed in the Planning Area 157
Table 37: Pre-Fire Open Conditions - Includes Pre-Fire Natural and Disturbed Area Openings 158
Table 38: Post-Fire Open Conditions (Includes Natural and Disturbed Area Openings) 160
Table 39: Proposed Haul Routes Outside of the Planning Area per Subwatershed 164
Table 40: Fish Bearing Streams Located in Proximity to Proposed Harvest Units 172
Table 41: Distance from Proposed Harvest Units to Fish Bearing Streams and CCH 173
Table 42: Selected Habitat Index Values for Streams in the Proposed Units 175
Table 43: Bureau Sensitive Fungi Documented or Suspected on Medford BLM 200
Table 44: Bureau Sensitive and Survey and Manage Plant Sites in Proposed Units 202
Table 45: Factors Affecting the Determination of the Rate of Noxious Weed Spread 212
Table 46: Project Design Features and Expected Implementation Results 214
Table 47: Cooperators on the Douglas Fire Complex Recovery Project 224
Table 48: Individual Aquatic Conservation Strategy Objective Assessment 242

Preface

The project area is located in Southwestern Oregon within the mixed evergreen zone of vegetation. In this region, fire is recognized as a key natural disturbance (Atzet and Wheeler 1982). Historically, the mixed conifer and mixed hardwood forests of Southwestern Oregon were generally characterized by an upper layer of conifers and a lower level of hardwoods (Franklin and Dyrness 1973, p. 133). The area incurred more frequent, low intensity fires, resulting from both lightning and Native American ignitions (USDI 1999b, 11). The historic fire regime maintained an open canopy structure and variable, patchy tree distribution across much of the forest.

After Euro-American settlement, several factors including fire exclusion, forest management activities, and climatic events have greatly altered historical vegetation patterns. This trend is being readily observed across the entire country and catastrophic fires are becoming more common.

Fire suppression has increased the accumulation of surface and ladder fuels, increased fuel continuity, changed successional dynamics, altered insect and disease dynamics, and created forests prone to larger, resistant-to-control and more frequent – stand replacing fires. In addition to the ecological impacts of these changes, there is an increased risk to firefighters, public safety and private property due to the mentioned conditions.

During the morning of July, 26 2013 in Southwestern Oregon, a dry lightning storm ignited over one hundred fire starts. In the project area, the fires burned in steep, rugged terrain near the communities of Riddle and Glendale, Oregon. Affected landscapes include mixed conifer stands of older age classes, young managed stands of conifers and hardwood stands. The majority of the fire growth occurred within 72 hours following ignition. By August 3rd, the Rabbit Mountain, Dad's Creek, and Farmer's Fires had cumulatively burned over 36,000 acres. The fires were contained on September 3, 2013 and comprised a total of 48,672 acres of Bureau of Land Management, State of Oregon, Josephine County and private lands (see Table 1 below). These fires are formally known as the Douglas Complex. The Douglas Complex is one of the largest recorded fires to burn on BLM land in Southwestern Oregon.

Table 1: Affected Ownerships within the Douglas Complex

Douglas Fire Complex Ownership Summary	
Jurisdiction	*Acres*
BLM	25,349
Private	20,711
Josephine County	2,292
State of Oregon	320
Total	**48,672**

The Southwestern Oregon Fire Recovery team (SWOFR) is an executive group of land managers on the Medford and Roseburg BLM Districts. This group was tasked with addressing issues resulting from the Douglas Complex. In order to address the land management objectives on these burned landscapes, the Medford BLM, Grants Pass Resource Area, has proposed the Douglas Fire Complex Recovery Project.

The Table below shows the total acres affected from the Douglas Complex. It further provides the acres removed from harvest treatment for various reasons. The Douglas Fire Complex Recovery Project evaluated 4,783 acres of moderate to high severity burn. Section 1.8 of the EA provides information on how the interdisciplinary team worked through the NEPA process to analyze in detailed actions on 1,669 acres.

Table 2: Douglas Fire Complex Recovery Project - Acre Assessment

Assessment Category	Acres removed from treatment	Total Approximate Acres
Total Acres in the Douglas Fire Complex		48,671
Total Medford BLM Acres in the Douglas Fire Complex		19,082
Total Matrix, Connectivity/Diversity Block (Medford District)		19,069
Low severity burn acres	14,286	
Initial field reconnaissance acres (high and moderate burn severity)		4,783
Acres excluded low volume	681	
Acres dropped within northern spotted owl high priority 0.5 mile core	1115	
Acres dropped from Known Spotted Owl Activity Centers (KSOAC)	346	
Timber Productivity Classification (TPCC) withdrawn lands	93	
Riparian Reserves	879	
Net Matrix total for treatment		**1,669**

Chapter 1 Introduction

1.1 Document Structure

The Grants Pass Resource Area (GPRA) has prepared an Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This EA discloses the direct, indirect and cumulative impacts that may result from the action alternatives. The EA provides the decision maker, the Grants Pass Field Manager, with information to aid in the decision making process. The document is organized into four chapters and an appendix:

- Chapter 1: Purpose & Need: This section includes information on the location of the project, the purpose and need for the project, and the BLM's proposal for achieving the purpose and need. This section includes details on how the BLM informed the public of the proposal and provides a synopsis of the issues raised.

- Chapter 2: Alternatives: This section provides a description of the action alternatives for achieving the stated purpose and need. Alternatives were developed in light of

substantive issues raised by the GPRA interdisciplinary team, the public and other agencies. Incorporated in this section are project design features (PDFs) that avoid or reduce impacts to resources. Alternatives considered but not analyzed in detail are also presented in this section.

- Chapter 3: Affected Environment and Environmental Effects: This section describes the environmental effects of implementing any of the alternatives. A description of the pre-fire and existing conditions for resources is provided in sub-sections. Effects of the alternatives are then described based on what is proposed in the No Action Alternative 1, Alternative 2, and Alternative 3.

- Chapter 4: Consultation and Coordination: This section provides a list of the resource specialists that prepared the EA analysis, and information on consultation efforts with Tribal governments and regulatory agencies.

- Appendix: The appendix provides information in support of the analysis presented in this Environmental Assessment.

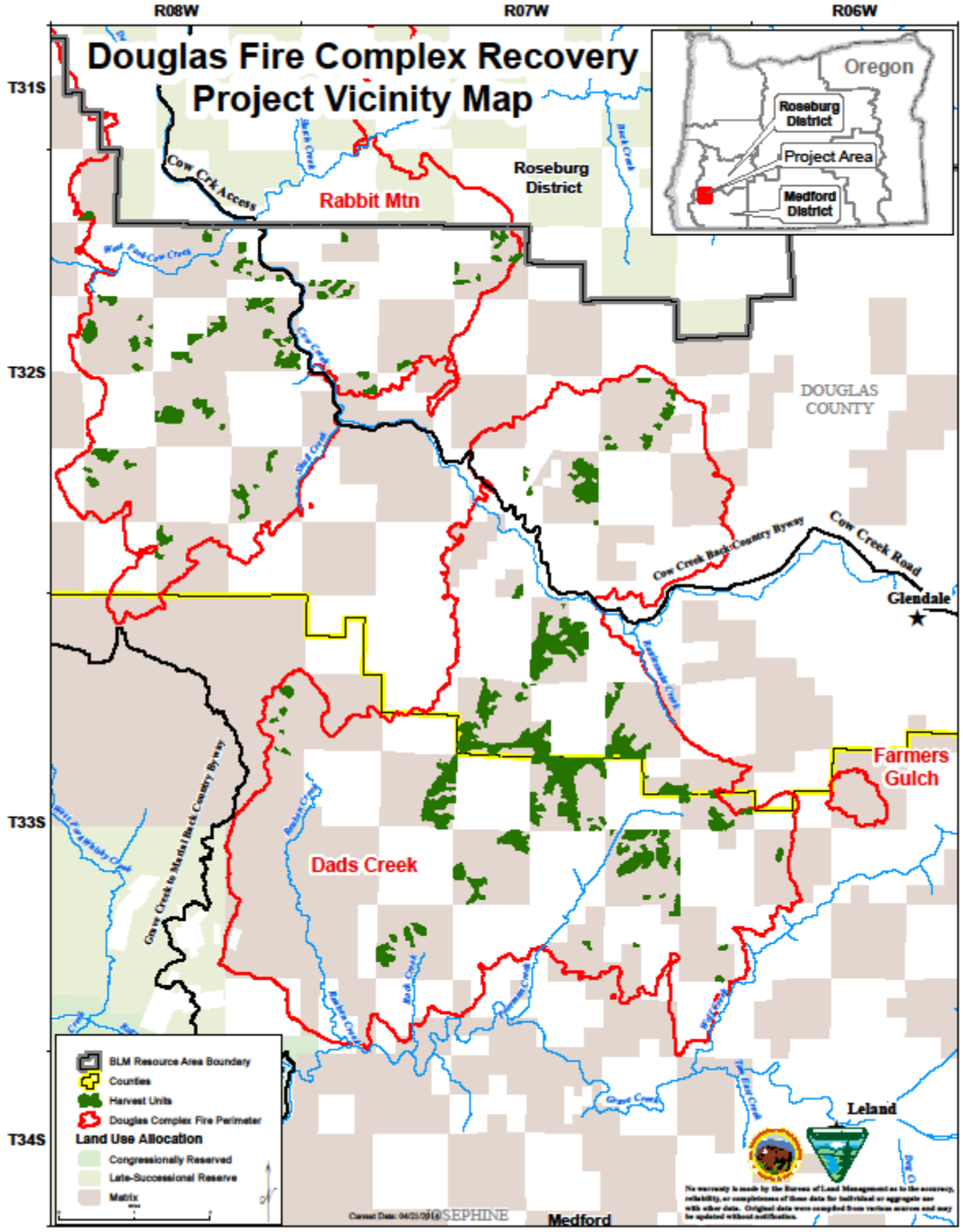
1.2 Project Area Vicinity

The proposed project area is located within Josephine and Douglas Counties of Oregon. See Figure 1, Vicinity Map. The Douglas Fire Complex Recovery Project units are found within the following legal descriptions, Willamette Meridian:

T32S, R8W, Sections: 3, 11, 12, 13, 14, 15, 23, 25, 27, 35
T32S, R7W, Sections: 7, 9, 17, 19, 23, 25, 27, 33, 35
T33S, R7W, Sections: 2, 3, 7, 9, 10, 11, 13, 14, 15, 17, 19, 21, 23, 25, 26, 27, 29, 31
T33S, R8W, Sections: 12, 13, 24, 25
T33S, R6W, Sections: 17, 18, 19

The project area is within the Grave Creek, Middle Cow Creek, and West Fork Cow Creek Hydrologic Unit Code (HUC) 10 watersheds. These watersheds drain into either the Umpqua or Rogue Rivers. All proposed project units are located on the BLM managed land within the Matrix Land Use Allocation (LUA). BLM lands are intermixed with private and county lands, creating a mosaic of ownership patterns.

Figure 1: Douglas Fire Complex Recovery Project Vicinity Map



1.3 Purpose and Need for Action

1.3.1 Need for the Project

Salvage for Economic Recovery

The Douglas Fire Complex burned across approximately 4,800 acres at moderate to high severity in the Matrix (LUA) and associated Riparian Reserves (RR) within the GPRA. Of those acres, 1,669 in Matrix LUA have been identified to provide for economic return, while simultaneously managing for multiple resource objectives. Salvage of dead or dying trees on up to 1,669 acres would allow the GPRA to retrieve some economic value from these trees while retaining levels of coarse wood and standing snags needed to meet RMP standards and guidelines.

There is a need to manage O&C Matrix lands in a manner that provides for a sustainable supply of timber. The existing condition of the burned landscape has resulted in trees that are dead and dying and are no longer on a trajectory for sustained yield. There is a need to remove the dead and dying trees and provide for a site that can support sustainable forest management in addition to conserving habitat elements as defined by the RMP.

Mortality and damage by the fire has resulted in timber with reduced lumber quality and merchantable value. Timely salvage is critical in order to capture remaining merchantable timber values before further deterioration occurs.

There is a need to restore the timber productivity on the Matrix LUA and meet reforestation objectives as defined by the RMP. Delays in salvage harvest and subsequent tree planting would allow undesirable competing vegetation to quickly establish. Maintaining conifer productivity among competing shrubs and hardwoods becomes more difficult and costly with delays in salvage harvest and site preparation.

Road safety and fire planning

Effects of the fire to BLM managed land have resulted in varying types of hazards such as danger (hazard) trees. There is a need for BLM to address safety hazards and future wildland fire potential. There is a need for BLM to comply with federal and state requirements for identifying and removing danger trees. The 2008 Field Guide for Danger Trees Identification and Response by and Oregon Occupational Safety and Health Administration (Oregon OSHA), US Forest Service, BLM and Associated Oregon Loggers gives guidance on Danger tree identification.

Burned trees have compromised the safety of roads used by the BLM, other agencies, private land owners, forest workers and the general public. This safety concern has been raised by state and county government, private landowners, industrial timber companies, and Oregon OSHA. Existing conditions may increase future fuel loading, as well as the potential for re-burn in some areas. There is a need to reduce fuel loading, eliminate safety hazards, and provide access to manage future wildfires. There is a need to meet federal and state OSHA regulations, provide safe employment conditions, as well as safe travel conditions for the public, contractors, and adjacent landowners with reciprocal rights on BLM roads.

1.3.2 Purpose (Objectives) of the Project

This project has been designed under the RMP and related regulatory documents which direct and provide the legal framework for management of the BLM lands within the Medford District (listed below). The area proposed for treatment falls within the Matrix Land Use Allocations as

defined in the RMP and Northwest Forest Plan (NWFP). The Douglas Fire Recovery Project incorporates the following RMP and regulatory objectives and directions:

Project Objectives and Management Direction for Salvage within the Matrix LUA

- Manage timber stands to reduce the risk of stand loss from fires, animals, insects and diseases (RMP, p. 72).
- 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 (RMP, p. 72).
- Produce a sustainable supply of timber to provide jobs and contribute to community stability (RMP, p. 38).
- Mortality of entire stands or of scattered trees that results from disturbance would be harvested in salvage operations (RMP, p. 186).
- Harvest only mortality above the level needed to meet snag retention and other habitat goals and provide desired levels of coarse woody debris (RMP, p.186).
- Salvage of volume from these stands following partial or complete stand mortality would be permitted provided residual structural objectives were met (RMP, p. 193).

Project Objectives and Management Direction for Road Safety and Fire Planning within the Matrix LUA

- Provide for the safety of forest users (including removing hazard trees along roads and trails in campgrounds, administrative sites, etc.) (RMP, p. 72).
- Strive to provide safe travel conditions for employees, the public, contractors, and contractors and for users with reciprocal rights who may transport timber or mineral materials on roads managed by the BLM (RMP p. 88).
- Adhere to Federal OSHA standard: "Furnish to each employee a place of employment which are free from recognized hazards that are causing and are likely to cause death or serious physical harm (29 CFR 1960.8)."
- Utilize and incorporate guidelines identified in the 2008 Field Guide for Danger Tree Identification and Response as developed by Oregon OSHA, US Forest Service and Associated Oregon Loggers, Inc.
- Reduce both natural and activity-based fuel hazards through methods such as prescribed burning, mechanical or manual manipulation of forest vegetation and debris, removal of forest vegetation and debris, or combination of these methods (RMP, p. 91)

1.4 Decisions Framework

The Grants Pass Field Manager is the responsible official for deciding whether or not, and in what manner, to implement any of the action alternatives analyzed in this EA.

Actions in this decision would include:

- Acres to salvage for economic recovery, road safety and fuels reduction
- Temporary route construction to accommodate harvest operations
- Permanent road construction to accommodate harvest operations
- The combination of logging systems to accommodate harvest operations
- Use of Project design features to avoid or minimize impacts to resources

The decision will be based on a consideration of the environmental effects of implementing any of the action alternatives. The Field Manager may select any alternative analyzed in detail, a modified alternative, or no action. If the Field Manager determines that the proposal would result in significant effects, additional analysis may occur through the development of an Environmental Impact Statement.

1.5 Conformance with Law, Regulation & Policy

1.5.1 Land Use Management Plans

This EA tiers to the following land use planning documents:

- Final Supplemental Environmental Impact Statement and Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl(Northwest Forest Plan FSEIS, 1994 and ROD,1994)

- Final Medford District Proposed Resource Management Plan/Environmental Impact Statement, and Record of Decision and Resource Management Plan (EIS, 1994 and RMP/ROD, 1995)

- Final Supplemental Environmental Impact Statement: Management of Port-Orford-Cedar in Southwest Oregon(FSEIS 2004) and ROD(2004)

- Medford District Integrated Weed Management Plan Environmental Assessment (1998) and tiered to the Northwest Area Noxious Weed Control Program (EIS, 1985)

- Final Supplemental Environmental Impact Statement and Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (FEIS,2000 and ROD,2001)

1.5.2 Relevant Statutes/Authorities

This section is a summary of the relevant statutes/authorities that apply to this project. The Action Alternatives 2 and 3 are designed in conformance with the direction given for the management of public lands in the Medford District and the following:

- Oregon and California Lands Act of 1937 (O&C Act). Requires the BLM to manage O&C lands for permanent forest production. Timber shall be sold, cut, and removed in accordance with sustained-yield principles for the purpose of providing for a permanent source of timber supply, protecting watersheds, regulating stream flow, contributing to the economic stability of local communities and industries, and providing recreational opportunities.

- Federal Land Policy and Management Act of 1976 (FLPMA). Defines the BLM's organization and provides the basic policy guidance for the BLM's management of public lands.

- National Environmental Policy Act of 1969 (NEPA). Ensures that information on the environmental impacts of any Federal action is available to public officials and citizens before decisions are made and actions are taken.

- Endangered Species Act of 1973 (ESA). Directs Federal agencies to ensure their actions do not jeopardize species listed as "threatened and endangered" or adversely modify designated critical habitat for these listed species.

- Clean Air Act of 1990 (CAA). Provides the principal framework for national, state, and local efforts to protect air quality.

- Archaeological Resources Protection Act of 1979 (ARPA). Protects archaeological resources and sites on federally-administered lands. Imposes criminal and civil penalties for removing archaeological items from federal lands without a permit.

- Safe Drinking Water Act (SDWA) of 1974 (as amended in 1986 and 1996). Protects public health by regulating the nation's public drinking water supply.

- Clean Water Act (CWA) of 1972 as amended. Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.

- National Historic Preservation Act (NHPA), 1966 as amended. NHPA establishes procedures for compliance processes to identify eligible cultural properties and the avoidance, minimization, or mitigation of impacts to eligible properties.

- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. NAGPRA establishes procedures for inadvertent discoveries of cultural items on Federal or Tribal lands and a repatriation process to return NAGPRA items to lineal descendants and cultural affiliated Tribes.

1.6 Public Involvement

The Douglas Fire Recovery Project is one of several post fire projects located in Southwest Oregon following the summer of 2013 wildfire season. The Southwest Oregon Fire Recovery team, consisting of Medford and Roseburg BLM management has actively engaged interested public and stakeholders following the aftermath of the fires. The public involvement efforts specific to Douglas Fire Complex Recovery project are addressed below.

Internal Scoping

An interdisciplinary team (IDT) of BLM resource specialists conducted internal scoping through the project planning process. Internal scoping included record searches, field surveys, reviews of current literature and discussion by the IDT. In the planning process the IDT considered elements of the environment that are specific to this project.

External Scoping

The BLM initiated external scoping for this project on November 22, 2013. A scoping letter and a map describing potential project activities was sent to approximately 259 recipients, including federal, state, county and municipal government agencies, tribal governments, adjacent

landowners, and interested parties on the GPRA and Roseburg District mailing lists. The scoping letter along with a map of areas being considered was also posted on the Medford District BLM's website at http://www.blm.gov/or/districts/medford/plans/index.php. Notice of scoping was also available in the Medford BLM's *Medford Messenger* on January 24, 2014. A total of 35 comment letters were received and considered during the scoping period. A detailed summary of the comments are included in the project record.

Public Meetings

On January 10, 2014 a press release was issued to inform the public of a series of public meetings specific to Southwest Oregon post fire related projects. On January 15, 2014, the GPRA sent post cards to approximately 259 recipients, including federal, state, county and municipal government agencies, federally recognized Tribes, adjacent landowners, and interested parties on the GPRA and Roseburg District mailing lists informing them of the meetings. Notice of the public meetings was also published on the Medford District BLM's website.

On the evening of January 21, 2014, a public meeting was held at the Glendale High School gymnasium. A total of 22 individuals identified themselves as interested in the Douglas Fire Recovery project. On the evening of January 23, 2014, a public meeting was held at the GPRA Interagency office. A total of 45 individuals identified themselves as interested in the Douglas Fire Recovery project. Several comments were received and considered from both of the public meetings (see Section 1.8 Issues).

On January 30, 2014 a workshop was held for actively interested public, industry and environmental groups that generated focused discussion on the proposed activities.

On March 27, 2014, a pamphlet was posted on the BLM's post-fire recovery website. This document included a status update on all the post fire projects in Southwest Oregon.

EA 30-day Public Comment Period

A legal notice will be published in the Grants Pass Daily Courier and the Roseburg News Review on May 7, 2014. The GPRA is requesting comments on the EA to be submitted by June 6, 2014 for consideration during the decision making process.
A public meeting is scheduled for May 15, 2014, at the Grants Pass Interagency Office from 5:45pm to 8:00pm. The purpose of the meeting is to provide an opportunity for the public to get information about the project. In addition, the SWOFR group will also be there to provide information on post fire recovery projects in Southwest Oregon on BLM managed lands.

A field trip is scheduled for May 31, 2014. The purpose of this field trip is to provide an on the ground review for the public to address comments or concerns specific to the Douglas Fire Complex Recovery Project.

1.7 Issues

Substantive issues are directly or indirectly related to the development of the project proposal. Substantive issues assisted the IDT to shape the alternatives, identify PDFs or provide considerations for analysis. Non-substantive issues are: 1.) outside the scope of the action; 2.) already decided by law, regulation or policy; 3.) irrelevant to the decision to be made; 4.) conjectural and not supported by scientific or factual evidence. The Council for Environmental

Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review."

1.7.1 Issues analyzed in detail

The IDT considered in detail the following substantive issues into the design of the action alternatives, project design features (PDF) and analysis of the environmental effects found in Chapter 3.0:

- *Safety:* Provide for public and worker safety along BLM managed roads and private property boundaries with presence of fire killed or fire damaged trees.
- *Wildlife:* Retain snags and down wood for wildlife habitat. Potential adverse impacts of creation of open spaces after salvage operations.
- *Northern spotted owl and avian habitat:* Potential loss of **s**nags and green trees used for foraging, nesting or roosting.
- *Soil compaction and site productivity:* Effects to ground cover recovery and nutrient cycling. Potential impacts to fragile soils.
- *Hydrology/Aquatics:* Protection of water quality, fish and aquatic habitat.
- *Economics:* Salvage harvest burnt timber to support the county's local economy and provide jobs.
- *Fuels/Fire:* Increase and accumulation of fuel loading on the forest floor; potential for future fire; future fire suppression challenges.
- *Silviculture:*
    - Newly planted private plantations adjacent to BLM managed lands being placed at risk of loss by present and future BLM land management actions or lack of actions.
    - Increase in the potential risk of high severity fire as live fuels within young managed stands occupy the site.
    - Replanting appropriate diversity of species.
    - Burned trees potentially being susceptible to bug and pest infestation.
- *Invasive species:* Spread of invasive species.
- *Cumulative effects:* Additional post fire projects on Roseburg and Medford districts.

1.8 Alternative options considered but not analyzed in detail

This Environmental Assessment explored and objectively evaluated a range of reasonable alternatives within law, regulations and policy. Through the planning process several

alternatives where explored but eliminated from detailed analysis for various reasons. The interdisciplinary team evaluated approximately 4,800 acres, primarily in moderate to high severely burned forest stands immediately after containment of the Douglas Fire Complex on the Medford BLM District. Alternative 2 and 3 analyze for an economically viable proposal with consideration to environmental effects that meet the purpose and need of the project. An alternative would not be considered if:

- It does not meet the purpose and need;
- Is technically or economically infeasible;
- Is inconsistent with the basic policy or objectives for the management of the area

The following alternatives were considered by the interdisciplinary team, but not analyzed in detail.

1.8.1 NWFP Known Spotted Owl Activity Centers (KSOAC)

Within the approximately 4,800 acres initially evaluated, 346 acres are within nine KSOACs. The actions for management in these KOACs are guided by direction under the Late Successional Reserve (LSR) LUA. Projects in this LUA are to encourage or improve the late successional habitat for northern spotted owl and late successional associated species. A management decision was made to not pursue salvage for economic recovery in this land use allocation. Approximately 346 acres were considered but not analyzed in detail.

1.8.2 Timber Productivity Capability Classification (TPCC) Nonsuitable Woodland areas

Within the approximately 4,800 acres initially evaluated, 93 acres were identified within TPCC withdrawn areas of nonsuitable woodland. Nonsuitable woodlands, which include all landslide prone areas and other unstable soils, are identified as not suitable for timber harvest. Fragile Nonsuitable is a TPCC indicating forest land having fragile conditions, which, if harvested, would result in reduced future productivity; even if special harvest or restrictive measures are applied. It was determined by the project silviculturist that salvage for economic recovery would not be economically viable. A management decision was made not to enter Nonsuitable Woodlands for economic recovery. Approximately 93 acres were considered but not analyzed in detail.

1.8.3 Riparian Reserves (RR)

Within the approximately 4,800 acres initially evaluated, 879 acres were identified within Riparian Reserves LUA. The direction for management is to be consistent with the Aquatic Conservation Strategy objectives. The IDT, in cooperation with National Oceanic and Atmospheric Administration, developed a preliminary strategy to accelerate the attainment of Aquatic Conservation Strategy objectives in the RR. Recovery objectives (in part) for the northern spotted owl were determined to be met in the current habitat conditions within the RR. A management decision was made not to incorporate an accelerated restoration strategy under this project, and therefore not to salvage for economic recovery within RR under this project. A total of 879 acres were considered but not analyzed in detail.

1.8.4 Economic viability (small dbh, low volume/acre)

Within the approximately 4,800 acres initially evaluated, 681 acres were identified within the Matrix LUA and determined not to be economical for harvest. This acreage represents young plantations, small diameter trees, uneconomical access and low volume per acre stands. For these reasons, these acres would not contribute to an economically viable timber sale, and would not meet the purpose and need of the project. Approximately 681 acres were considered but not analyzed in detail.

1.8.5 Northern Spotted Owl (Recovery Action 10 Application)

Within the approximately 4,800 acres initially evaluated, approximately 300 acres of moderate to high severity burned owl habitat were identified within northern spotted owl sites with recent pair occupancy or reproduction. Approximately 815 acres of low to moderate burn severity that would result in high amounts of green tree removal were deferred due to associated adverse effects to NSO. These acres are found within the Matrix and RR LUAs. The GPRA wildlife biologists implemented Recovery Action 10 (USDI FWS 201) by prioritizing sites for protection based on occupancy and reproduction history as well as post-fire habitat conditions. The result of this consideration was a reduction in adverse effects to northern spotted owl (USDI BLM 2014). A total of approximately 1115 acres were considered but not analyzed in detail. Elimination of these acres still provides for an economically viable timber sale, while managing for the northern spotted owl.

1.8.6 Decommissioning of roads/Reducing permanent road network

Approximately 5 miles of roads were initially identified for decommissioning within the Medford BLM managed road system within the Douglas Fire Complex. The purpose and need of the project is to provide for economic recovery. Given the timely degradation of timber value, the IDT did not have time to analyze for this action in the Douglas Fire Complex Recovery project. The BLM plans to analyze this action in future NEPA analysis and documentation. The action to decommission 5 miles of road was considered but not analyzed in detail.

Chapter 2 Alternatives

This chapter describes and compares the alternatives for the Douglas Fire Complex Recovery Project. Alternative 1 is the No Action Alternative. The No Action Alternative serves as a baseline to compare effects of actions within Alternatives 2 and 3. Alternatives 2 and 3 are proposed to meet the Purpose and Need of the project within the multiple use objectives and resource protection measures established by the NWFP/ RMP, ROD 1995. Alternatives 2 and 3 are analyzed in Chapter 3 with consideration to salvage for economic recovery, road safety and fire planning objectives. Detailed maps of Alternative 2 and 3 are provided and found on the Medford BLM planning site at http://www.blm.gov/or/districts/medford/plans/index.php. PDFs associated with Alternatives 2 and 3 have been developed to reduce or avoid potential effects to resources.

2.1 Alternative 1 No Action

Under the No Action Alternative, no salvage of fire-killed or fire-injured trees would occur. Road safety and fire planning actions would not occur. The economic value of the burned timber of merchantable value would not be recovered. No roads or landings would be constructed to facilitate logging operations. Reforestation in the 1,669 acres of Matrix LUA would be more difficult and may not occur in some areas due to the dangers presented to forest workers. The No Action Alternative would not meet the purpose and need of the project.

2.2 Alternative 2

Alternative 2 proposes the harvest and removal of fire-killed or fire-injured trees. For the purpose of this analysis, a fire-killed tree is defined as the tree crown exhibiting 100% scorch with brown needles, or the crown is black with no needles. A fire-injured tree may retain some green needles and the crown may not be entirely scorched. Fire injured trees have incurred cambium damage, bark char, and potentially girdled or partly girdled by fire.

Sale, service, and/or stewardship contracts would include salvage harvest in units and harvest and removal of roadside hazard trees. The salvage harvest would occur on approximately 1,669 acres within the Matrix LUA. Along 14 miles of roads, potential failure zones identified by the OSHA *Field Guide for Danger Tree Identification and Response* equate to 556 acres which are included in the total acres of 1,669. Potential failure zones are areas where there is a high likelihood for hazard trees to fall. Salvage harvesting would not occur in Riparian Reserves, Late Successional Reserves, or 100 acre northern spotted owl activity centers in this project. Table 3 provides a summary of activities proposed in Alternative 2.

Salvage harvest is proposed within areas that sustained moderate to high burn severity. Treatment areas were developed using a combination of post-fire aerial photo analysis, soil and vegetation burn severity models and ground reconnaissance. The BLM consulted the Southwest Oregon Forest Insect and Disease Service Center (SWOFIDSC) to assist in identifying trees with a high probability of mortality. The SWOFIDSC guidelines (SWOFIDSC 2001 and USDA 2014) are based on published research and professional judgment of local forest entomologists. These guidelines are directly incorporated into the silvicultural prescription for this project. Silvicultural prescriptions are the same regardless of the differing objectives: salvage for economic recovery, road safety and/or fire planning. Some live trees would be felled and removed incidentally to facilitate salvage activities. Below is a summary of the silviculture prescription:

- Within stands burned at a mixed severity, fire-killed and fire-injured trees 8 inches diameter breast height (DBH) and greater that exhibit a high probability of mortality would be targeted for salvage. Targeted trees would be based on species specific crown scorch amounts which would result in a 75% probability of mortality.

- Fire-killed hardwoods 8-16 inches DBH may be cut and/or removed for reforestation site preparation. Live or dead standing material < 8 inches DBH could be slashed and/or hand pile burned where they impede establishment of conifers.

- A minimum of 2 dead/dying trees (snags) per acre would be retained on average across each project unit (RMP, p.39). Retained snags would generally be grouped in clusters and would reflect the species mix of the original stand. Emphasis would be placed on retaining the largest snags available (RMP; 39, 47).

- Large wolf trees or trees with heavy branching or poor form would be targeted for retention because they provide habitat for numerous wildlife species. Snags that exhibit a greater chance of remaining on the landscape and surviving future windstorms would also be targeted for retention, where safety allows.

- Non-hazardous older decay class snags (3, 4, and 5) would be retained where available and protected to the greatest extent possible from disturbance. If a retention snag needs to be felled for safety concerns another snag of similar size would be retained in substitution.

- Even spacing of the retention snags is not required and they would generally be clustered in groups of 3 or more. These trees are meant to act as wildlife trees/snags and future coarse woody debris on the harvested areas. The untreated clusters would be selected in a location within the unit to avoid felling the trees to meet federal and Oregon OSHA regulations.

- In Matrix LUA, a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long would be left per the RMP management direction. Where stands are deficient in coarse wood, merchantable material would be used to make up the deficit (RMP, p.39).

- Generally, live trees without a high probability of mortality would be retained. However, some live trees would be felled and extracted for landing construction, road/route construction, and road widening for suitable haul widths. Yarding corridors would minimize going through patches of live trees to reduce the effects to forest stands. However, all potential yarding corridors were factored into the effects to habitat for each unit.

Additional retention in high habitat suitability areas within Critical Habitat (according to the Relative Habitat Suitability (RHS) output from the MaxEnt model), 0.5 mile core areas of spotted owl sites occupied with pairs, and occupied Del Norte salamander talus areas:

- Where available, retain a minimum of 4 dead/dying trees (snags) per acre over 16 inches DBH. Retained trees would reflect the species mix of the original stand and emphasize retention of the largest snags available (RMP, p.39). Large wolf trees or trees with heavy branching or poor form would also be targeted for retention

- All existing down coarse wood would be retained.

Table 3: Proposal Summary of Alternatives 2 and 3

Proposed Activities within the Matrix LUA		**Alternative 2**	**Alternative 3**
Harvest Summary	Road safety and fire planning units within economic recovery harvest units	556	556
	Economic Recovery harvest units	1113	1113
	Total Harvest	**1669**	**1669**
Operations Summary	Ground Based	307	264
	Cable/Skyline	1105	924
	Helicopter	257	481
Road Construction Summary	Temporary Routes	6.59 miles	3.23 miles
	Permanent Road	0.32 miles	0.32 miles
	Maintenance	180.2 miles	180.2 miles

*A detailed description of unit activities within Alternative 2 and 3 is located on the Medford BLM's planning site at http://www.blm.gov/or/districts/medford/plans/index.php.

Removal of trees for harvest would be accomplished using ground based, skyline and helicopter logging systems. To facilitate operations, road construction activities to accommodate salvage harvest would include the following:

Temporary Route Construction
Approximately 5.09 miles of temporary route construction would occur. Temporary routes are not intended to be part of the permanent or designated transportation network system. Temporary routes would be decommissioned after use, which includes subsoiling, installing water bars (where needed), applying seed, mulching and blocking routes.

Temporary Route Reconstruction
Approximately 1.50 miles of temporary route reconstruction would occur. Reconstruction restores an existing route to its original or modified condition. Reconstructed routes would be decomissioned after harvest, which includes subsoiling, installing water bars (where needed), applying seed, mulch and blocking routes.

Permanent Road Construction
Approximately 0.32 miles of permanent road would be constructed. This proposed permanent (33-7-21.04, Segment A) is located on a ridge top and would become part of the BLM's

permanent road infrastructure. The proposed road will be designed per the *BLM Manual 9113-1 Roads Design Handbook (Rel. 9-388).* Cut and fill slopes would be balanced for minimal erosion susceptibility. The road would be shaped, crowned, and constructed with inboard ditch lines where necessary, and have cross drain structures installed for ditch line relief. Road surface would be bladed and compacted per design specifications.

Road Maintenance
Maintenance activities would occur on approximately 180.2 miles of existing roads to keep the road at its original design standard. Typical maintenance may include, but is not limited to: road blading and reshaping; spot rocking & surface replacement; ditch cleaning; cut-bank sluff removal; culvert inlet and outlet clearing; catch basin cleaning; culvert replacement; and removing vegetation along roadsides to improve sight distance for travel.

Project design features identified by the interdisciplinary team to avoid or reduce potential resource effects of Alternative 2 are identified in the EA Section 2.4.

2.3 Alternative 3

Alternative 3 was developed in response to watershed resource concerns. Silvicultural prescriptions and project design features are the same within Alternative 2 and Alternative 3. Alternative 3 proposes more helicopter operations and less road construction to accomplish logging activities, while still meeting the purpose and need of the project. See the Table 3 for actions proposed in Alternative 3. Project design features and Best Management Practices identified by the interdisciplinary team to avoid or reduce potential resource effects of Alternative 2 are identified in the EA, Section 2.4.

2.4 Project Design Features and Best Management Practices

Project Design Features (PDFs) are measures incorporated into the site specific design of the project to eliminate or minimize adverse impacts on the human environment. PDFs are noted by a point (•). Best Management Practices (BMPs) are methods, measures or practices incorporated into the project to meet the requirements of the Clean Water Act of 1967 to reduce nonpoint source pollution to the maximum extent practicable. The BMPs reduce sediment delivery from BLM roads incorporated into the 1995 Resource Management Plan (RMP) through an RMP plan maintenance action in July of 2012. The purpose of applying project BMPs is to minimize or prevent sediment delivery to the waters of the United States. BMPs are noted by an asterisk (*).

2.4.1 Measures Common to All Project Activities

* Any project related activities would be suspended if conditions develop that cause a potential for sediment laden runoff to enter a wetland, floodplain or waters of the state. Exposed soil resulting from project related activities would be covered or otherwise temporarily stabilized. Sediment trapping devices would be properly installed to hydrologically disconnect sites. Operations may resume when sediment control devices are in place and conditions allow turbidity standards to be met.

- Project activities off of existing roads would not occur on Timber Productivity Capability Classification Fragile Non-Suitable Woodlands (F_NW) nor would they occur on other Non-Suitable Woodland categories (RMP, p. 41).

- Seed and straw used for rehabilitation, decommissioning, winterization, covering bare soil, and post treatment throughout the proposed action area would be approved species mixtures and certified weed free to prevent the further spread of noxious weeds. All seeding would be contingent on seed availability.

- To prevent the potential spread of noxious weeds, the operator would be required to clean all logging, construction, chipping, grinding, shredding, rock crushing, and transportation equipment prior to entry on BLM lands. Cleaning shall be defined as removal of dirt, grease, plant parts, and material that may carry noxious weed seeds onto BLM lands. Cleaning prior to entry onto BLM lands may be accomplished by using a pressure hose.

- Prior to initial move-in of any equipment, and all subsequent move-ins, the operator would make the equipment available for BLM inspection at an agreed upon location off federal lands.

- Intermittent seeps and upslope unstable areas would receive a no treatment buffer of one row of overstory trees or a 25 foot radius (whichever is greatest) from the outer edge of instability around these areas for soil stabilization (RMP, p. 154).

- In the Dad's Creek-Cow Creek & Riffle Creek-Cow Creek 12th field subwatershed, where the Equivalent Clearcut Acreage (ECA) threshold is exceeded, no additional open space areas (green tree removal in groups of ¼ acre or more) would occur. Short temporary routes and individual yarding corridors may be constructed on a site-specific basis.

2.4.2 Riparian Reserves

- No ground disturbing harvest activities would occur within Riparian Reserves. For this project area, the Riparian Reserve includes the 200 feet on both sides and above all perennial and intermittent streams, perennial seeps and springs, and around unstable areas located within stream draws. This distance is extended to 400 feet on both sides, and above, all fish streams.

- No fording of intermittent or perennial streams would occur during use of existing roads.

- Expansions of existing landings or construction of new landings would not occur in the Riparian Reserve. Use of existing landings within Riparian Reserves could occur. Additionally landing piles would be constructed outside of RR.

2.4.3 Harvest Operations

- Whole tree yarding may occur where slash depth exceeds 18 inches.

- Coarse woody debris over 8 inches diameter would be placed or felled on contour along Riparian Reserve or Fragile Gradient Non-suitable Woodlands (FGNW) soils interface within timber units. This requirement may be waived by the Authorized Officer if an adjacent area has sufficient ground cover vegetation present to effectively trap sediment, and the understory vegetation and large downed wood present within the harvest unit is still partially intact. Generally, contour felled logs would be oriented

perpendicular to the slope, within 150 feet of the lower margin in a staggered pattern that is at least two rows deep, with enough overlap between logs that at least two logs would be between the action area and the lower boundary at any given point. Space between placed or felled logs would be a minimum of 50 feet. A majority of each log would be required to be in direct contact with the ground.

- Coarse woody debris or properly installed certified weed free straw waddles would be placed above roads which are hydrologically connected by ditch to the stream network. Specifically these sediment barriers would be applied above BLM roads that are below or within the following units: 11-3Aw, 11-3B, 12-4Bw, 14-3A, 13-F, 13-E, 13-1c, 23-3, 3-1a, 9-1a, 11-2a, 11-2b, 17-1, 17-2, 13-2WP, 21-1, 29-3, 29-2B1, 29-2B2, and 29-3C

- With the exceptions of the activities listed below, seasonally restrict all tractor and cable yarding operations to the dry season.

  Dry condition operations could be authorized during the wet season for the following:

  - Helicopter and full suspension cable units

  - Cable units with slopes less than 70%. Wet season yarding in these units would additionally be required to meet the following PDF's:

    - Landings would be required to be at least 150 feet apart.

    - Converging yarding corridors would be minimized to the greatest extent possible. No more than three converging yarding corridors would occur per landing.

    - Install waterbars, and pull slash and/or mulch over yarding corridors enough to cover bare soil to a depth of at least 6 inches and not to exceed 18 inches.

    - Yarding corridor rehabilitation would occur immediately following completion of yarding activities on each corridor (i.e. maximum of two corridors open at a time: one actively yarding and one actively being rehabilitated).

  - Ground-based logging would occur in units when soil moisture at a depth of 4-6 inches is dry enough that a handful of soil will not maintain form when compressed or rolled, and when soil condition at the surface does not allow soil to readily displace or cause ribbons and ruts along equipment tracks. These conditions are generally found when the soil moisture content of the soil is between 20-25%, depending on soil type. Soil moisture content may be determined by soil core samples or a soil moisture meter.

  - Previously yarded logs, decked on landings that are along appropriately protected roads, could still be loaded and hauled during the wet season as long as the dry condition PDF for hauling is met and no sediment is delivered to the stream network. (See Hauling PDFs for a list of conditions that exclude a road from being considered "dry condition").

All other actions would be restricted to the dry season only, including all construction and decommissioning.

- Existing skid trails would be utilized whenever practical. New skid trails would be pre-designated and approved by the Authorized Officer. Skid trails including turning points would be 12 feet width on average.

- Tractors would be equipped with an integral arch to minimize soils disturbance and equipment would walk over as much ground litter as possible to reduce compaction.

- Utilized skid trails would be rehabilitated upon completion of harvest.

- Ground based equipment would be limited to slopes less than 35% and yarding equipment would be limited to designated skids.

- Use of blades while ground based yarding would not occur to minimize soil disturbance.

- At a minimum, one-end suspension would be required on all ground based and cable units to minimize soil disturbance. Full suspension would be required if yarding is needed to cross unstable areas or stream draws.

- In stands where tree tops and limbs have been largely consumed by wildfire and the minimum coarse woody debris requirement of 120 linear feet does not create a layer of material capable of preventing soil displacement as identified by the Authorized Officer, an additional 280 linear feet of coarse woody debris over 8 inches diameter would be retained.

- Lateral yarding would be required on all units to protect residual leave trees and soils. Yarding carriages would be required to maintain a fixed position during lateral yarding to reduce damage to the residual stand.

- Directional falling toward the lead would be required on cable yarded units to minimize damage to residual leave trees.

- The number of cable yarding corridors would be minimized to reduce soil compaction and displacement from cable yarding. Cable yarding corridors would be located approximately 150 feet apart at the tail end.

- Cable yarding lines would be respooled when changing yarding corridors if necessary to protect residual leave trees.

* Prior to the start of the wet season, yarding corridors would be water-barred as per the Medford RMP (p. 167) water bar spacing guidelines to minimize erosion.

* Prior to the start of the wet season, cable yarding corridors, and other areas of exposed soil resulting from this action, would have at least 6 inches of slash, or 2-4 inches of wood chips or certified weed -free straw mulch placed over them to reduce the risk of

surface erosion and to protect water quality. Slash would not exceed a depth of 18 inches, and some ground cover would be left on site during fuels reduction treatments.

2.4.4 Landings

- Seasonally restrict all landing construction and rehabilitation operations to the dry season.

- Landings would be located on stable locations that minimize sediment delivery potential to streams (e.g., ridge tops, stable benches or flats, and gentle-to-moderate convex or planer side-slopes), in areas with low risk for landslides, and outside jurisdictional wetlands. Placement of landings on unstable headwalls would be avoided.

- New landings would not be constructed in green stands over 80 years old, unless the area has already had special status species clearance. Any improvements of existing landings would not remove more than 0.2 acres of green stands over 80 years old

- Landings used during dry conditions within the wet season would have silt fencing or other sediment control measures in place during periods of non-use if they are hydrologically connected to streams, directly or indirectly via ditchlines. Any captured sediment would be disposed of outside of Riparian Reserves.

- Landings, and other areas of exposed soils resulting from this activity, would be winterized by properly installing and/or using water bars, berms, sediment basins, certified weed-free hay bales, wood straw, small dense woody debris, seeding, and/or mulching, as directed by the Authorized Officer.

- All new landing areas would be rehabilitated to reduce soil compaction, minimize sedimentation, and improve site productivity. Landings outside of existing road prisms would additionally be planted with conifers following use.

- During rehabilitation of landings, divert runoff water away from headwalls, slide areas, high landslide hazard locations or steep erodible fill slopes.

- Any remaining debris at the landing sites would be piled and burned, chipped, removed for biomass utilization or made available for firewood.

2.4.5 Hauling and Road Maintenance

- Certain activities (blading of aggregate roads, rocking, brushing, cross drain installation) could occur during the wet season for emergency road maintenance. Non-emergency road maintenance work would occur during the dry season. If these activities occur within 200 feet of streams, sediment control devices would be placed and maintained as necessary to prevent action related stream sedimentation.

- Blading and vegetation removal would be avoided unless necessary to remove drainage impediments when maintaining inboard ditches. Sediment control measures would be evaluated and implemented if necessary, where ditchline blading is required within 200 feet of streams.

- Waste material from road maintenance activities would be placed in stable disposal areas a minimum of 200 feet from any stream and in a location where sediment laden runoff can be confined. Where necessary, erosion control would be provided to minimize sediment delivery to streams.

- All natural surface or rocked routes that are re-opened for harvest operations or log hauling would receive adequate surfacing for winter use (generally 10-12 inches of clean, compacted aggregate), would be gated or blocked prior to the wet season and stabilized in such a way that no future maintenance would be necessary to prevent road damage or stream sedimentation.

- Prior to dry condition hauling during the wet season, structural road treatments would be implemented as needed to prevent discernible stream sedimentation from occurring during off season use, such as: increasing the frequency of cross drains, installing sediment barriers or catch basins, applying gravel lifts or asphalt road surfacing at stream crossing approaches, and cleaning and armoring ditchlines.

- Roads would be bladed and shaped to conserve existing aggregate surface material, and retain or restore the original cross section. Berms and other irregularities that impede effective runoff or cause erosion would be removed. During road improvement activities it would be ensured that surface runoff is directed into vegetated, stable areas to the extent practical.

- When cleaning ditchlines, undercutting of cut-slopes would be avoided. Bare soils would be seeded and mulched including cleaned ditchlines that are hydrologically connected to stream channels. Routine machine cleaning of ditches and blading during the wet season would be avoided.

- Low-growing vegetation on cut-and-fill slopes would be retained (i.e. grasses, ferns).

- Culvert inlets and outlets, drainage structures and ditches would be inspected and maintained before the wet season to diminish the likelihood of plugged culverts and the possibility of washouts.

- Natural surface and rocked haul routes and related ditchlines that could deliver sediment into Oregon Coast Coho and Southern Oregon/Northern California Coasts Coho critical habitat would have sediment barriers (e.g., hay bales, silt fence, settling ponds) installed to prevent sediment from reaching these streams. Specifically these sediment barriers would be applied to BLM roads: 32-8-10.0 (Bear Creek Road), 32-8-24.1 (Riffle Creek Road), 32-8-26.0 (Bonnie Creek Road), 33-7-2.1 (Rattlesnake Creek Road), and 33-7-32.0 (Rock Creek). Sediment barriers would be placed by the purchaser according to specifications and locations outlined by the BLM fish biologist, engineer, and contract administrator. These barriers would be maintained and monitored (Oregon Department of Environmental Quality ODEQ Erosion and Sediment Control Manual 2005) by the purchaser and contract administrator during haul route usage.

- No instream road work would occur within 300 feet of Coho critical habitat.

- Downspouts and/or energy dissipaters would be utilized for drainage outlets where appropriate.

- Flowing water would be diverted around each culvert or cross drain installation site whenever there is sufficient water volume. Diverted water would be returned to the channel immediately downstream of the work site. Effective erosion control measures would be in place at all times during installation. These measures would be removed from the channel within the same calendar year and before September 15th along any fish bearing stream or before the start of the wet season for all other stream types.

2.4.6 Temporary Routes

- Temporary route construction or re-construction, use, and decommissioning would occur during the dry season of a single calendar year. If this is not possible, written justification would be submitted to the Authorized Officer for approval and all winterization activities would be completed prior to the start of the wet season.

- Temporary routes would not be located on or above a headwall or on slopes in excess of 60%.

- Temporary route construction would avoid green trees within 180 year or older stands. In addition, where temporary route construction cannot avoid green trees greater than 80 years old, clearing limits would be limited to the minimum extent possible.

2.4.7 Activity Fuels Treatments

- To help maintain soil productivity and reduce erosion, woody debris from logging would be scattered on yarding corridors, and where possible throughout the unit, on landings, and roads, to a maximum depth of 18 inches. Where slash quantity is such that lop-and-scatter treatment alone would result in an increase in the fire hazard classification, high concentration of slash would be hand-piled and burned outside yarding corridors. Activity slash remaining in units would be lopped-and-scattered, or hand piled and burned based on post-harvest assessment.

- Merchantable sawlogs would be removed from yarded material, and any remaining debris at the landing sites would be slashed and/or hand piled and burned at approved locations, chipped, removed for biomass utilization or made available for firewood. Hand piles would be a maximum of 8 feet in diameter by 8 feet in height and a minimum of 6 feet in diameter and 5 feet in height. Each hand pile would be covered with a large enough piece of 4 mil black plastic to ensure a dry ignition spot (generally 5 feet x 5 feet or large enough to cover 90% of the pile). All four corners and the middle of plastic sheets shall be anchored with slash or other debris. To minimize scorch and mortality, hand piles would not be placed adjacent to or within 10 feet of leave trees or large woody debris.

- Around each landing pile, a minimum 20 foot area on the ground would be cleared of slash, litter, debris and other vegetation. Each landing pile would be covered with at least a 4 mm black plastic to ensure a dry ignition point (generally 10 feet x 10 feet). All 4 corners and the middle of plastic sheets shall be anchored with slash or other debris.

- Landing piles would not be placed within 15 feet of leave trees to minimize scorch and mortality. Landing piles would be as free of dirt as reasonably possible to facilitate desired consumption.

- Piles would be burned in the fall to spring season after one or more inches of precipitation have occurred. Patrol and mop-up of burning piles would occur when needed to prevent treated areas from reburning.

- Large cull logs (greater than 12 inches on the small end) would be left on the site unless quantity is such that an increase in fire hazard classification would result. In this case, cull logs could be removed only as necessary to reduce the fire hazard classification.

- Prescribed fire burn plans would be completed prior to ignition. All prescribed burning would be managed in a manner consistent with the requirements of the Oregon Smoke Management Plan administered by the Oregon Department of Forestry and the regulations established by the Air Quality Division of the Oregon Department of Environmental Quality.

- Fire-killed hardwoods 8 -16 inches DBH may be cut and/or removed for reforestation site preparation. Live or dead standing material < 8 inches DBH could be slashed and/or hand pile and burned where they impede establishment of conifers.

- No more than 12-15 tons per acre of coarse woody debris and slash would be left within units

2.4.8 Hazmat

- Contractors must prepare a Spill Prevention, Control, and Countermeasure Plan for all hazardous substances to be used in the contract area, as directed by the Authorized Officer. Such plan would include identification of Purchaser's representatives responsible for supervising initial containment action for releases and subsequent cleanup. Such plans must comply with the State of Oregon DEQ OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements.

- Hydraulic fluid and fuel lines on heavy mechanized equipment would be in proper working condition to minimize potential for leakage into streams. No re-fueling of chainsaws or heavy equipment would occur within 150 feet of streams, stream crossings or wet areas. Absorbent materials would be required to be onsite to allow for immediate containment of any accidental spills.

- Spilled fuel and oil would be cleaned-up and would be disposed of at an approved disposal site.

- Fire suppression foam would not be used within 150 feet of streams and wetlands.

2.4.9 Northern Spotted Owl (Threatened) and Survey & Manage Wildlife Species

Project Design Criteria included in the Medford District BLM's Douglas Complex Biological Assessment have been applied and incorporated into the design of the Douglas Complex Recovery Project (see below).

- In Relative Habitat Suitability (RHS) units within NSO Critical Habitat: Retain a minimum of 4 snags per acre >16" DBH and all down coarse woody debris as Primary Constituent Element to support prey species for spotted owls (see Table 5 for all increased snag retention units). Retention would occur to the extent possible not compromising public safety and hazardous fuel loading concerns. If retained snags must be felled due to hazard concerns, they would be left on site if retention would not cause safety hazards.

- In the NSO highly viable half mile core areas with reproductive and pair occupied sites: Retain a minimum of 4 snags per acre >16" DBH and all down coarse woody debris to support prey species for spotted owls (see Table 5 for all increased snag retention units). If retained snags must be felled due to hazard concerns, they would be left on site if retention would not cause safety hazards.

Any of the following measures may be waived in a particular year if nesting or reproductive success surveys conducted according to the U.S. Fish and Wildlife Service (USFWS) survey guidelines reveal that spotted owls are non-nesting or that no young are present that year. Waivers are valid only until March 1 of the following year. Previously known well established sites and nesting activity centers are assumed occupied unless protocol surveys indicate otherwise.

- Activities (such as tree felling, yarding, temporary route construction and re-construction, and hauling on roads not generally used by the public, prescribed fire) that produce loud noises above ambient levels would not occur within specified distances (Table 4) of any documented owl site between March 1 and June 30 (or until two weeks after the fledging period) – unless protocol surveys have determined the activity center to be not occupied, non-nesting, or failed in their nesting attempt. The distances may be shortened if significant topographical breaks muffle sound traveling between the work location and nest sites.

- The BLM has the option to extend the restricted season until September 30 during the year of harvest, based on site-specific knowledge (such as a late or recycle nesting attempt) if project would cause a nesting spotted owl to flush (see Table 4 for disturbance distance).

Table 4: Disturbance Distances from Various Activities for northern spotted owls

Activity	Buffer Distance Around NSO Nest Sites
Heavy Equipment (including non-blasting quarry operations)	105 feet
Chain saws	195 feet
Commercial Timber Harvest	0.25 miles
Prescribed fire/Activity fuel burning	0.25 miles
Helicopter Operations (March – June 30)	0.25 miles

In talus occupied with Del Norte salamanders:

- Harvest would occur during the dry season.
- No more than 15% of talus habitat areas within units would be compacted from cable yarding with one-end suspension or fuels activity treatments.
- No tractor yarding would occur.
- No ground disturbance to talus would occur in talus plots less than 1/2 acre in size.
- Directionally fell trees outward and away from talus where possible.
- Within mapped talus management areas, retain a minimum of 4 snags per acre >16" DBH and all down coarse woody debris to provide sources of surface cover objects (see Table 4 for all increased snag retention units). Retention would occur to the extent possible not compromising public safety and hazardous fuel loading concerns. If retained snags must be felled due to hazard concerns, they would be left on site if retention would not cause rolling hazards to public safety.

Table 5: Units with Minimum of four snags per acre

Unit	Resource Reason	Unit	Resource Reason	Unit	Resource Reason
03-1	NSO Core& Del Norte	12-5A	CHU & Del Norte	23-1A	NSO Core
03-2A	CHU	13-1	CHU	23-2A	NSO Core
07-6A	CHU	13-4	Del Norte	23-2B	NSO Core
07-6B	CHU	13-4A	Del Norte	23-2C	NSO Core
07-6C	CHU	13-A	CHU	23-3A	NSO Core
07-6D	CHU	13-A1	CHU	23-3B	NSO Core
07-6E	CHU	13-A2	CHU	23-4	CHU
09-1	Del Norte	13-A3	CHU	23-4A	NSO Core
09-1A	CHU	13-E	CHU	23-4B	NSO Core
09-1C	CHU	13-F	CHU	23-F	CHU
09-1D	Del Norte	15-1	CHU	23-G	CHU
09-4	Del Norte	15-2	CHU	25-6	CHU & Del Norte
09-5A	CHU	15-4	CHU	27-2A	CHU & NSO Core & Del Norte
09-6A	CHU	17-1A	CHU	27-4	CHU
09-8A	CHU	17-2	NSO Core & Del Norte	27-4	CHU
11-2	Del Norte*	21-1	NSO Core	27-5	CHU
11-3A	CHU	21-2	NSO Core	27-5A	CHU
11-3B	CHU	21-3	NSO Core	29-1	NSO Core
11-4	Del Norte	21-4	NSO Core & Del Norte	29-1A	NSO Core
12-1	CHU	21-6	NSO Core	29-2B	NSO Core
12-1A	CHU	21-6A	NSO Core	29-3	NSO Core

Unit	Resource Reason
12-2	CHU
12-3A	CHU
12-3B	CHU

Unit	Resource Reason
23-1	CHU
23-10C	Del Norte
23-A	Del Norte

Unit	Resource Reason
29-3A	NSO Core
29-3C	NSO Core

* Del Norte site covers only a portion of this unit (11-2)

2.4.10 Special Status and Survey & Manage Plant Species

- Bureau Sensitive and Survey and Manage botanical species would be protected by the no treatment buffers to minimize adverse impacts from project activities. Site management requirements are provided in the Botany Species Survey and Site Management section. Minimum buffer size is determined by habitat requirements and existing habitat conditions on a case-by-case basis.

- In mix severity and green areas, project activities would be confined to areas which have current botany surveys, or have been cleared by the project botanist.

- If additional Special Status plant sites are found during implementation, the project botanist would prescribe appropriate measures based on species, proposed treatment, site-specific environmental conditions, and available management recommendations.

- Trees would be directionally felled away from all no-disturbance buffers.

2.4.11 Cultural Resources

- Cultural resource surveys in the Project Planning Area were conducted in accordance with the National Cultural Programmatic Agreement and the Protocol for Managing Cultural Resources on Lands Administered by the BLM in Oregon. Site specific protection measures were applied such as modifying logging systems and strategic placement of roads to reduce ground disturbing impacts to preserve the integrity of cultural resources.

- If cultural resources are discovered during project implementation the project would be redesigned to protect the cultural resource values present, or evaluation or mitigation procedures would be implemented based on recommendations from the BLM Archaeologist with input from federally recognized Tribes, approved from the Field Manager and concurrence from the State Historic Preservation Office.

2.5 Seasonal Restriction Table

Table 6: Summary of Seasonal Restrictions and Operational Periods

Restriction	Resource Concern	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Activities that produce loud noises above ambient levels.	Spotted Owl critical nesting time March 1st through June 30th												
Harvest activities in occupied talus areas	Del Norte salamander – no wet season												
Road building, maintenance, or renovation including culverts	Water quality and sedimentation – no wet season												
Landing construction & rehabilitation	Water quality and sedimentation – no wet season												
Partial suspension cable yarding in units with >70% slope	Water quality and sedimentation – no wet season												
Tractor yarding	Water quality and sedimentation – no wet season												
Hauling	Water quality and sedimentation – dry condition only												
Logging operations	Fire season, ODF regulated use												

Key

- Operations generally allowed.
- Operations restricted, modified or allowed depending on conditions.
- Operations generally restricted

2.6 Summary of Environmental Effects by Alternative

Resource	No Action (Alt 1)	Alt 2	Alt 3
Vegetation	Conifer communities will continue to deteriorate with increased mortality from insect infestations. Hardwood species would become established and regeneration timelines as established by the RMP would not be met (p. 44). This alternative does not meet the purpose and need for sustained yield timber or for addressing safety hazards and wildfire potential (p. 48).	Silvicultural prescriptions would allow for snag removal and increased access for tree planting and natural regeneration of conifer sites into the desire vegetation type per the RMP (p.50). With treatment occurring on 1,669 acres, overhead hazards will be reduced as well as the beetle infestation potential. Snags and coarse woody debris recruitment will continue with 3,114 high severity burn areas not being treated and retention standards on treatment acres to reflect wildlife structural needs (p. 53).	Similar effects as to alternative 2 with 1,669 acres being treated however there would be an increase of 224 acres using helicopter yarding with a corresponding decrease in conventional yarding.
Fire and Fuels	Increasing safety risk to public who travel on the affected road systems. Wildfire crews would have ingress and egress compromised as the area would be deemed unsafe. Increase fire safety risk as high fuel loading would increase as more snags fall. Increased potential for fires spotting and decreased access for fireline construction on future fires (p. 67). This action would not be compliant with RMP for reduction of fuel hazards.	Safety hazards along 14 miles of road would be addressed increasing public and employee safety. With the extraction of snags, surface fuel loading is going to decrease within the units. Activity fuels would be managed to be less than 12-15 tons per acre. (p. 70). One strategic ridgeline would create a future fire break.	The effects to safety are considered the same as under alternative 2
Wildlife (NSO)	Private lands is still expected to continue logging further decreasing suitable habitat. Suitable habitat that burned on federal lands will not be treated which will allow short term conversion into foraging habitat (p. 92) Occupancy is expected to decrease as suitable foraging habitat continues to decrease.	Removal of fire killed trees is expected to adversely affect 13 known spotted owl sites and may reduce site occupancy or reproduction. Additional 25 owl sites are expected to be negatively affected, but occupancy or reproduction is not expected to be reduced.	No measureable difference between Alt 2 and 3 for effects to NSO
Wildlife (Red Tree Voles)		6 RTV sites were found in surveys. PDFs for the project stipulate that placement of routes and landings would avoid nest trees. The removal of trees would occur within the recommended buffer causing increased to exposure to nests, or removal of negligible amount of suitable habitat, but no nests would be removed (p. 111).	No measureable difference between Alt 2 and 3 for RTVs.
Wildlife (Bureau Sensitive /Special Status) –none affected		3 Bureau Sensitive Bat species exist but few have been documented within the planning area. Known habitat features used by the bats (caves, mines) in will be protected. Other habitat includes snags. The net increase in snags from pre-fire condition is expected to remain abundant (p. 112) and well distributed across the landscape (p.113).	No measureable differences between Alt 2 and 3 for Bureau Sensitive Species (Bats).
Soils: Productivity and Compaction	No treatments within the 1,669 acres of fire killed and injury trees. No timber investments would be recovered within the project area. No treatment would lead to gradual increases in nutrient recycling from down wood and branches but would also lead to increase fire risk that	No treatment on 3,114 acres of high severity burn would lead to an increase in woody debris for nutrient cycling. The treatment of 1,669 acres would be on snags beyond what is required for retention. Total compaction would be within the limits allowed by the RMP. The additional	The effects between alt 2 and 3 are similar with a slight decrease in the amount of soil compaction.

	could burn out all the nutrients again (p. 121).	increase in ground debris from treatment would help decrease soil erosion potential	
Soils: Sedimentation and Erosion	Areas that do not have adequate coverage would experience increased rates of surface erosion. Most of these effects would be short term and would end with vegetation re-establishment.	Offsite erosion potential on road use will be diminished with approved BMPs and PDFs. Short term compaction effects on the 26 acres of roadbed for 1-2 years. Action will decrease surface erosion potential with additional slash being generated from the project.	Effects are similar to Alternative 2 however; there is reduced surface road compaction and erosion potential with over 3 fewer miles of temporary route construction.
Hydrology	Areas that do not have adequate coverage would experience increased rates of surface erosion. Where hydrologically connected, there could be increased stream sedimentation. Most of these effects would be short term and would end with vegetation re-establishment.	There will be short term impacts on local water quality. There are no impacts to peak flows or water yield as a result of the project with the implementation of the approved BMPs and PDFs.	Effects are similar to Alternative 2.
Fish	Increased sediment delivery to nearby streams that experienced high and mixed severity fire. Increase risk of debris slide on open surface areas causing further sediment input on fish bearing streams.	No impact is expected with full implementation of approved PDFs and BMPs. No additional sediment delivery into the streams and decreased erosion potential in open areas due to increased slash from project. No treatments are proposed in RR.	Effects are similar to Alternative 2 with no effects expected.
Cultural	Increased risk of potential damage to unknown cultural sites with fire damaged trees having the potential to fall on or around cultural sites. Additional increase in vandalism or looting of cultural sites due to increase exposure with fire damage opening areas.	No impacts are expected with full implementation of approved PDFs and BMPs however there is a slight risk of unknown sites being damaged by equipment. Decommissioning of temporary routes after use could have beneficial effect on preserving any additional cultural sites by limiting access.	Effects are similar to Alternative 2.
Botany	No effects are expected to ESA, Survey and Manage or ISSSSP sensitive plants.	No ESA listed species are present in the project area. Survey and Manage species are present but will not be affected by implementation of approved PDFs and BMPs. Potential for short term, 1-3 years, impact on ISSSP species due to soil displacement from activity.	Effects are similar to Alternative 2.
Noxious Weeds	Noxious weeds are expected to continue to spread on the project landscape.	Short term potential exists for noxious weed spread in the project area but can be minimized by implementation of the approved BMPs and PDFs. Potential for native biodiversity to decline with the spread of noxious weeds.	Effects are similar to Alternative 2.
Recreation and Visual Resource Management	Potential for increase in OHV activity, hunting, and other recreational opportunities with increased open space.	Potential for increase in conflicts for use between recreational users and timber operators. Potential for increase in OHV routes with new temporary route construction.	Effects are similar to Alternative 3

Chapter 3 Environmental Effects

Chapter 3 describes the environmental effects to resources of implementing any of the alternatives. Methodologies, assumptions and scale of analysis for resource are disclosed. A description of the resource pre-fire and existing conditions is provided. Effects of the alternatives are then described based on what is proposed in the No Action Alternative 1, Alternative 2, and Alternative 3. Projects considered for the cumulative effects analysis for each resource can be found in Appendix C.

3.1 Vegetation

3.1.1 Affected Environment

Abiotic Condition

The elevation in the Douglas Complex ranges from 720 feet to 3,900 feet. The nature of the land is that of steep hills (from 0 to 100, average 45% slope), narrow ridge tops, and sharp creek bottoms. Current RR acreage is approximately 11,150 acres. Temperatures range from 0 degrees (F) on mountaintops in January to 110 degrees in the interior valleys in August. Extended summer drought is common. Average annual precipitation varies from near 40 inches per year in the interior eastern valleys to approximately 49 inches per year in the western portions. Approximately 10% of the yearly total precipitation falls from June to September.

Precipitation patterns have an effect on vegetation growth, vigor, and its response to disturbances such as fire. According to NOAA (2014) Medford, Oregon, recorded 0.78 in (20 mm) for the month of January 2014, the 7th driest January in a 103-year record. On the state rank map for the last 12 months, Oregon had the fourth driest February-January on record and, during August 2013-January 2014, its the ninth driest August-January on historical record, adding that "snowpack in California and Oregon has been abysmal so far this season and reservoirs have been in severe decline." From the November 2013 to January 2014 period, Oregon was the third driest state in the 1895-2014 precipitation pattern record (NOAA 2014). These droughty conditions, especially on south facing slopes and lower sites, can have lasting effects on the landscape, causing widespread stress to individual trees and their ability to recover from fire damage.

Pre-Fire Condition

Vegetation Pattern

This section describes the pre-fire condition within the entire fire perimeter and the pre-fire landscape condition. The Douglas Complex is located in the mixed evergreen zone of vegetation (commonly referred to as mixed conifer and hardwood forest) and is generally characterized by an upper layer of conifers and a lower layer of hardwoods (Franklin and Dyrness 1973, 133). Forest management and fire (and lack thereof) have greatly affected historical vegetation patterns. Prior to European settlement the area was characterized by more frequent, low intensity fires in the area, resulting from both lightning and Native American ignitions (USDI 1999b, 11). Active fire exclusion has allowed the area to grow into dense forests. The Grave Creek Watershed Analysis describes the regional history of pre-settlement vegetation condition as follows:

> "The region did not have continuous forests of old growth. Another study indicated that late seral forests comprised 43 to 71 percent of the landscape (Ripple 1994).
>
> . . . The denudation of the landscape by miners and earlier by Native Americans could have resulted in more than 25 percent of the area being in an open condition in the early part of this century" (USDI 1999a, 70-71).

Fire suppression has increased the overall cover of Douglas-fir and tanoak. Douglas-fir is the dominant conifer species in the Douglas Complex with ponderosa pine, sugar pine, and incense cedar often present. Of these species, Douglas-fir is be found in all stand layers (top, middle, and bottom), whereas the latter three species appear far less frequently in the middle layer. Douglas-fir behaves as a drought tolerant pioneer and regeneration occurs on recently disturbed ground (Atzet et al. 1996). Atzet and others (1996) state that the lack of fire in southwest Oregon in the last several decades has enhanced tanoak's competitive status. Atzet and Wheeler (1984; 202, 220) add that "the group of Douglas-fir associations that support tanoak have a dominating silvicultural problem . . . the potential for competition from tanoak is extremely high" and can significantly reduce crop tree growth. Fire suppression has also allowed needles, bark, and limbs of trees to accumulate at tree bases raising the chances for fires to burn more severely and reside longer to kill cambiums and roots. Where fire has been excluded for 50+ years, hardwoods have likely developed large burls that could vigorously resprout after disturbance (Tappeiner et al. 2007, 285). EA Section 3.2 discusses fire and fuels in greater depth including the existing post-fire condition, fire severity, and other effects on vegetation.

White fir appears in lesser amounts and is generally confined to the bottom two layers of stands. Hardwood species of tanoak, California black oak, madrone, and golden chinquapin are likewise confined to the bottom two layers of stands.

Vegetation patterns will differ by slope, aspect, elevation and soils. Lower elevations exhibit more cover in ponderosa pine, California black oak, and white oak; whereas higher elevations and more productive soil types display more tanoak, white fir, and chinquapin.

Vegetation community subseries percentages were collated through GIS and are presented in Table 7. These areas reflect Medford District BLM land within the Douglas Complex. The table shows that dry Douglas-fir forest comprises the vast majority of the vegetation subseries, representing nearly two-thirds of the Medford BLM land within the Douglas Complex. This is followed by dry Tanoak/Douglas-fir bringing the total of dry class vegetation forestland to 90%. The presence of tanoak extends beyond the Tanoak/Douglas-fir-dry vegetation subseries and is widespread throughout the Douglas complex.

Table 7: Vegetation Classes in the Medford BLM Douglas Complex

Vegetation Sub Series	Approximate Acres	Percentage
Douglas-fir dry	11760	61
Douglas-fir moist	1569	8
Dry non-forest	6	0
Jeffrey pine	120	1

Vegetation Sub Series	Approximate Acres	Percentage
Tanoak Douglas-fir dry	4037	21
Western hemlock Coast intermediate NWO	43	0
Western hemlock coastal	562	3
Western hemlock hyperdry	492	3
Western hemlock intermediate	206	1
Wet nonforest	269	1
White fir cool	4	0
White fir intermediate	125	1
White fir warm, moist - low elev	2	0

Insects & Diseases

Bark beetles and woodborers are the two insect groups that have been detected inside and within one mile of the fire area. 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 (Figure 2) 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). Woodborers, particularly the flatheaded fir borer (*Phaenops drummondi*), although less aggressive than bark beetle species, commonly breed in felled trees or those weakened by fire, defoliation, drought, or other types of disturbance.

Figure 2: Mountain pine beetle attack and subsequent woodpecker activity

The flatheaded fir borer is a primary cause of Douglas-fir mortality in southwestern Oregon, including fire-affected hosts (SWOFIDSC 2014). The flatheaded fir borer prefers infesting wounded, diseased, dying, or fire-injured conifer hosts, causing its greatest impacts on Douglas-fir (SWOFIDSC, Shaw et al., 2009, 5), attacking trees in a wide range of diameters. On southwest Oregon sites below 3,500 feet elevation, Douglas-fir is particularly vulnerable. The flatheaded fir borer does not wait for the tree to die, but rather eats the cambium of a live tree which inhibits the tree from producing new phloem, subsequently killing the tree. Shaw and others (2009, 15) state that management recommendations to avoid the detrimental effects of subsequent post-fire insect related damage include removing fire-damaged trees at high risk of attack (i.e. trees with more than 50% crown scorch).

The Southwest Oregon Forest Insect and Disease Service Center (2014) provided the following discussion: the probability that fire-injured trees will be infested by insects varies widely among fires depending on several factors. These include tree ages, site quality, time of year of fire, fire intensity, weather conditions in the years after a fire, and whether or not insect populations are high in stands adjacent to those involved in a fire. It is therefore important to estimate insect population size within the footprint of or adjacent to the Douglas Complex Fire location. Aerial detection surveys are flown annually over the forested areas of Oregon, mapping recent tree mortality and other current year insect, tree disease and abiotic impacts visible from low flying, fixed wing aircraft. These data can indicate the presence and relative annual trend in abundance of insects such as bark beetles, whose killed hosts are detectible due to their faded tree crowns. While not exactly quantitative, such aerial reconnaissance is an important monitoring tool.

The 2012 and 2013 Insect and Disease Aerial Detection Surveys shows no evidence that there were any large bark beetle populations active within the footprint of or within one mile of the perimeter of the Douglas Complex Fire in those years (USDA et al. 2012 & 2013). Some activity was detected affecting small areas or individual trees. These levels are indicative of scattered, low level bark beetle and flatheaded fir borer populations with no concentrated activity (SWOFIDSC 2014).

Figure 3: Impacts of the flatheaded fir borer on Douglas fir

The mountain pine beetle, *Dendroctonus ponderosae*, and the flatheaded fir borer were active at low levels within 1 mile of the fire area prior to the burn (USDA et al. 2012). Even at low levels, Larsson and others (1983) suggest that comparatively few mountain pine beetles are needed to kill low vigor ponderosa pine trees. Flowers and Kanaskie (2007a) add that "the mountain pine beetle (MPB) is the most destructive tree-killing beetle in Oregon." Because it can be difficult to differentiate MPB attacks from those made by western pine beetle

(D. brevicomis) and because both species infest the same pine, some of these aerial survey observations could include western pine beetle. Western pine beetle and flatheaded fir borer are both known to readily infest fire-injured hosts.

On southwest Oregon sites below 3,500 feet elevation and droughty sites, the flatheaded fir borer behaves much more aggressively causing extensive Douglas-fir mortality (Shaw et al., 2009) and often attacking and killing numerous apparently healthy Douglas-firs (SWOFIDSC). When stand densities are high, pine beetles will behave similarly to the flatheaded fir borer in stands on south and east aspects below 3,500 foot elevations (USDA 1998). The average elevation in the Project Area of the Douglas Complex is 2,250 feet, ranging from 720 to 3,900 feet elevation. Percentage of land below 3,500 feet elevation is 95%. Furthermore, Fettig et al. (2007) reported that in Douglas-fir forests, factors contributing to beetle infestation levels consistently include poor growth and high stand density. These conditions exist in stands in the Douglas Complex as indicated by stand exams performed prior to the fire.

Stand Density

Stand exams were performed in March 2013 on nearly 880 acres of BLM land in the Douglas Complex on stands over 40 years of age. Survey crews collected field data to produce reports on species composition, diameter distribution, commercial volume, and stand density, revealing conditions affecting forest health, (e.g. damage to trees, insect and diseases, and mortality). Collected stand data was also used to compute the intensity of competition within a stand expressed as relative density (RD). At higher densities the growth rates of individual trees slow down (Davis and Johnson 1987, 79), therefore tree vigor declines with increasing competition. Drew and Flewelling (1979) identified the zone of imminent competition mortality occurring between 0.55 and 1.0 relative density. A RD of 1.00 means that trees on the site occupy the full growing space with mortality levels equaling stand growth. Briegleb (1952) stated that the optimum densities generally will lie between 0.34 and 0.55 RD. Data indicated that stands had an average RD of 0.56, just above the lower threshold for competition induced mortality. The average stand density condition before the fire was therefore overstocked and within the zone of imminent mortality.

Larsson and others (1983) point out that ponderosa pine vigor decreases as stand density increases and suggest that comparatively few beetles are needed to kill low vigor trees. As a general rule, stands that contain less than 150 square feet of basal area per acre are less prone to pine bark beetle attack. A RD of 0.56 with an average basal area of 216 ft^2/acre indicated that surveyed stands were within imminent competition mortality and were already prone to beetle infestation.

Fire exclusion has allowed increases in stand density to occur. As stand densities increase, so does competition. This correspondingly weakens the vigor of the stand and affects its ability to recover from disturbances. Decreased tree vigor is magnified during periodic drought years when the cumulative effects of years of below average amounts of precipitation cause an interruption of basic functional processes (e.g., photosynthesis, transpiration, respiration, translocation, and assimilation).

Tree senescence, or aging, also plays a role in the condition and vigor of individual trees and their ability to recover from fire damage and resist insect attack. Movement of food, water, and

minerals becomes more difficult as the distance from the roots to the top of the tree increases. The problem is magnified when water becomes a limiting resource in tall trees. Water deficits may cause needle and stem mortality as evidence by dead tops or dead branches and needles in the upper part of the crowns.

Other factors such as the amount of pre-fire understory shrub growth, soil type, precipitation, aspect, crown position in the canopy, topography, root pathogens, and insects also affect tree vigor and its ability to maintain basic functional processes and recover from disturbances. Large numbers of intermediate and suppressed trees are more prone to mortality following fire.

Existing Condition/Affected Environment

The impacted area within the Medford District BLM in this section will be referred to as the Douglas Complex Fire Recovery Planning Area.

Vegetation Pattern

The fire burned with a mixed severity therefore the burn pattern and intensity caused varying impacts to forest vegetation. Many of the cooler draw bottoms experienced relatively less burn severity than upper slope areas throughout the fire complex. Of the fire area, 22% of the land area resulted in > 75% canopy cover mortality, while 77% resulted in 0-25% canopy cover mortality.

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 mortal insect attack. Tree survival will depend on tree size, amount of crown scorch, extent of cambium injury, and proximity to active bark beetle populations. Shrub dominance and competition is expected to be moderate to high for the next 10 to 20 years.

While the remaining green trees with undamaged cones would provide a seed source for the establishment of conifers natural or artificial regeneration from seed is unreliable (Uchytil 1991, Burns and Honkala 1990). The extent of natural seeding can occur up to ¼ mile of a seed tree or stand edge, the great majority of Douglas-fir seeds fall within 330 feet (Burns and Honkala 1990). Studies on the Biscuit and Timbered Rock Fires have shown that post-fire natural regeneration was highly variable in density and strongly dominated by single species (USDA/USDI 2014). Thick-barked large diameter conifers with high canopy base heights and shaded understories may be the most fire resistant components in southwest Oregon. Through management intervention, development of large fire resilient tree structure can be accelerated by many decades as opposed to no treatment that would likely rely on the slower process of natural regeneration. Salvage harvesting would expedite tree planting and ensure that more fire resilient species become established and protected from future fire (Tappeiner et al. 2007; 289, 256). Maintaining control of diversifying conifer species establishment ensures that in addition to survival goals, species diversity goals could be met.

Moderate to high burn severity acres in the Douglas Complex Fire Recovery Planning Area amounted to 5,043 acres. Plantations experienced higher severity than other burn areas, likely

due to lower canopy base heights. In addition, Douglas-fir tends to increase the rate of fuel buildup and fuel drying with its presence in the hot, dry environment of southwest Oregon. Uchytil (1991) describes fire effects to Douglas-fir west of the Cascades (referred to here as "coast Douglas-fir"):

> "Crown fires commonly kill all trees over extensive areas. Hot ground fires that scorch tree crowns and char tree boles kill variable proportions of coast Douglas-fir. Rapidly spreading ground fires tend to inflict more damage to Douglas-fir crowns, while slow spreading ground fires are damaging to the bole and can kill trees through cambial heating. Crown scorching from summer fires is more damaging than late summer or fall fires because more buds are killed. During late summer the buds are set and subsequent-year needles are well protected. Seedlings and saplings are susceptible to and may be killed by even low-intensity ground fires. Seed: Temperatures in excess of 140 degrees F (60 C) are lethal to Douglas-fir seeds. Thus most seeds on the forest floor will be destroyed by fire. Crown fires will kill seeds in green cones; however, green cones are relatively good insulators and are not highly flammable, and fires that burn not excessively hot often only scorch the cones. Seeds can mature in scorched cones on fire-killed trees, and later disperse onto the burned area."

In areas of severe vegetative mortality, the successional pathway of forest stands has been reset to early seral conditions. With early seral conditions, the live tree crown cover is open; dead structural stand components are present; and shrub, forbs, and grass dominance and competition is expected to be moderate to high for the next 10 to 20 years. Some older stands that were previously thinned before the fire escaped the higher severity impacts (Figure 5).

The remaining green trees with undamaged cones would provide a seed source for the establishment of conifers. However, the 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. Germination of Douglas-fir occurs readily on exposed mineral soil. Douglas-fir cannot survive, however, under the dense shade cast by heavy logging slash or competing understory vegetation (Uchytil 1991).

Competition is accentuated on dry sites where shrubs could prevent conifer establishment, even when germinating together (Tappeiner et al. 2007, 288). Tree planting during this stage accelerates the early seral successional process of conifer establishment and ensures a greater diversity of conifer species (USDA/USDI 2014). In southwest Oregon natural regeneration strongly dominated by Douglas-fir is expected at varying densities (USDA/USDI 2014). 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, green trees may be ¼ mile away or more. In areas of severe stand mortality, future silvicultural options have drastically diminished.

Fire damage stimulates new vegetation growth, particularly sprouting. Conifers in southwest Oregon lack the ability to resprout. Hardwoods and shrubs resprout because the hormone flow

keeping their buds dormant stops and triggers immediate sprouting. Tappeiner et al. (2007, 287-288) state that the larger and denser the cover of hardwoods and shrubs before the fire, the more likely they would quickly recolonize a dense cover afterward. Hardwoods such as tanoak (*Lithocarpus densiflorus)*, Pacific madrone (*Arbutus menziesii*), canyon live oak (*Quercus chrysolepis)*, and golden chinquapin (*Castanopsis chrysophylla*) are prolific sprouters when their tops are killed by fire.

Atzet and Wheeler (1984, 216) also caution that "Tanoak can be a very serious competitor with the crop trees. Its seriousness will be directly proportional to the amount present before." Tanoak sprouting is evident where their tops were killed by the fire. They have the potential of dominating the site in the first few years if not managed and can cause significant delays in conifer establishment. Niemiec and others (1995) state that tanoak sprouts vigorously after fire and often dominates large areas. The ability of tanoak to resprout after fire and grow rapidly the first few years after top-kill gives it an additional competitive edge over its associates (Fryer 2008). This is a primary concern on matrix lands where these lands are specifically designated as commercial base forest land for sustained yield management and continuous timber production. In the first few years following fire, tanoak sprouting usually overtops conifer seedlings, can reach densities of tens of thousands of stems per acre, form extensive stands, and in Douglas-fir-tanoak-Pacific madrone forests, reach heights of 12 feet, only overtopped by conifers decades later (Fryer 2008). Similarly, Niemiec and others (1995) state that tanoak is a very tolerant, persistent, and versatile species that occupies any crown position and is "capable of maintaining a substantial component at any successional stage in many forest types." A top-killing disturbance event on established tanoak would result in its heavy resprouting which can hinder conifer development for the next several decades. Its presence impedes efforts to meet conifer regeneration targets and timeframes.

Pacific madrone is also known for its aggressive resprouting ability. Niemic and others (1995) provide the following discussion:

> "Most reproduction of Pacific madrone arises from sprouts after fire or cutting. Death of the main stem stimulates profuse sprouting (up to 300 sprouts per parent), which originate from dormant buds near the root collar. These sprouts provide reliable regeneration and have rapid growth potential, which is due to carbohydrate reserves and soil access provided by pre-existing roots. Sprouts may grow as much as 5 ft in height the first year and attain an average height of 10 ft after 3 years."

Golden chinquapin and canyon live oak are most competitive and persistent on droughty sites. Both species will vigorously resprout at high densities after fire.

Insects & Diseases

Disturbances on established forest stands invite secondary disturbance agents. Fire-injured trees are at greater risk of damage or mortality from bark beetles or borers because these trees lack the ability or have a reduced ability to produce defensive compounds to resist attack.

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 much as four or five). 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.

Wood borers and ambrosia beetles are early players in the ecological processes of decomposition and nutrient recycling: "they can severely degrade the quality and value of wood intended for our use by creating tunnels and introducing staining and decay fungi" (SWOFIDSC 2014). Infestation of severely burned trees by woodborer species, as well as by ambrosia beetles is already in progress. The actions of these insects are part of the normal decomposition process that is primarily mediated by decay fungi. Other than the flatheaded fir borer, other woodborers and ambrosia beetles are not known to kill trees, depending instead upon dying and dead trees for habitat. However, the value of salvaged timber infested by these organisms declines significantly as their feeding continues.

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 most often in heavy blowdown of mature trees, and are seldom an issue at elevations less than 3,000 feet in southwest Oregon. The fir engraver can cause patch, branch or topkill 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 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. According to the 2012 Aerial Insect and Disease Survey, the mountain pine beetle, western pine beetle, and flatheaded fir borer insects were active in eight different sections within the fire area and active at low levels in two different sections within ½ mile of the fire area prior to the burn (USDA et al. 2012).

It is also possible that the very dry spring through fall last year may have stressed those firs sufficiently to induce fir engraver attack (SWOFIDSC 2014). On February 5, 2014, Roseburg Forest Products landowners reported rapid degradation of small sawlogs and poles from fir engraver infestations on their land. Western pine beetle is also more successful and active in killing hosts during years with below normal precipitation; it is known to be attracted to fire-affected trees and will be an important species to monitor (SWOFIDSC 2014). The only area where trees were killed in 2012 and 2013 and attributed to the same agent is sugar pine killed by mountain pine beetle in the area between the Rabbit Mountain and Dad's Creek fire footprints, southwest of Cow Creek and northwest of Puller Creek. Unlike with western pine beetle, fires are not known to induce mountain pine beetle population increases. Existing populations, however, have been known to attack pines with moderate levels of fire injury, especially sugar pine (SWOFIDSC 2014). There was also some western pine beetle activity in that area in 2013 which may warrant some attention here and in nearby fire-affected areas.

Port-Orford cedar (POC), a geographically limited and valuable tree species, has suffered high mortality from the pathogen *Phytophthora lateralis* for many years. The movement of people,

animals, and particularly vehicles, through infested areas, can spread the disease. Mitigation measures are outlined in a 2004 POC Management Plan and are incorporated into this project. Review of sites proposed for treatments for the risk of spread of the disease would be conducted as a standard operational practice with results found in the project record.

Snags and Coarse Woody Debris
The wildfire created an abundance of snags across the Douglas Complex Fire Recovery Planning Area. The wildfire has created an abundance of snags that provide cavity nesting habitat for a variety of wildlife. Snags also provide a large accumulation of fuel for secondary fires in the future. Moreover, snags pose a safety hazard to humans. Snag fall and fragmentation has occurred during and immediately after the fire event was declared controlled. It is also continually occurring as tree and branch failure and in the months following the fire and will continue to occur in subsequent years unless intervening management action reduces the densities.

Coarse woody debris provides habitat for wildlife, invertebrate, microbial, and fungal species, as well as important ecological functions such as moisture retention, soil stabilization, and nutrient recycling. The amount and decay class of woody debris reflects the stage of stand development. In a natural cycle, two stages (stand initiation and old growth) typically have the greatest amounts of coarse woody debris.

3.1.2 Alternative 1 – No Action

Direct and Indirect Effects
Vegetation Pattern

Of BLM land that experienced moderate to high severity, approximately 3,500 acres of moderate to high severity forestland not receive treatment under this project regardless of what alternative is chosen.

Timber investments would not be recovered when salvage of mortality and anticipated mortality fails to occur. Commercial timber species have been cultivated on Medford District BLM land for decades with the intent of providing a sustainable growth and yield of forest products. Recovering lost timber investments would not occur in Alternative 1, but rather allowed to deteriorate as foregone investments. Mortality from fire is not confined to the immediate impact of the burn. Tree survival will depend on tree size, amount of crown scorch, extent of cambium injury, and proximity to active insect populations. The more host material is left for insects, the greater the likelihood that insect populations would build and spread to live green trees.

Resources previously used by the dead tree are reallocated to new or surviving vegetation. Fryer (2008) provides the following observations:

> "…without management intervention, hardwoods and shrubs in general—and tanoak in particular—are likely to dominate postfire succession for decades in areas where conifer seed sources were greatly reduced by wildfire, especially if reburns occur before early-seral conifers become large enough to resist fire damage."

Tree planting, monitoring, and follow-up treatments may not occur due to overhead dangers posed by large numbers of snags. Manual regeneration treatments would more likely occur on sites where overstory snags are removed. Where overhead hazards are not reduced, tree planting would become far less effective, unsafe for tree planters, or may not occur at all. If it occurs among burned areas, tree planting effectiveness then diminishes and planting sites remain hazardous to tree planters and forest workers.

Because the likelihood of tree planting diminishes with Alternative 1, no action would likely see a higher proportion of hardwoods and shrubs, particularly tanoak where it occurred prior to the fire, than conifers, especially drought and fire resistant conifer species. The prompt establishment of desired species to assure that regeneration targets and timeframes are met (RMP 1995, p. 184) diminishes as well. A no action scenario allows nature to take its course, which runs the risk of delaying or not achieving long term sustained growth and yield objectives as well as meeting species diversity goals.

Natural regeneration of conifers would consist predominantly of Douglas-fir whereas, planted seedlings would provide for greater diversity of conifer species (USDA/USDI 2014). Because fires facilitate the rapid establishment of hardwoods and shrubs, particularly tanoak, timely management in the first 1-2 post-fire years is critical in the future outcome of the forest. Alternative 1 would make each post-fire year increasingly difficult to regenerate with a diversity of conifer species to assure that regeneration targets and timeframes are met so that in addition to survival goals, species diversity goals could be met per RMP direction (RMP, 184).

On the driest sites and lowest elevations, full site occupancy may occur prior to conifer establishment due to moisture and nutrient limitations. In the no treatment scenario the long term effects of conifer establishment and growth would be evident within 10 years as a result of limitations to growing space from competing undesirable vegetation. Early post-fire vegetation would establish and dominate the site early as these initial stronger competitors exploit nutrients and soil moisture.

Figure 4: Post-fire shrub vegetation in the Klamath-Siskiyou Ecoregion, Southern Oregon. Sourch: Hibbs and Jacobs 2011.

When it comes to regenerating post-fire conifer sites in southwest Oregon, Fryer (2008) states that "the time and energy required to shift the dominance in favor of the crop tree species increases significantly with delays." ." The first few post-fire years are critical to the outcome of a recovering site. In a no treatment scenario, natural establishment of conifer germinants may occur if a seed source is available. However, conifer ingrowth is neither predictable nor reliable to meet stocking objectives or ensure that regeneration standards and species composition are met. 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 ¼ of a mile (USDA/USDI 2014). The study also found limited post-fire establishment of fire resilient conifers. Short term effects of no treatment would result in increased competition of desired species with colonizing and resprouting of hardwoods and shrubs. Relying on natural regeneration "results in the loss of the ability to use genetically-selected stock and the potential for delayed regeneration due to the unpredictability of seedfall" (RMP 1995, 184). Fire resilient ponderosa pine only produce large seed crops every 4-8 years; during off-years competing vegetation can inhibit their establishment (Tappeiner et al. 2007, 283). Delays would therefore forestall the establishment of desirable species in a timely manner that meets regeneration targets and timeframes. Maintaining conifer productivity among competing shrubs and hardwoods becomes more difficult and costly with delays in salvage logging and site preparation - the longer the wait, the greater the cost. The effect of Alternative 1 would thereby inhibit the ability to expedite harvesting of fire-killed and fire-injured trees while the product remains viable. Alternative 1 also inhibits the ability to safely expedite tree planting to successfully establish, maintain, and monitor forestland to meet long term sustained timber productivity objectives.

Insects & Diseases

Aerial detection surveys in 2012 and 2013 show scattered, low level bark beetle and flatheaded fir borer populations with no concentrated activity. This indicates no evidence of large bark beetle populations active within the footprint area or within a mile of the fire perimeter in 2012 and 2013 (SWOFIDSC 2014). Although large scale outbreaks are not anticipated, the very dry spring through fall of 2013 may have stressed those firs and pine sufficiently to induce insect attack from fir engraver and western pine beetle detected within one mile around the Douglas Complex Fire perimeter. "Western pine beetle is more successful and active killing hosts during years with below normal precipitation, as are many other bark beetles, especially fir engraver. Western pine beetle is known to be attracted to fire-affected trees and will be an important species to monitor" (SWOFIDSC 2014).

Most of the insect activity in fire-affected areas occurs during the first three years following the fire, most of it within the first year or two. As previously noted, Shaw and others (2009, 15) state that management recommendations to avoid the detrimental effects of subsequent post-fire insect related damage include removing fire-damaged trees at high risk of attack (ie. trees with more than 50% crown scorch). Leaving all fire-damaged trees greater than 50% crown scorch would likely invite insect attacks that could then spread to trees not damaged by the fire. This could result in additional tree mortality within and beyond the fire perimeter that wasn't the direct result of the fire itself. The SWOFIDSC (2014) add that extant populations have been known to attack pines with moderate levels of fire injury, especially sugar pine. Western pine beetle activity in 2013 warrants some attention in these nearby fire-affected. Wood borers and bark beetles would be active within the first year of the fire containment with wood decay evident within two years. Alternative 1 would leave all host material for attracting insect

infestations. This increases the likelihood of insects infesting and killing additional 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 the No Action Alternative.

Snags and Coarse Woody Debris

The Medford District RMP (1995, 40) recognizes the need to retain snags at levels sufficient to support wildlife population levels. The Medford District RMP (1995, 44) identifies a need to provide a renewable supply of large down logs well distributed across in a manner that meets the needs of species and provides for ecological functions. Not treating the fire area would leave all fire-killed and fire-injured trees. The Medford District BLM land of the Douglas Complex exhibited 5,043 acres of moderate to high severity fire. 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 10 years or more following the fire. Most twigs and branches would be absent after 5 years, with large limbs beginning to fall after 8 to 10 years. Smaller trees would decline more rapidly with breakage occurring within the first 3 to 4 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 will also fuel the intensity of future fires. While it is recognized that silviculturally, some standing snags can favor the regeneration of some species by reducing wind, temperature and humidity extremes, excessive standing dead and down material, however, greatly reduces forest productivity from secondary burning of dry logs on the forest floor several years after a fire (Oliver and Larson 1996, 107).

Fire-killed trees would contribute to snags and coarse woody debris amounts and would provide habitat for wildlife, invertebrate, microbial, insect predator, and fungal species. Post-fire studies in Oregon have demonstrated that while fires provide a huge volume of snags, post-fire snag fall and fragmentation 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 widespread retention of snags under Alternative 1 would impede safe and effective tree planting, monitoring of planting success, 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 planting sites, pose safety hazards to tree planters, and increase susceptibility of the stand to future severe fires (Tappeiner et al. 2007; 289, 256). Oliver and Larson (1996, 106) state that overstory and understory stems killed, but not consumed by the fire remain as standing, dry, combustible fuels for another fire and greatly reduce forest productivity.

A no treatment scenario would retain excessive snags and subsequent windfall of dying trees into the future. Snag fall and fragmentation could destroy emerging regeneration and would increase fuel loads. Peterson et al. (2009) suggest that without treatment or removal of post-fire deadwood density, “high fuel loads may complicate the reintroduction of low-severity fire to the recovering forest.” Physical damage from insects can kill trees, which can then provide fuel for the next wildfire. Trees may remain standing for the first two decades, but will eventually fall to the forest floor. The heavy fuel loading would increase fire intensities during any subsequent

wildfire events and consume trees that have established. When trees are killed, dead needles, twigs, limbs, tops, and eventually boles fall to the forest floor. This accumulation of both fine and large fuels increases the fire hazard in both the short and the long term (Peterson et al. 2009). The retention of all snags and CWD fuels under Alternative 1 causes an increased risk of secondary burns. No action would contribute to more intense burning conditions, complicating firefighting efforts. Secondary burns would greatly reduce long term forest productivity.

Summary

Alternative 1 does not meet the Purpose and Need to provide a sustained yield of timber and to address safety hazards and future wildland fire potential (Section 1.4). Medford District Resource Management Plan matrix land use allocation objectives of producing a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability (RMP 1995, p. 38). It also fails to meet the timber resource objectives of providing for salvage harvest of timber killed or damaged by events such as wildfire (RMP 1995, p. 72).

Salvage harvest is utilized primarily to recover mortality and anticipated mortality and to prepare these now inadequately stocked areas for safe tree planting. Under Alternative 1, the District would forgo recovering timber investments and economic recovery. It would also forgo safe access to work sites to safely implement and monitor tree planting, limit abilities to control future fire hazard, provide initial control of the site to channel resources to desired vegetation, adversely influence the plant community that redevelops on the site, and ensure the retention of site productivity (RMP 1995, p. 183). Because the likelihood of tree planting diminishes under Alternative 1, the prompt establishment of desired species to assure that regeneration targets and timeframes are met (RMP 1995, p. 184) diminishes as well. A no action scenario allows nature to take its course, which runs the risk of delaying or not achieving sustained growth and yield objectives as well as objectives to grow large fire resistant long term woody structure for future wildlife components.

Without recovering deadwood densities, tree planting becomes far less effective, unsafe for tree planters, or may not occur at all. Short term effects of no treatment would result in increased competition of desired species with colonizing and resprouting of hardwoods and shrubs. The first few post-fire years are critical to the outcome of a recovering site. In a no treatment scenario, natural establishment of conifer germinants may occur if a seed source is available. However, conifer ingrowth is neither predictable nor reliable to meet stocking objectives and to assure that regeneration standards and species composition are met. A recent study in southwest Oregon showed that a marked decrease in abundance and stocking occurred at distances from a seed source greater than ¼ of a mile (USDA/USDI 2014). Limited conifer establishment is expected where hardwoods and shrubs, particularly aggressive tanoak, pioneer the post-fire site. The likelihood of tree planting diminishes where harvest doesn’t occur as a site preparation treatment. Long term effects of no treatment include increasing the flammability of the fire-affected area due to large fuel accumulations from fallen trees. Secondary burns would be more intense, causing damage to the soil component, and greatly reducing site productivity. Another long term effect comes from insect damage, whose populations can build, spreading into green trees. Moreover, recovering the economic loss of timber investments would be foregone.

Another long term effect of Alternative 1 would be the risk of decreasing site productivity. Alternative 1 would result in an increase in the flammability of the fire-affected area due to large

fuel accumulations from fire-killed and fire-injured trees. This deviates from the Purpose and Need of reducing fuel loading. Because Alternative 1 would limit abilities to control future fire hazard, secondary burns would be more intense, causing damage to the soil component, and greatly reducing site productivity.

Cumulative Effects: No Action

Cumulative effects to vegetation are considered within the spatial and temporal scale of this analysis as described as the Planning Area. Current or foreseeable projects that have effects to vegetation in the Planning Area are as follows: Fire Resiliency Project, Rueben Hazardous Fuels Reduction Project, ESR Projects, Regon Thin, McKnabe Timber Sale, Young Stand Management Project, Boney Skull, Discretionary and Non-discretional road safety actions and the Wolf Pup Project. A description of these activities within these referred to projects is found in Appendix C.

In these projects mentioned above, 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) resiliency at multiple scales. Improvements in stand and landscape scale resiliency to fire, climate change, and disturbance processes would likely occur with density reduction. In commercial thin units treated before the fire, the most vigorous, largest, and dominant trees were the selected leave trees. This occurred in the Wolf Pup Project (Figure 5). Their post-fire survival provides an overstory seed source that could aid in regenerating the site. In the Wolf Pup Project, post-fire green trees within the sale are being harvested. Parts of the Wolf Pup Project that incurred moderate to high severity mortality are being analyzed under Douglas Fire Recovery. Future federal timber sale projects may also be considered at a later date if stand conditions warrant treatment.

The No Action Alternative would not beneficially contribute cumulatively to other vegetation projects providing for a sustainable yield of timber in this analysis area. There would be an adverse effect cumulatively of not meeting reforestation objectives in the RMP in the Planning Area.

Figure 5: Wolf Pup Timber Sale thinning unit received little to no crown scorch from the Douglas Complex

Ongoing salvage projects are expected on 17,167 acres of private forest industrial land within the Douglas Complex. On these lands, harvest activities are generally removing the majority of the trees even in low severity fire areas. These commercially managed stands would follow Oregon State Forest Practices in leaving large snags, large hardwoods, and large coarse woody debris elements. There are also 320 acres of ODF land that would likely see post-fire recovery treatments applied. State lands typically leave the same required elements detailed in Oregon Forest Practices except in high priority spotted owl sites where an elevated number of snags and all coarse woody debris would likely remain.

3.1.3 Alternative 2

Direct and Indirect Effects

Vegetation Pattern

The silviculture prescription includes:

- Snags: Retain minimum of 2 snags per acre, ≥ 16 inches DBH
- Coarse Woody Debris (CWD): Retain a minimum of 120 linear feet (16” x 16’) per acre in decay classes 1 and 2. Where this management direction cannot be met with existing CWD, merchantable material would be used to make up the deficit.

Silviculture prescription specific to Critical Owl Habitat (CHU) and relative high suitability (RHS) areas , high priority owl sites, & occupied Del Norte talus:

- Snags: Retain minimum of 4 snags per acre ≥ 16 inches DBH
- Retain all CWD. Where 120 linear feet of CWD does not exist, merchantable material would be used to make up the deficit.

Removal of trees would be accomplished using conventional and helicopter logging systems. To facilitate operations, 6.59 miles of temporary route and 0.32 miles of permanent road are proposed. The effect of these road activities on insect populations and insect-related tree mortality is expected to be negligible.

Site preparation to prepare inadequately stocked areas for regeneration are used to provide physical access to planting sites, control fire hazard, provide initial physical control of the site to channel limited resources on the site into desired vegetation, influence the plant community that redevelops on the site and ensure the retention of site productivity (RMP 1995, p. 183).

Salvage of fire-killed or damaged trees would reduce the potential for severe fire in the new forest as well as improve access for tree planting (Tappeiner et al. 2007, 256). Alternative 2 would have a short term increase of fine fuels deposited on the forest floor resulting in an immediate increase in fire hazard until activity fuels are treated. Activity fuels treatments are proposed that would reduce this immediate deposition of fuels as described in Section 2.4.7. Activity fuels treatments would reduce the risk of secondary burning of the forest floor. Reducing snags and activity fuels would avoid complications in suppressing secondary burns. The emerging forest would be better protected from secondary burns, thereby maintaining or improving long term forest productivity.

In Alternative 2, mortality and anticipated mortality of timber would be recovered, reducing large fuels for the long term. On lands impacted by moderate to high burn severity, fire-killed and fire-injured trees in excess of those needed to meet snag and coarse woody debris requirements would be salvaged. This reduction of large, long term fuels would provide greater assurances in recovering long term forest productivity following fire. Fire-injured trees with green foliage may be removed if there is a high probability of mortality or potential of insect infestation within the next four years (SWOFIDSC 2001, USDA 2014).

The prescription leaves trees with a low probability of mortality (where trees do not meet the crown scorch guidelines that signify ≥ 75% probability of mortality). In these areas, live canopy closure would vary between 0 to 40 percent. Retained overstory trees, snags, and down logs would provide for structural and biological legacies (Franklin 1992; Hansen et al. 1991; Hunter 1995) necessary to maintain ecosystem processes throughout the management cycle (RMP 1995, p. 188).

Thick-barked large diameter conifers with high canopy base heights and shaded understories may be the most fire resistant components in southwest Oregon. Through management intervention, development of large fire resilient tree structure can be accelerated by many decades as opposed to no treatment that would likely rely on the slower process of natural regeneration. Salvage harvesting would expedite tree planting and ensure that more fire resilient species become established and protected from future fire (Tappeiner et al. 2007; 289, 256). Maintaining control of diversifying conifer species establishment ensures “that in addition to survival goals, species diversity goals could be met” (RMP 1995, p. 184).

Slashing may be necessary to reduce density of hardwood and brush competition as a site preparation prior to tree planting. This would occur only in units with > 40% competition ground cover, leaving live hardwoods over 8” DBH for biological and species diversity (RMP

1995; p. 75, p. 188). Post-fire studies have shown that cutting of competing vegetation did not result in the loss of those shrub species from the sites or decrease the diversity of the developing plant communities (USDA/USDI 2014). Following salvage of the fire area, logging slash would be evaluated for treatment (lopping and scattering, or hand piling and burning) to minimize activity fuels. This would expedite tree planting and help to ensure that drought tolerant and fire resilient conifer species are represented on the landscape as well as ensuring that long term site productivity is sustained in a timely manner. Atzet and Wheeler (1984, 202-203) caution that it is extremely important to establish crop tree species immediately after harvest to reduce losses in yield, especially in sites where tanoak cover was present before the fire.

The actions proposed under Alternative 2 would prepare 1,669 treatment acres for tree planting and associated monitoring through the future. Under Alternative 2, overhead hazards would be reduced, tree planting would be safely expedited and effective, and is more likely to occur than under Alternative 1. The actions under Alternative 2 would likely see a reduction in the proportion of hardwoods and shrubs to conifers and would likely see a higher number of drought and fire resilient conifers than under Alternative 1. The prompt establishment of desired species to assure that regeneration targets and timeframes are met (RMP 1995, p. 184) is more likely to occur in Alternative 2. Also, the likelihood of safe, successful, and timely reforestation of desirable species improves on areas that are treated under Alternative 2.

Alternative 2 would protect 1,669 treatment acres from secondary burns by reducing both activity fuels and snags. Alternative 2 helps to ensure that long term forest productivity is recovered, maintained, improved, and/or sustained. Alternative 2 would assist land managers in quickly regenerating the site, acquiring initial control of the site to channel resources to desired vegetation, influence the plant community that redevelops on the site, and ensure the retention of long term site productivity (RMP 1995, p. 183).

Delays in salvage logging produce impacts that extend well into the future and affect the future structure and composition of the forest. Fire-killed trees will lose more than 40% of their value after two years. Delays in salvage logging would also delay plans for tree planting. Delays would allow undesirable competing vegetation to quickly establish. This is particularly concerning on sites occupied by tanoak as their sprouting becomes an immediate impediment after fire to conifer growth and productivity and hinders cultivation of commercial conifer species. Maintaining conifer productivity among competing shrubs and hardwoods becomes more difficult and costly with delays in salvage logging and site preparation - the longer the wait, the greater the cost.

Insects & Diseases

Salvage of fire-injured trees on matrix lands would reduce but not eliminate the potential for the build-up of insect populations. With the reduced amount of breeding habitat, there would be a corresponding reduction of insects and potential for green tree mortality in areas salvaged prior to beetle emergence. In other areas, such as riparian reserves, nest patches, and 100 acre northern spotted owl activity centers where no treatment is proposed, insect populations are expected to increase. With the increased amount of wood borers, the BLM expects mortality of large, healthy Douglas-fir trees within untreated lands in the fire area and on adjacent lands outside of the fire area.

Alternative 2 defers from treating 879 acres of riparian reserves, 346 acres within nine KSOACs, approximately 1,115 acres to avoid adverse effects to NSO, 93 acres of Nonsuitable woodland, and 681 acres of low sawlog volume areas. In addition, treated units retain snag and coarse woody debris prescribed in Alternative 2. This leaves a substantial amount of host material on 3,114 acres for insects to infest and breed in. Infestations may not be ameliorated, but rather, their detrimental effects may be reduced by removing host material in 1,669 acres of land proposed for treatment in Alternative 2. Because fire induces secondary destructive agents of insects, mortality in residual and adjacent green trees may still occur and last for several years following the fire (Peterson et al. 2009).

Infestation of severely burned trees by woodborer species in the insect families Cerambycidae and Buprestidae, as well as by ambrosia beetles (Family Curculionidae, subfamily Scolytinae) is already in progress. The actions of these insects are part of the normal decomposition process that is primarily mediated by decay fungi. Other than the flatheaded fir borer, other woodborers and ambrosia beetles are not known to kill trees, depending instead upon dying and dead trees for habitat. However, the value of salvaged timber infested by these organisms declines significantly as their feeding continues.

Snags and Coarse Woody Debris

The Medford District RMP (RMP 1995) standards and guidelines require that, over time, one to two snags per acre will be present to meet the requirement for cavity nesting birds at 40 percent of potential population levels. Snags that provide large accumulation of fuel for secondary fires in the future and pose a safety hazard to humans would be reduced on 1,669 acres. Snag fall and fragmentation will continue to occur on 3,114 acres of harvest-deferred land as well as in snag retention areas of treatment units. Snags and future sources of snags would be left at a minimum rate of 2 trees per acre at least 16 inches in diameter, where available. During salvage operations additional standing trees would be reserved to meet the target levels of wildlife structural features. Additional retention would occur on identified CHU land, within ½ mile northern spotted owl cores, high priority owl sites, and occupied Del Norte talus sites to provide additional wildlife structure. In salvage areas, at least 120 linear feet of decay class 1 and 2 logs per acre greater than or equal to 16 inches in diameter and 16 feet long would be left and where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit (RMP 1995; 39, 44, 73).

Alternative 2 lowers the density of dead and dying trees. The average size of dead trees would increase due to the emphasis on retention of the largest snags available to provide the unique structure and functions associated with these large old trees (RMP 1995; 39, 47, 75). The silvicultural design aims to intermix patches of untreated forest within the salvaged areas. Retaining large diameter snags in clumps serves to maintain habitat for cavity nesting birds as a management goal (RMP1995, 40; Russell et al. 2006).

<u>Cumulative Effects</u>

The cumulative activities in the projects considered for this analysis are disclosed in the Alternative 1 No Action cumulative effects section. Impacts to vegetation are confined with the Douglas Complex Recovery Planning Area. Alternative 2 is expected to have a beneficial cumulative effect when considering other projects within the spatial and temporal scales of analysis. These projects include the following: Fire Resiliency Project, Rueben Hazardous Fuels

Reduction Project, ESR Projects, Young Stand Management Project, Skull Creek, Discretionary and Non-discretional road safety actions and the Wolf Pup Project. Actions in Alternative 2 are expected to have measurable beneficial cumulative impacts because site specific project design features would maintain long term forest productivity for the establishment and growth of vegetation, namely commercial conifer species, which would be expedited under this Alternative. Timber investments would generally be recovered by Alternative 2 actions. These actions would also function to expedite safe and effective tree planting operations and future monitoring for conifer establishment. Alternative 2 also reduces fuels to decrease the intensity and severity of future fires within the project. Both short and long term regeneration targets and timeframes are more likely to be met. Coarse woody debris would be provided in a manner that meets the needs of species and provides for ecological functions per RMP requirements and snag retention would emphasize the largest trees available to ensure their longevity and to provide the unique structure and functions associated with these large old trees (USDI 1995, 39). Large insect infestations are not expected and the reduction of host material for the insects would limit the potential damage and prolong the standing retention of snags.

3.1.4 Alternative 3

Direct and Indirect Effects

Alternative 3 is similar to Alternative 2. Public comments identified concerns with watershed resources. Development of this alternative was to accommodate those concerns and provide the decision maker with comparable effects with respect to ground disturbing activities. The Direct and Indirect Effects of Alternative 3 would be the same as Alternative 2 (Table 8) except that 252 acres of ground based yarding, 936 acres of cable/skyline yarding, and 481 acres of helicopter logging would take place – an increase in 224 acres of helicopter yarding with a corresponding decrease in acres of conventional yarding systems of ground based and cable/skyline. A total of 1,669 acres of treatments in this Alternative would affect vegetation patterns, insects and diseases, snags, and coarse woody debris similarly to Alternative 2 because the prescriptions are the same.

Table 8: Short Term Vegetation Effects (0-10 years) of the Proposed Action Alternatives

Stand Condition	No Treatment	Action Alternatives	
		Alternative 2	**Alternative 3**
Commercial Value of Standing Timber	100% loss of any commercial/economic value	Harvesting 1,669 acres would meet reforestation objectives of the project and provide for a sustainable yield of timber. Timber value declines with delays in recovering mortality and anticipated mortality. By the second post-fire year, heartrot spreads; grade reductions added as insects infest timber. Rate of volume loss lower for larger logs than small logs. Immediate to severe decline in value during the first months post-fire in poles to small sawlogs; Immediate but lesser decline in the first months of medium and large sawlogs. After 5 yrs 50% loss in merchantable volume in trees 11-40" dbh; ~100% loss in merchantable volume in trees 11-20" dbh after 10 yrs. Pine, especially insect infested pine, will exhibit greater decay rates than Douglas-fir.	Harvesting 1,669 acres would meet reforestation objectives of the project and provide for a sustainable yield of timber. Timber value declines with delays in recovering mortality and anticipated mortality. By the second post-fire year, heartrot spreads; grade reductions added as insects infest timber. Rate of volume loss lower for larger logs than small logs. Immediate to severe decline in value during the first months post-fire in poles to small sawlogs; Immediate but lesser decline in the first months of medium and large sawlogs. After 5 yrs 50% loss in merchantable volume in trees 11-40" dbh; ~100% loss in merchantable volume in trees 11-20" dbh after 10 yrs. Pine, especially insect infested pine, will exhibit greater decay rates than Douglas-fir.
Potential to Meet Reforestation Density Standards and Timelines	Low (tree planting, monitoring, and follow-up treatments may not occur due to overhead dangers posed by large numbers of snags. Growth/vigor of regeneration could be slowed by shade. Natural regeneration is unpredictable in establishment and growth may not meet or be timely in meeting reforestation objectives or place the new stand on a developmental trajectory that can meet LUA objectives)	High potential. Tree planting (where needed) and monitoring will occur on sites where overstory snags are removed. Follow-up maintenance and protection treatments will occur as needed and as available funding permits. Establishment of regeneration and growth is more predictable and there is a much higher likelihood of meeting reforestation and LUA objectives.	High potential. Tree planting (where needed) and monitoring will occur on sites where overstory snags are removed. Follow-up maintenance and protection treatments will occur as needed and as available funding permits. Establishment of regeneration and growth is more predictable and there is a much higher likelihood of meeting reforestation and LUA objectives.
Conifer Species Establishment / Growth	Potentially long time frames required as many areas will likely be entirely dependent upon natural regeneration. Decrease in tree planting effectiveness resulting in increased competition with shrubs and hardwoods	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success. Planted seedlings would provide for greater diversity of conifer species.	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success. Planted seedlings would provide for greater diversity of conifer species.
Hardwood Species	Sharp increase in areas not managed as plantations, particularly tanoak	Increase then decrease as control of competing vegetation ensues in plantations	Increase then decrease as control of competing vegetation ensues in plantations

Stand Condition	No Treatment	Action Alternatives	
		Alternative 2	Alternative 3
Shrubs/Brush/ Forbs	Sharpest increase of vegetation cover in areas not managed as plantations	Increase then decrease as control of competing vegetation ensues in plantations	Increase then decrease as control of competing vegetation ensues in plantations
Snags	Decrease in pole and small sawlog size boles Slight decrease in larger sizes	Decrease across all sizes except for minimum of 2 (4 in CHU) large snags/ac maintained	Decrease across all sizes except for minimum of 2 (4 in CHU) large snags/ac maintained
Coarse Woody Debris	Sharp increase in pole and small sawlog size boles; Slight increase in larger sizes	At least 120 linear feet (16" x 16') per acre (DC 1 & 2) maintained and all CWD in CHU, high priority owl sites, and Del Norte talus sites	At least 120 linear feet (16" x 16') per acre (DC 1 & 2) maintained and all CWD in CHU, high priority owl sites, and Del Norte talus sites
Hazardous Fuels	Sharp increase in pole and small sawlog size boles; Slight increase in larger sizes	At least 120 linear feet (16" x 16') per ac (DC 1 & 2) maintained. Activity fuels would be reduced to acceptable levels	At least 120 linear feet (16" x 16') per ac (DC 1 & 2) maintained. Activity fuels would be reduced to acceptable levels
Windthrow Hazard	Susceptibility of all size classes especially in severe fire mortality areas	Sharp decrease. Slight increase in green trees retained in units	Sharp decrease. Slight increase in green trees retained in units
Ability to Respond to Future Silvicultural Treatments	Decrease as windfall of small size snags and lower limbs and tops of larger snags accumulate creating impediment to manage vegetation	Sharp increase as tree planting effectiveness improves and efficiency of maintaining plantation improves	Sharp increase as tree planting effectiveness improves and efficiency of maintaining plantation improves
Rate of Development of Older Forest Characteristics	Decreased rate as delays in growth of large woody species compete with hardwoods and shrubs (likelihood of effective tree planting diminishes with no treatment)	Slight increase as tree planting effectiveness of species that produce large woody structure improves	Slight increase as tree planting effectiveness of species that produce large woody structure improves

Table 9: Long Term Vegetation Effects (11+ years) of Proposed Action Alternatives

Stand Condition	No Treatment	Action Alternatives	
		Alternative 2	Alternative 3
Commercial Value of Standing Timber	100% loss of any commercial/economic value	1,669 acres would provide for economic recovery. Areas that aren't being considered for detailed analysis: Viability of timber value no longer present. 100% volume loss in trees 11-20" and 80% volume loss in trees 21-30" after 10 yrs. Pine, esp. insect infested pine will exhibit greater decay rate than Douglas-fir Commercial value invested in planted seedlings to potentially provide crop tree in 60 years.	1,669 acres would provide for economic recovery. Areas that aren't being considered for detailed analysis: Viability of timber value no longer present. 100% volume loss in trees 11-20" and 80% volume loss in trees 21-30" after 10 yrs. Pine, esp. insect infested pine will exhibit greater decay rate than Douglas-fir Commercial value invested in planted seedlings to potentially provide crop tree in 60 years.

Stand Condition	No Treatment	Action Alternatives	
		Alternative 2	Alternative 3
Potential to Meet Reforestation Density Standards and Timelines	Low (as unpredictable vegetation recolonizes the post-fire environment)	High provided silvicultural plantation maintenance.	High provided silvicultural plantation maintenance
Conifer Species Establishment / Growth	Depends on prefire vegetation colonizing the site	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success
Hardwood Species	Sharp increase in areas not managed as plantation	Increase then decrease as control of competing vegetation	Increase then decrease as control of competing vegetation
Shrubs/Brush/ Forbs	Sharp increase in areas not managed as plantations	Increase then decrease as control of competing vegetation	Increase then decrease as control of competing vegetation
Snags	Decrease in pole and small sawlog size boles Moderate decrease in larger sizes	Decrease across all sizes except for minimum 2-4 lg snags/ac maintained	Decrease across all sizes except for minimum 2-4 lg snags/ac maintained
Coarse Woody Debris	Sharp increase in pole and small sawlog size boles; Slight increase in larger sizes	At least 120 linear feet (16” x 16’) per acre (DC 1 & 2) maintained and all CWD in CHU, high priority owl sites, and talus sites	At least 120 linear feet (16” x 16’) per acre (DC 1 & 2) maintained and all CWD in CHU, high priority owl sites, and talus sites
Hazardous Fuels	Sharp increase throughout due to the buildup of fallen trees. By 15 years of no post-fire logging, fuels would have accumulated sufficiently to reburn	At least 120 linear feet (16” x 16’) per acre (DC 1 & 2) moving into older decay classes. Standing dead minimum 2-4 in CHU) lg snags/ac dropping lower limbs, tops, eventual tree failure depending size	At least 120 linear feet (16” x 16’) per acre (DC 1 & 2) moving into older decay classes. Standing dead minimum 2-4 in CHU) lg snags/ac dropping lower limbs, tops, eventual tree failure depending size
Windthrow Hazard	Susceptibility of all size classes especially in severe fire mortality areas	Slightly increased hazard of snags in recovery units as roots deteriorate. Decreased hazard of green trees as widfirmness established	Slightly increased hazard of snags in recovery units as roots deteriorate. Decreased hazard of green trees as widfirmness established
Ability to Respond to Future Treatments	Decrease as windfall of all size snags accumulate creating impediment to manage vegetation	Continued increase with growth trajectory of acceptably stocked planted conifers provided plantation maintenance	Continued increase with growth trajectory of acceptably stocked planted conifers provided plantation maintenance
Rate of Development of Older Forest Characteristics	Depends on prefire vegetation colonizing the site	Slight increase as tree planting effectiveness of species that produce large woody structure improves	Slight increase as tree planting effectiveness of species that produce large woody structure improves

Cumulative Effects

Cumulative effects of Alternative 3 would be the same as Alternative 2 except that treatments would be applied to 252 acres of ground based yarding, 936 acres of cable yarding, and 481 acres of helicopter yarding. A total of 1,669 acres of treatments in this Alternative would affect vegetation patterns, insects and diseases, snags, and coarse woody debris similarly to Alternative 2 because the prescriptions are the same.

3.2 Fire & Fuels

3.2.1 Methodology

- The spatial scale used for the fire and fuels assessment is the Wolf Creek, Poorman Creek – Grave Creek, McCullough Creek – Cow Creek, Dads Creek – Cow Creek, Riffle Creek – Cow Creek, Bear Creek – West Fork Cow Creek HUC 12th field subwatersheds. Nineteen thousand and eighty two acres burned on Medford District BLM administrated lands within the Douglas Fire Complex (Dads Creek Fire 12,621 acres, Rabbit Mountain Fire 6,216 acres and Farmers Gulch Fire 245 acres).

- Fuels Models (Scott and Burgan 2005) and photo series were used to estimate and predict surface fuel loading.

- Rapid Assessment of Vegetation Conditions after Wildfire (RAVG) process was used for assessing post-fire vegetation mortality http://www.fs.fed.us/postfirevegcondition/whatis.shtml) and Burned Area Reflectance Classification (BARC) assessing post-fire vegetation condition using soil burn severity (http://www.fs.fed.us/eng/rsac/baer/barc.html).

- Guidelines for addressing forest worker safety are provided by the Occupational Health and Safety Administration (OSHA) (OAR 437-001-0706) and BLM policy (BLM Handbook 2000, 1112-2 *Safety and Health for Field Operations*). These guidelines require forest workers to eliminate and/or mitigate hazards in the work environment.

- Guidelines regarding visitor safety on public lands, allows use by forest visitors are provided, in part, by the Oregon Recreational Use Statute (ORS Title 10, Chapter 105, subsection 105.682). Under this stature, *"an owner of land is not liable in contract or tort for any personal injury, death or property damage that arises out of use of the lands for recreational purposes, woodcutting or the harvest of special forest products…"*

3.2.2 Assumptions

The following assumptions were made to generate a more accurate surface fuel loading representation after fire salvage and before fuels treatment:

- Unmerchantable material is less than 8 inches in diameter.

- All material (top and boles) from cut trees less than 8 inches DBH would be left on the surface where fuel loading is less than 12-15 tons per acre.

- Cut trees greater than 8 inches DBH would be removed from the site; however, the un-merchantable tops and boles would remain on-site where fuel loading are less than 12-15 tons per acre.

- Danger trees outside of the analysis area would be felled and covered under the Oregon and the Federal Occupational Safety & Health Administration (OSHA), who have administrative rules about danger trees and the work environment. The Oregon rules are called Oregon Occupational Safety and Health Code Division 7 Forest Activities and apply to all types of forest activities. Federal OSHA rules regarding federal employees are called General Duty Standard (29 CFR 1960.8).

- The highest probability of serious injury or property damage is from falling dead trees (snags).

- Due to higher levels of human activity, roadways and worksites are considered the highest probability areas for injury or property damage.

- The probability of a serious accident or injury is assumed to be low due to relatively low visitor use and safety compliances required by forest workers under OSHA and BLM policy.

- To comply with OSHA requirements, imminent hazard trees would be felled as identified.

3.2.3 Affected Environment

Background Information: Fire History

Fire is a part of the forest ecosystem within the Klamath Province Region in southwestern Oregon where it is recognized as a key natural disturbance (Atzet and Wheeler 1982). Fire has played an important role in influencing ecosystems processes and creating diverse forest conditions in southwestern Oregon. Forests are diverse in terms of vegetation, topography, weather patterns, and management history. This means that the fire pattern, its frequency and severity, often differ between forest types and/or stands. Prior to the 20th century in dry forests, such as those of Douglas-fir and ponderosa pine in southwest Oregon, frequent but low-intensity fires and mixed severity fires were the historical norm. Low severity fire moderated the regeneration of fire intolerant species, promoted fire tolerant species regeneration, such as Douglas-fir and ponderosa pine, maintained an open forest structure, reduced forest biomass, decreased the impacts of insects and diseases, and maintained wildlife habitats for many species that utilize open stand structures. These frequent fires historically served as a thinning mechanism by naturally regulating stand densities and were effectively being excluded from ecosystems by the 1940s (Graham et al., 2004).

Fire exclusion and past management activities have altered the historical fire patterns (regimes). Fire exclusion has greatly impacted dry forests and has increased the accumulation of fuel (surface and ladder) and increase tree density than in the past, making forests more prone to larger, resistance-to-control and more frequent stand-replacing fires.

Information from the Oregon Department of Forestry database shows a total of 310 fires occurred in the Wolf Creek, Poorman Creek – Grave Creek, McCullough Creek – Cow Creek, Dads Creek – Cow Creek, Riffle Creek – Cow Creek, Bear Creek – West Fork Cow Creek HUC 12th field subwatersheds between 1960 -2012 (Table 10).

Table 10: Fire History – Number of Fires

Ownership	Size Classes - Natural Caused Fires							Size Classes – Human-Caused Fires							Total
	A	B	C	D	E	F	G	A	B	C	D	E	F	G	
BLM	47	16	1	2	---	---	---	35	15	1	---	1	---	---	118
Private Industrial	13	6	1	1	---	---	---	25	7	1	---	1	---	---	55
Other Private	12	2	---	---	---	---	---	77	24	1	---	---	---	---	116
State of Oregon	3	1	---	---	---	---	---	1	---	1	---	---	---	---	6
County	2	1	---	---	---	---	---	8	4	---	---	---	---	---	15
Total	77	26	2	3	---	---	---	146	50	4	---	2	---	---	310

Data derived from Oregon Department of Forestry database from 1960 to 2012.

Size Class A = Less than 1 acre
Size Class B = 1 to 9 acres
Size Class C = 10 to 99 acres
Size Class D = 100 to 299 acres
Size Class E = 300 to 999 acres
Size Class F = 1,000 to 4,999
Size Class G = Greater than 5,000 acres

Pre-fire Condition

During the past 15 years, southwest Oregon has experienced an increase in the number of high severity large wildland fire events compared to historical times (i.e., Biscuit 2002, Timber Rock 2002, Bland Mountain 2004, Blossom 2005, Williams Creek 2009, Douglas Complex 2013, Brimstone 2013, Big Windy 2013). Weather (drought, high temperatures, low humidity, and high winds), vegetative conditions (dense, multi-layered stands and increase surface fuel loading), steep topography and limited access were contributing factors in the majority of these large fires.

Fire Hazard

Fire hazard generally refers to the difficulty of controlling potential wildfire. Fire hazard is defined by how a fire reacts to fuel, weather, and topography which affect the fire behavior. Fire behavior characteristics such as rate of spread, intensity, severity, crowning, spotting, fire duration and resistance-to-control are common denominators (Brown et al., 2003). Fire severity is the effect on plant survivability and is an important component as it transfers heat downward into the soil, as where fire intensity transfers heat mostly upward through flame length (Ryan and Noste 1985).

Fire Behavior

Fire behavior describes how a wildfire burns based on environmental factors such as surface fuels, vegetation, canopy base height, density or closure, slope, aspect, weather, and elevation. Fuel models are one method to help describe the fuels available to a fire based on the amount, distribution, and continuity of the vegetation and wood. Fuels combined with weather and slope can be used to predict potential surface fire behavior characteristics such as rate of spread, flame lengths, and fireline intensity.

Fire behavior dictates which fire suppression strategy may be effectively employed, the extent to which a fire may grow, and the affects it may cause. Because fire behavior is critical in fire suppression tactics and strategies, it serves as a threshold. Table 11 displays the different thresholds for different suppression actions. These fire suppression actions directly relate to flame length and the types of suppression action taken by ground crews to where fire control efforts are ineffective. These surface fire behavior charts are also known by fire staff as the "hauling charts." Hauling charts refer to haul in or haul out suppression resource based on current and expected fire behavior.

Table 11: Relationship of surface fire flame lenght and intensity to suppression actions

Flame Length (ft)	Fire intensity (Btu/ft/s)	Actions	
< 4	< 100		Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4-8	100-500		Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8-11	500-1000		Fires may present serious control problems—torching out, crowning and spotting. Control efforts at the fire head will probably be ineffective.
> 11	> 1000		Crowning, spotting and major fire runs are probable. Control efforts at head of fire are ineffective.

(Andrews, Patricia et al., 2011 USDA, GTR-253)

Fuel Models

Fuel models are classification systems pertaining to local site conditions that assist land managers in predicting potential fire behavior. Fuel models are sets of parameters that describe physical fuels properties, including fuel loads, fuel bed depth, and moisture of extinction (Anderson 1982, Scott & Burgan 2005). Each model is typically used to represent a range of conditions in which fire behavior may be expected to respond similarly to changes in fuel moisture, wind, and slope. Fuel models are one element used to predict potential fire behavior.

Fire behavior fuel models are grouped by fire-carrying fuel type. The majority of the salvage harvest and roadside safety hazard (moderate and high severity burn areas) treatment units can be identified within the timber understory (TU) and the timber litter (TL) fuel models. Table 12 shows the typical flame lengths associated with fuel models within the Douglas Fire Complex during fire season weather conditions given a 5 mph wind.

Table 12: Fire Behavior Fuel Models with Flame Lengths

Fire Behavior Fuel Model	Fuel Model Group	Flame Length (feet)
GR1	Grass	1-3
GR2	Grass	2-6
GS1	Grass Shrub	1-4
GS2	Grass Shrub	2-6
SH7	Shrub	4-15
SH9	Shrub	12-16
SB2	Slash-Blowdown	4-7
SB3	Slash-Blowdown	6-10
SB4	Slash-Blowdown	8-15

Fire Behavior Fuel Model	Fuel Model Group	Flame Length (feet)
TL4	Timber Litter	1-2
TL5	Timber Litter	1-3
TL6	Timber Litter	2-4
TL7	Timber Litter	1-3
TL8	Timber Litter	2-4
TL9	Timber Litter	2-5
TU1	Timber Understory	.5-2
TU2	Timber Understory	3-5
TU5	Timber Understory	7-9

(Scott & Burgan 2005. USDA, GTR-153)

Existing Condition

The Douglas Fire Complex burned in a mixed severity pattern over multiple ownerships and jurisdiction. Table 13 and Figure 6 and 7 display the burn severity by classes for Douglas Fire Complex.

Areas of moderate and high fire severity have corresponding high levels tree mortality, which was influenced by weather (i.e., low relative humidity, high temperatures, high winds), topography (steep slopes and limited access), and fuel loading (surface, ladder and canopy cover). The majority of the moderate and high severity burn areas were reset to an early seral condition (early-successional stage).

Fires created a mosaic pattern (burned and unburned areas) in the very low and low severity classes. Surface fire burned throughout these areas with individual and small group torching of trees.

Table 13: Burn severity by land jurisdiction within the Douglas Fire Complex

Burn Severity Classes	BLM Medford	BLM Roseburg	State of Oregon	County	Private Industrial Forestlands	Other Private	Total
High	1,714	1,308	87	477	3,679	228	7,493
Moderate	3,329	1,362	42	495	4,611	220	10,059
Low	3,880	1,223	56	562	3,552	393	9,666
Very Low	10,159	2,374	134	757	6,984	1,045	21,453
Total	19,082	6,267	319	2,291	18,826	1,886	48,671

Data derived from Burned Area Reflectance Classification (BARC) data. http://www.fs.fed.us/eng/rsac/baer/barc.html

Figure 6: Examples of moderate/high severity burn areas

Figure 7: Examples of low/very low severity areas

The fire behavior anticipated with the current forest vegetation condition in the moderate and high severity burn areas would be relatively low risk. Even though there are large numbers of fire killed trees throughout the area, these snags do not yet represent a fire hazard because they are still standing and there is essentially little or no ground fuel to carry a wildfire and expose these snags to ignition on a large scale. Large dead surface fuel greater than 3 inches in diameter has little influence on spread and intensity of the initiating surface fire in fire behavior models; however, they can contribute to development of large fires and high fire severity (Brown et al., 2003). These large fuels would also contribute to increased resistance-to-control. These snags could contribute to increase spotting potential as a receptor and ignition source.

The areas burned at low and very low severity have the potential for reburning at a lower intensity because much of the fuel loading (surface and ladder) and fuel continuity was consumed in the wildfire. These areas are expected to have a short-term alteration of fuel loading within the next 5 years as vegetation recovers to pre-fire conditions. In the areas of low and very low severity, an initial increased loading in the 1- and 10-hour timelag fuels may occur as needles and small branches drop the first year or two. Resprouting brush will continue to add to the live fuel loading and will have some effects on fire behavior. Some ladder fuels may remain throughout the area as unburned or areas of green understory vegetation which survived the fires. Scorched vegetation may contribute to ladder fuels for up to 1 year until scorched needles and leaves fall.

Figure 8: Douglas Complex burn severity map

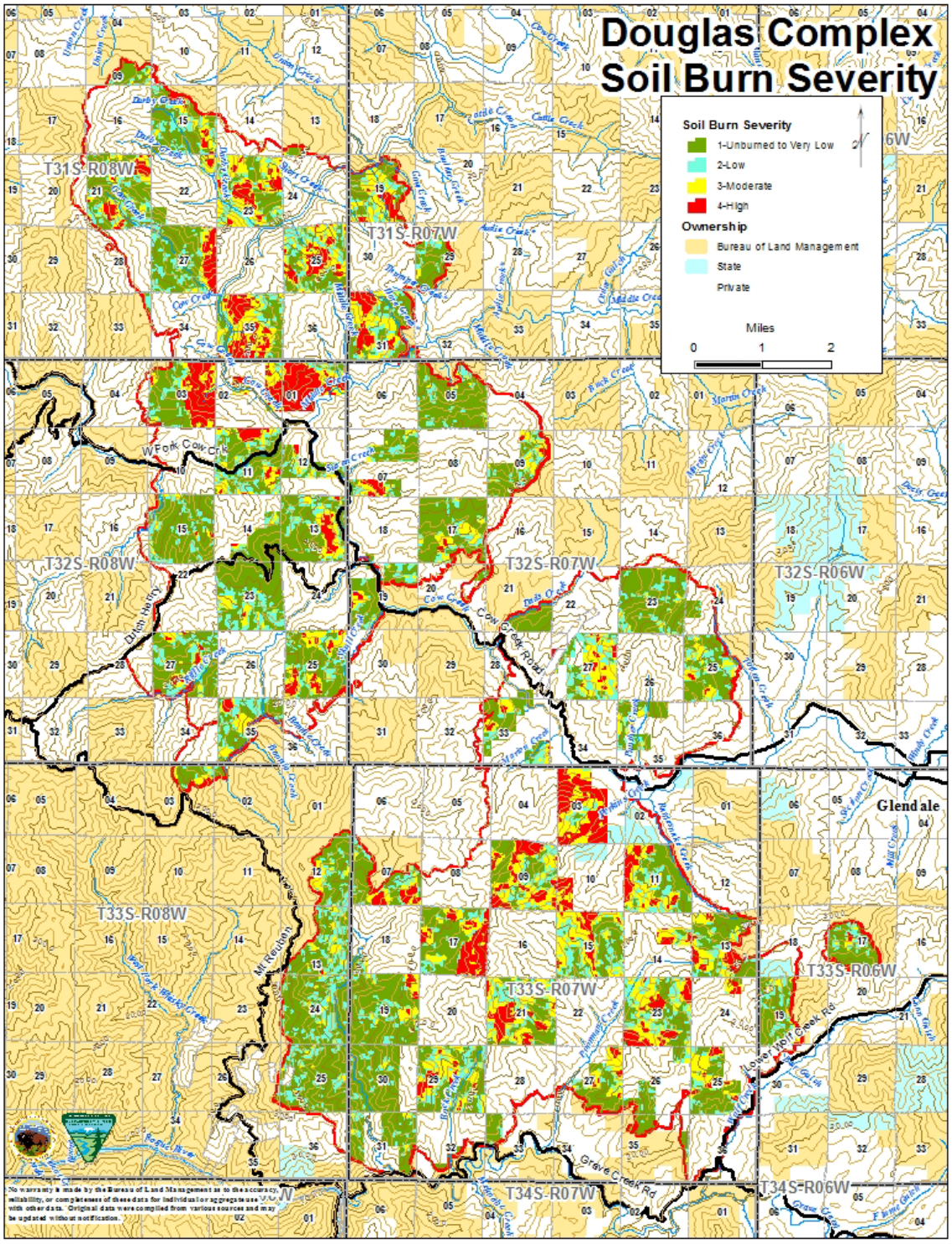


*Photo Reference: http://www.fs.fed.us/eng/rsac/baer/barc.html

The fires have modified the pre-fire fuel models in the moderate and high severity burn areas, resetting them to an early-successional stage. These areas will return to the associated fuel models that were pre-fire conditions and will follow progression through time for vegetation recovery. Table 14 shows the expected changes in fuel models from pre- to post- fire conditions for the next 25 fire years.

Table 14: Pre and estimated post-fire behavior models on Medford District BLM administered lands within the Douglas Fire Complex

Fuel Loading (Pre-fire Condition)	Fuel Model Group	Acres (Pre-fire Fuel Model)	Expected Fuel Loading (Post-fire Condition)	Predicted Fuel Model Group	Acres (Converted to Post-fire Fuel Model)
High Fire Severity					
-----	Urban/Developed (NB1)	3	-----	Urban/Developed (NB1)	3
Low	Grass (GR1 & 2)	14	Low to Moderate	Grass (GR1 & 2)	14
Low to Moderate	Grass-Shrub (GS1 & 2)	233	Low to Moderate	Grass-Shrub (GS1 & 2)	233
Moderate to Very High	Timber Litter (TL4,5,6,7,8, & 9)	349	Low to Very High	Grass-Shrub (GS1 & 2) Shrub (SH7 & 9)	349
Moderate to Very High	Timber Understory (TU 2 & 5)	2,070	Very High	Shrub (SH7 & 9)	2,067
Moderate Fire Severity					
Low to Moderate	Grass (GR1 & 2)	1	Low to Moderate	Grass (GR1 & 2)	1
Moderate	Grass-Shrub (GS2)	11	Moderate	Grass-Shrub (GS2)	11
Moderate to Very High	Timber Litter (TL5,7,8 & 9)	33	Moderate to Very High	Grass-Shrub (GS2) Shrub (SH7 & 9)	33
Very High	Timber Understory (TU5)	192	Very High	Shrub (SH7 & 9)	192
Low Fire Severity					
-----	Urban/Developed (NB1)	71	-----	Urban/Developed (NB1)	71
Low to High	Grass (GR1,2 & 7)	22	Low to High	Grass (GR1,2 & 7)	22
Moderate	Grass-Shrub (GS2)	525	Moderate	Grass-Shrub (GS2)	525
Moderate to Very High	Timber Litter (TL4,5,6,7,8 & 9)	2,089	Low to Very High	Timber Litter (TL4,5,6,7,8 & 9)	2,089
Low to Very High	Timber Understory (TU1,2 & 5)	13,472	Low to Very High	Timber Understory (TU1,2 & 5)	13,472

Scott and Burgan 2005. USDS, GTR-153, Rapid Assessment of Vegetation Conditions after Wildfire (RAVG) http://www.fs.fed.us/postfirevegcondition/whatis.shtml

Figure 9: Biscuit Fire - Three years post-fire photos

Pre-fire Fuel Model –Timber Litter
Burn Severity – Low/Very Low
Post-fire Fuel Model – Timber Litter

Pre-fire Fuel Model – Timber Understory
Burn Severity – High
Post-fire Fuel Model – Shrub

Hazards

The primary safety hazard within the analysis area is the presence of snags. Public, forestry worker, and fire fighter safety are the main focus along primary (connecting one county road with other) and secondary (interior local or resource road) travel routes throughout the Douglas Fire Complex in moderate and high severity burn areas. The highest probability of injury or property damage is assumed to be along the travel routes and in areas of frequent human activities. An estimate of 14 miles (530 acres) of primary and secondary travel routes has been proposed for hazard tree (snag) removal.

The potential of hazard trees causing injury or damage would still be dependent on the presence of humans when a given tree falls. The potential of a snag being considered a hazard tree is dependent on the condition of the tree, its position relative to human activity, and weather conditions. A danger tree (hazard tree), as defined by Oregon OSHA (OAR 437-007-0025), is *"A standing tree, alive or dead, that presents a hazard to personnel due to deterioration or physical damage to the root system, trunk(stem), or limbs, and the degree and direction of lean."*

3.2.4 Alternative 1 – No Action

Direct and Indirect Effects

Under the No Action Alternative, salvage harvest and roadside safety hazards of fire killed trees would not occur under this project. Within 2 years after the fire, it would become increasingly unsafe for public travel and for suppression crews to take action on wildfire in the moderate and high severity burned areas. Ingress and egress would be compromised and the work environment would be considered unsafe.

In time, as trees continue to decay and are identified as danger trees, they would be felled and left on the forest floor or removed for safety concerns. High concentration of fuel loading would accumulate over time as snag fall occurs. Increase in large dead and down fuel loads would result in higher fire intensity and resistance-to-control (Brown et al., 2003). Increased hazard and risk would make it more difficult for suppression crews to meet suppression objectives. Snag fall would continue to compromise travel routes for decades as snags deteriorate and fall.

The expected half-life for ponderosa pine snags post-fire ranges between 7 – 10 years. For Douglas fir snags, the expected half-life is between 12 – 16 years (Russell et al., 2006; Ritchie et al., 2013). In addition to safety concerns, fallen dead trees would limit access for suppression crews and increase surface fuel loading. Accumulation would occur at a rate that is greater than the rate of decomposition. Table 15 shows the correlation between tree species, size (diameter breast height, d.b.h) and total tree bole weight (tons) of wood and bark of individual trees.

Table 15: Total tree bole weight (tons) of wood and bark of individual trees based on whole tree volume

Diameter at Breast Height (d.b.h.)	Douglas Fir	Ponderosa Pine
12	.341	.332
18	.938	1.009
24	1.921	2.151
30	3.346	3.832

Brown et al., 2003. USDA, GTR-105

The gradual increase in the number of downed logs would increase fire behavior over time making it more difficult to control wildfires with greater environmental impacts. Based on the information provided in Table 14, the predicted fuel loading for managed and natural stands (Table 16) would exceed 30 tons per acre within 15 years based on the expected half-life of the snags. As snags persist this would also increase spotting potential as a receptor and ignition source. Fireline construction is greatly slowed where firelines intersect numerous large logs. This would lead to high or even extreme resistance-to-control. Fire suppression action by hand crews and heavy equipment would be slow, ineffective and increase suppression cost.

Table 16: Site Potential Fuel Loading for Managed and Natural Stands (tons per acre)

	Snags/Acre		Douglas Fir Tons/Acre		Ponderosa Pine Tons/Acre	
Diameter at Breast Height	Managed Stands[1]	Natural Stands[2]	Managed Stands	Natural Stands	Managed Stands	Natural Stands
12	200	125	68	43	66	42
18	109	70	102	66	110	71
24	70	45	134	86	151	97
30	45	30	151	100	172	115

[1]Fully stock managed stands
[2]Natural regeneration stands

Cumulative Effects

Current or foreseeable projects that have beneficial effects to reduced fuel loading are as follows: Fire Resiliency Project, Rueben Hazardous Fuels Reduction Project, ESR Projects, Young Stand Management Projects, Boney Skull, Discretionary and Non-discretional road safety actions and the Wolf Pup Project. Details on these projects can be found in Appendix C. The No Action Alternative would leave fuel loading on 1,669 acres. The cumulative effects of the projects mentioned above added to the 1,669 acres of decreased fuel loading would not have a cumulative beneficial fuels reduction effect in the long term.

In areas that burned with moderate to high severity, the result was nearly 100 percent mortality of all vegetation. Litter, duff, and small woody debris were almost completely consumed, and

much of the large woody debris was charred or consumed. This type of stand-replacement fire sets the stand back to an early-successional stage. In areas of relatively low or very low fire severity, the result was a mosaic of burned and unburned soil, shrubs, and overstory vegetation. These areas would recover more quickly due to more live forest structure and less damage to soils.

In 5 to 10 years, fire behavior characteristics would begin to take on those exhibited of a shrub fuel model, with potential high rates of spread and flame lengths. In addition, as snags continue to fall and begin to decay they would contribute to increase in fuel loading, fire behavior, fire intensity, and spotting distance. Suppression tactics would be compromised in areas of heavy fuel loading and snags. The increase in fire behavior over time would decrease the effectiveness of fire suppression resources to contain wildfires quickly, limit the strategic options, and put fire fighters at higher risk. These conditions would result in potential larger fire size and higher suppression cost.

The primary safety hazard concern and highest probability of serious injury or property damage is from falling snags along the roadways and worksites. Hazard trees that are an imminent danger to public safety and forest workers would be felled across all LUA's to meet OSHA safety requirements. Hazard trees would also be felled where there is a threat of property damage to adjacent landowners. The no action alternative, would not address the road safety issues/concerns for the public, forest workers and fire fighters in this project. Hazard tree assessment would be performed within the Douglas Fires Complex to meet OSHA and BLM regulations. Travel routes would become increasingly unsafe as time goes on for public travel. Ingress and egress would be compromised and the work environment would be considered unsafe for forest workers and suppression crews taking action on future wildfires.

3.2.5 Alternative 2

Direct and Indirect Effects

Under Alternative 2, the proposed forest management actions of salvage harvest and roadside safety hazards along primary, secondary roads and ridgelines of fire killed and fire injured trees would occur using salvage timber sales. Table 17 displays the difference between the two proposed Action Alternatives.

Table 17: Comparison of Road Safety, Ridgeline and Economic acres in Alternative 2 and 3

Activity	Alternative 2		Alternative 3	
	Salvage Harvest (acres)	Miles	Salvage Harvest (acres)	Miles
Cable Logging	1,105	-----	924	-----
Ground Base Logging	307	-----	264	-----
Helicopter Logging	257	-----	481	-----
Roadside Safety Hazard within Economic Recovery	419	8.5	419	8.5
Roadside Safety Hazard outside Economic Recovery	111	5.5	111	5.5
Ridgeline Harvest within Economic Recovery	26	.7	26	.7
Permanent Road Construction	-----	.32	-----	.32
Temporary Route	-----	6.59	-----	3.23

Fuel Loading
Harvesting fire killed trees would remove horizontal and vertical fuel loads that would contribute to high intensity wildland fire over the next 2 to 4 decades. Public, forest workers, and fire fighters safety would increase as hazard trees (snags) would be harvested along primary, secondary roads, ridgelines, and within the salvage units. With the harvest of fire killed trees, a reduction of surface fuel loading is expected. Table 18 is based on the average of 6 snags retained per acre with an average DBH of 18 to 24 inches. This provides a look into the future large woody debris fuel loading within the harvest units as the snags will eventually fall to the forest floor over time.

Table 18: Snag Recruitment in Harvest Units for Managed and Natural Stands (tons per acre)

	Snags/Acre		Douglas Fir Tons/Acre		Ponderosa Pine Tons/Acre	
Diameter at Breast Height	Managed Stands	Natural Stands	Managed Stands	Natural Stands	Managed Stands	Natural Stands
18	6	6	6	6	6	6
24	6	6	12	12	13	13

Salvage harvest would transition the bulk of the fuel load from the canopy to the ground. Removal of snags reduces long-term fuel loads but generally results in increased amount of fine fuels for the first few years after logging unless surface fuels are effectively treated (Peterson et al., 2009, McIver and Starr 2000). In moderate and high severity burn areas, the majority of the vegetation suffered very high mortality. Most of the 1-hour timelag and a portion of the 10-hour timelag fuels were consumed in the fire, leaving few needles and twigs on the trees and shrubs to contribute the fuel loads in these size classes. In the 1-hour timelag, 0-.2 tons per acre would be available. In the 10-hour timelag 1.5 to 3 tons per acre would be expected after salvage harvest. The primary increase in fuel would be in the 100-hour timelag and 1,000-hour timelag, expecting to range from 4 to 15 tons per acre. The expected fuel loading post-harvest would range from 5.5 to 18 tons per acre based on stand conditions.

Salvage and Slash Disposal
Proposed activity slash disposal would reduce fuel loading and continuity within the salvage harvest treatment units and along roads. Merchantable fire killed trees greater than 8 inches in DBH would be removed during salvage harvest. The 1995 Record of Decision and Resource Management Plan objective is to reduce both natural and activity-based fuels hazards through methods such as prescribed burning, mechanical or manual manipulation of forest vegetation and debris, removal of forest vegetation and debris, or combinations of these methods (RMP 1995).

Post-harvest assessment of activity slash would determine the appropriate treatment for slash disposal. This assessment would determine the fuel hazard and fire risk based on aspect, slope, surface fuel loading, access and location of salvage unit. Activity slash less than 12 to 15 tons per acre would be considered for lopping and scattering and/or hand pile and burning. Lopping and scattering activity fuels would not change the fuel load following salvage harvest, but would reduce the vertical and horizontal continuity of the fuel bed. Flame length and rate of spread would be expected to decrease. Slash concentration greater than 12 to 15 tons per acre would be considered for hand piling and burning, chipping of slash or removal to reduce fuel loading and increase suppression success.

Hand piling and pile burning would decrease fuel loading of material 1 to 6 inches in diameter by 80 to 90 percent in the heavier concentration areas and would be effective in reducing the rates of spread and flame lengths. Fuels greater than 6 inches in diameter would be left on the forest floor and would contribute to the organic matter and soil stabilization.

These slash disposals treatments would reduce fire hazard by decreasing fire behavior characteristics (rate of spread, intensity, severity, crowning, spotting distance, fire duration and resistance-to-control). The reduction in flame length and fire intensity would result in reduced risk and increased safety to fire fighters. This action would give greater flexibility in suppression tactics and enhance the probability of success.

Reduction of snags along primary, secondary roads and worksite would decrease the potential for serious injury or property damage from standing fire killed trees. Risk to the public safety would also be reduced. Approximately 14 miles of hazardous tree removal would occur along roads, enhancing overall safety concerns.

Based on expected fuel loading and potential fire behavior within the salvage harvest and roadside safety hazard treatments areas, Timber Litter Fuel Type (TL1) fuel model would be expected in the short-term. In areas of higher concentrations of slash, 100- and 1,000-hour timelag surface fuel loads could move the stand into a Slash-Blowdown Fuel Type (SB) fuel model, resulting in higher flame lengths (Table 11), fire duration and intensity than in an unsalvaged stand. Long-term, 10 to 20 years post-harvest treatment, the effects of the slash on fire behavior would be overcome by new vegetation growth. Fuel loading and potential fire behavior would expect a Shrub Fuel Type Models (SH) and/or Timber-Understory Fuel Type Models (TU) where the primary carrier of fire is live and dead shrubs, small trees and herbaceous vegetation. Thompson et al., (2007) conducted a post-fire study of the Biscuit Fire on reburn of natural and artificial regeneration stands. They concluded that young conifer plantations (15 years or more), whether naturally or artificially regenerated, burn at relatively high severity, creating more early-successional vegetation and delaying or precluding the development of mature forest composition and structure. In a moderate wildfire in these fuel types one would expect high mortality or stand replacement, as the scorch heights would exceed the vegetation height (McIver and Ottmar 2007).

Cumulative Effects

The project area landscape is mostly a combination of private timberlands and public lands. The private timberlands are managed for timber production and therefore will likely have a harvest rotation less than 60 years. The forest management on BLM administrative lands and private timberlands combined effect on the landscape will result in a varying pattern of forest structure over the long-term.

On BLM administered lands approximately 7,000 acres within the Medford District and 2,020 acres in the Roseburg District will be proposed for planting within the next 5 years. On industrial forest lands, intensive salvage harvest will occur leaving large blocks of open space with few standing trees. If the current trends continue, within the Douglas Fire Complex approximately 24,050 acres (49 %) will be in young conifer stands. As these stands become established there will be an increase in potential risk for high severity fire as live fuels quickly occupies the site. Natural or artificial regenerated stands would become more volatile over time

and exhibit increased fire behavior intensities. After 20 to 30 years fire within these stands would exhibit increased rates of spread, flame lengths, and intensities similar to the crown fire that occurred with the Douglas Fire Complex due to increased fuel loads, ladder fuels, stand density, and low canopy cover. As these forests stands mature, fire severity would decrease and fuel loading and ladder fuels would be reduced through competition for space, moisture, light and nutrients.

Within the next 5 years approximately 1,000 to 1,500 acres are proposed for hazardous fuels treatment and prescribed fire within or adjacent to the Douglas Fire Complex. Between 2003 and 2013 approximately 5,175 acres were previously treated for hazardous fuel reduction in the Wolf Creek, Poorman Creek – Grave Creek, McCullough Creek – Cow Creek, Dads Creek – Cow Creek, Riffle Creek – Cow Creek, Bear Creek – West Fork Cow Creek HUC 12th field subwatersheds (Table 19).

Table 19: Burn Severity on Hazardous Fuels Reduction Treatment Acres from 2003 to 2013

Burn Severity	Unburned to Very Low	Low	Moderate	High	Unburned (Outside Fire Perimeter)
Acres	418	269	147	45	4,295

The beneficial effects of these treatments were demonstrated in the Dads Creek and Rabbit Mountain fires where wildfire that burned through previously treated areas showed a decrease in fire behavior, fire severity and intensity. Five percent of the hazardous fuels reduction acres burned at a high severity whereas 78 percent burned low to very low with little or no canopy mortality. Previously and future hazardous fuel reduction treatments will help modify the vegetation composition across the landscape against future high severity fires. This may help in protecting reforestation projects for all ownerships against future wildfire.

Alternative 2 would have beneficial cumulative effects to reduced fuel loadings in the analysis area in the long term.

3.2.6 Alternative 3

Under Alternative 3, the proposed forest management actions of salvage harvest and roadside safety hazard of fire killed trees would occur using salvage timber sales. Alternative 3 provides for salvage harvest and roadside safety hazard treatments on approximately 1669 acres see Table 3 for comparison of the Action Alternatives 2 and 3.

Direct, Indirect and Cumulative Effects are the same as described for Alternative 2, no measurable differences in fuel loading and fire behavior is expected, as silvicultural prescriptions are the same. Public, forestry workers and fire fighters safety is considered the same as described for Alternative 2.

3.3 Wildlife

This section discusses terrestrial wildlife habitats and the potential impacts to terrestrial wildlife species from the proposed actions as described in Chapter 2 of this document. For the purposes of the analysis, this EA section will refer to these reference scales: the “Project Area”, “Planning Area” or specific “Analysis Areas”. The Project Area describes where action is proposed, such as units where harvest is proposed, or where, road construction or landing construction is proposed and areas immediately proximate to these actions. The spotted owls and critical habitat

Analysis Area is used for a more applicable spatial scale for species with larger home ranges and dispersal movements. The Planning Area is used for special status species where there is little or no known site information, and where there is a likelihood of occurrence based on the range of the species and suitable habitat within the Planning Area or Proposed Action. Project Area is used for Survey and Manage species that have required survey protocols for habitat-disturbing projects, and is usually reflects areas including and adjacent to the disturbed habitat.

3.3.1 Affected Environment

Pre-fire Vegetation Conditions

Pre-fire conditions (see Chapter 1, Vegetation)

Post-fire Vegetation Conditions

The Douglas Complex burned with a mosaic of mixed severities, therefore the burn pattern and intensity caused varying impacts to forest vegetation across the fire area. Many of the lowest cooler draw bottoms experienced relatively less burn severity than upper sloped areas throughout the fire complex. The Douglas Fire Complex (Dads Creek, Rabbit Mountain, Farmers Gulch) affected a total of 48,670 acres of land. Of those acres, approximately 19,082 acres burned on BLM's Medford District land. Burn severity on most of BLM land was very low (10,159 acres/53%), with high severity (1,714 acres/9%) being the smallest effected severity class (see Fire and Fuels Table 12). On Medford BLM land, moderate and high fire severity burned approximately 2,360 acres (BARC data) of 10,240 acres (23%) of late-successional forest ≥80 years of age within fire perimeter on the Medford BLM District. Approximately 860 acres of moderate and severe burned forest ≥80 years of age occur with proposed action units (36% of moderate and severe burned late-successional habitat).

Special Status Wildlife Species

Special Status Species are those species that are federal listed as Threatened or Endangered; Proposed or Candidates for federal listing as Threatened or Endangered; or are BLM-designated Sensitive species (USDI 2011). Survey and Manage species were originally listed for protection under the Northwest Forest Plan and are modified in the 2001 S&M EIS ROD. Table 20 lists the Special Status and Survey and Manage species that have distribution ranges which overlap the Planning Area. Species determined to not be affected by the proposed action, have a very low likelihood of occurring in the Project Area, or whose presence would be considered accidental or incidental, will not be included in the effects analysis.

Table 20: Wildlife Special Status Species Known, Suspected or Habitat Occurs in the Project Area

Scientific Name	Common Name	Status	Occurrence
Strix occidentalis caurina	northern spotted owl	FT	Known
Arborimus longicaudus	Oregon red tree vole	SM	Known
Great Gray Owl	Strix nebulosa	SM	Not likely
Del Norte Salamander	Plethodon elongatus	SM	Known
Helminthoglypta hertleini	Oregon shoulderband snail	SEN/SM	Suspected
Martes pennant	Fisher	SEN	Not likely
Haliaeetus leucocephalus	Bald Eagle	SEN/EPA	Known
Antrozous pallidus	pallid bat	SEN	Suspected
Corynorhinus townsendii	Townsend's big-eared bat	SEN	Suspected
Myotis thysanodes	fringed myotis bat	SEN	Known

Scientific Name	Common Name	Status	Occurrence
Callophrys johnsoni	Johnsons hairstreak	SEN	Not Likely
Bombus occidentalis	Western Bumblebee	SEN	Not Likely
Actinemys marmorata	Pacific pond turtle	SEN	Known
Rana Boylii	Foothill yellow-legged frog	SEN	Known
Falco peregrinus	Peregrine Falcon	SEN	Not likely

Status:
FT – Federally Threatened SEN – Bureau Sensitive Species EPA – Bald and Golden Eagle Protection Act SM – Survey and Manage Species
Occurrence:
Known – Species is known to occur in the Project Area
Suspected – Species not known to occur but reasonable potential to exist in the Project Area
Habitat – Less probable for species to occur but suitable habitat is found in the Project Area and is within the known or suspected range of the species

Federal Listed Species

Northern Spotted Owl (NSO)

The spotted owl is perhaps the most studied raptor in the world, and thus there exists a tremendous quantity and quality of data (*e.g.*, vital rates are evaluated in a meta-analysis for several long-term demographic study areas every 5 years; *e.g.*, Anthony et al. 2006, Forsman et al. (2011); habitat selection

(Courtney et al 2004) has been thoroughly evaluated; large numbers of individuals have been followed during dispersal (Forsman et al. 2002); among many other aspects of the species' ecology (USDI FWS 2011).

The northern spotted owl, a Federal-listed Threatened species, is associated with existing habitat within and adjacent to the Douglas EA Project Area. Spotted owls prefer coniferous forest with multiple vertical layers of vegetation and a variety of tree species and age classes with the presence of large logs and large diameter live and dead trees (snags), for nesting, roosting, and foraging habitat. They may also be found in younger stands with multilayered, closed canopies, large diameter trees, and abundance of dead and down woody material. Based on studies of owl habitat selection (including habitat structure and use and prey preference throughout the range of the owl), spotted owl habitat consists of four components: nesting, roosting, foraging, and dispersal (Thomas et al. 1990).

In more recent reports (Davis et al. 2010, 2011; Forsman et al. 2011), it has become more evident that the barred owl population is increasing across the range of the northern spotted owl. Forsman (2011) indicates that the spotted owl populations have declined across most of the range, with the most significant declines occurring in Washington where the barred owl has been present the longest. For each of the individual demographic study areas, there has been an almost steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected (Forsman et al. 2011). In some areas, as many of 60 percent of the spotted owl sites have barred owls detected; specifically for the Klamath study area, approximately 30 percent of the spotted owl sites have barred owls in recent years. Forsman et al. (2011) found evidence barred owl detections were important sources of variation and had negative effects on spotted owl apparent survival and recruitment. Although analysis within the nearest NSO demography study (Klamath Study Area, or KSA) to the Project Area indicates a

stable spotted owl population during the study period, the recent data shows the beginning of a trend towards a declining population (Davis et al. 2010). Davis et al. (2010) states that

> [t]here is mounting evidence that barred owls are negatively impacting spotted owl population within the KSA. This is illustrated by several population trends beginning about 2003, which is when barred owl detections within the KSA exceed 10% of the sites. Spotted owl detections have been steadily decreasing since 2002 and reached the lowest point in 2010, the same year barred owl detections reached their highest level. Fecundity rates appear to be declining during the past 8 years and in only 1 of those 8 years was the rate above average. Fecundity rates for sites with known barred owl presence were lower than at other sites. If these trends continue, a combination of lower occupancy and reduced fecundity, there may be cause for concern regarding the spotted owl population.

On June 30, 2011, the USFWS released the *Revised Recovery Plan for the Northern Spotted Owl* for public comment (USDI FWS 2011). This Revised Recovery Plan recommends achieving recovery of the spotted owl through 1) the retention of more occupied and high-quality habitat, 2) active management using ecological forestry techniques, both inside and outside of reserves, 3) increased conservation of spotted owls on State and private lands, and 4) the removal of barred owls in areas with spotted owls Revised critical habitat was designated in 2012, becoming final in January 2013. See critical habitat discussion below.

The original foundation for spotted owl recovery was the 1994 Northwest Forest Plan (NWFP). Management direction and land allocations in the standards and guidelines of the NWFP are intended to constitute the Forest Service and BLM contributions to the recovery of the northern spotted owl (USDA USDI 1994a). The NWFP provides a network of late-successional reserves, 100-acre Known Spotted Owl Activity Centers (KSOACs), connecting riparian corridors, and connectivity blocks across the lands within the Plan area.

The NWFP-designated KSOACs were the best habitat on Federal lands to be retained as close as possible to the spotted owl nest site, or owl activity center, for all sites known as of January 1, 1994 (USDA and USDI 1994a). This was intended to preserve an intensively used portion of the breeding season home range close to a nest site or center of activity (USDI 1995). There are 16 KSOACs in the Project Area boundary that were exposed from very low to high burn severities. No treatment is proposed in the Activity Centers.

Analysis Areas

The extent of the Analysis Area for the northern spotted owl is defined by a composite of a

1.3-mile polygon buffers around proposed timber sale units and provincial home range radius (1.3 mile) (Thomas et al. 1990 and Courtney et al. 2004) circles around activity centers affected by the proposed action. The Analysis Area covers approximately 98,717 total acres, of which 51,237 acres (52%) are on Federal lands.

The Douglas Fire Complex Recovery Project Area is located within the provincial home range territory (approximately 1.3-mile radius from the site center) of 38 affected historic spotted owl sites. For purposes of this analysis, all sites are conservatively assumed to be occupied unless

protocol surveys did not locate resident owls in the last several years. Some sites have multiple historical alternate nesting or occupational areas during the breeding season. For analysis, the site with most recent dominant use, or the site most impacted by the proposed action when alternate sites are used consistently, is analyzed. Annual surveys for spotted owls have been conducted for 12 to 30 years for most sites within the Klamath Demographic Study Area, which covers approximately 70% of the analysis area. The remainder of the analysis area is covered by additional known sites, which are surveyed for project clearances, exploratory surveys, or occasional site monitoring. The Douglas Fire Complex created a mixture of light, moderate, and severe burn conditions in the project area, reducing habitat suitability in owl territories by reducing midstory and overstory canopy components in the moderate and severe burn areas. The canopy loss reduced the amount of nesting habitat, and in the severe burn areas, foraging and dispersal components of the habitat were also removed. Seven sites have been occupied by a single owl once or less in the past six years (Table 21). These sites typically have occasional owls that are identified as residents in adjacent sites.

Home Range Circle is an approximation of the median home range size used by spotted owls in the Klamath Province. Medford District uses the median home range estimated for southwestern Oregon of 3,340 acres or a circle with a radius of 1.3 miles. The Home Range Circle provides a coarse but useful analogue of the median home range for northern spotted owl (Lehmkuhl and Raphael 1993, Raphael et al 1996). Although it provides an imprecise estimate of actual home ranges, the home range circle approach has been used to show that stand age/structure, patch size, and configuration within the circle influences the likelihood of occupancy. When less than 40 to 60 percent of the circle is in NRF habitat, the likelihood of spotted owl presence is lower, and survival and reproduction may be reduced (Thomas et al. 1990, Bart and Forsman 1992, Bart 1995, and Dugger et al. 2005). Therefore, the home range circle is a useful analytical scale for the purpose of quantifying habitat and the impact to owl sites from proposed habitat modification. The provincial home ranges of several owl pairs may overlap.

Core Area Circle occurs within the home range circle, and has a radius that captures the approximate core use area, defined as the area around the nest tree that receives disproportionate use (Bingham and Noon 1997). The Medford District uses a 0.5 mile radius (~500 acre) circle to approximate the core area. Research has indicated that the quantity and configuration of “older forest” (analogous to Nesting Roosting Foraging Habitat) provides a valid inference into the likelihood of occupancy (Hunter et al 1995), survival, and reproduction (Franklin et al 2000, Zabel et al 2003, Olson et al 2005, Dugger et al, 2005, Dugger et al 2011). Generally survival and reproduction are supported when there is between 40 and 60 percent older forest within the core (Dugger et al 2005), but local conditions and possibly pair experience, contribute to large variance in actual amounts for individual owls. The amount of habitat within an approximate 0.5 mile radius provides reliable predictor of occupancy, and the quantity and configuration have been shown to provide reasonable inferences into survival and reproduction. Core areas represent the areas that are defended by territorial owls and generally do not overlap the core areas of other owl pairs (Dugger et al. 2005, Zabel et al. 2003, Bingham and Noon 1997). Rosenberg and McKelvey (1999) reported that spotted owls are “central place” animals with the core area being the focal area. Owls often switch nest trees and use multiple core areas over time, possibly in response to local prey depletion or loss of a particular nest tree

Nest Patch circle occurs within the core area circle, and is the 300-meter radius (70 acres) around a known or likely nest site and is included in the core and home range area. Nest area arrangement and nest patch size have been shown to be an important attribute for site selection by spotted owls (Swindle et al. 1999, Miller 1989, and Meyer et al. 1998). Models developed by Swindle and Perkins (2000) showed that the 200-300 meter radius (and sometimes greater), encompassing approximately up to 75 acres, around a nest is important to spotted owls. The nest patch size also represents key areas used by juveniles prior to dispersal. Miller (1989) found that on average, the extent of forested area used by juvenile owls prior to dispersal averaged approximately 70 acres. Owls often switch nest trees and use multiple nest areas over time, possibly in response to local prey depletion or loss of a particular nest tree.

These three areas represent how NSOs utilize the forest environment around their nest sites, and the importance of the habitat located within each spatial scale to a given NSO pair. They also provide a better understanding of how habitat altering treatments may affect NSOs life functions, depending on where the treatment would occur in relation to known NSO nest sites.

Habitat threshold levels are not absolute levels of likelihood of occupancy and reproduction, as the response of resident owls to the environment depends on many factors, such as weather, prey species availability and density, the quality and placement of habitat, competition for resources from other species, retention of suitable habitat on private forest land, and many other biotic and abiotic factors. Private forested land contributes to habitat, but is not included in this analysis because it is often harvested and on short rotations, therefore available habitat may be significantly higher in many of these sites, but is not expected to contribute to long term spotted owl management. Some sites within the analysis area are significantly below thresholds on federal land, but are consistently occupied with breeding pairs.

Table 21: Environmental Baseline of NRF Habitat Pre/ Post Fire Known for Northern Spotted Owl Sites

SITE (Territory)	Pre-Fire NRF on Federal Lands							Post-Fire NRF on Federal Lands					
	# Of Years Survey	#Years With Pairs[2] last 6 years	# Young last 6 years	Home Range Acres	Home[3] Range %	0.5 Mile Core Acres	0.5 Mile Core[4] %	Home Range Acres	Home[3] Range %	Home Range Change	0.5 Mile Core[4] Acres	0.5 Mile Core %	0.5 Mile Core Change
0376O	31	0	0	609	18%	30	6%	558	16%	- 2%	30	6%	0
0377B				734	22%	196	39%	734	22%	0	196	39%	0
0895B	28	6	5	857	25%	205	41%	851	25%	0	205	41%	0
0896O[1]	21	0	0	1020	30%	164	33%	1003	29%	- 1%	164	33%	0
0903O[1]	26	5	1	915	27%	242	48%	767	23%	- 4%	240	48%	0
0906A	28	2	0	854	25%	180	36%	708	21%	- 4%	173	35%	-1%
0907A[1]	27	5	1	733	22%	313	63%	210	6%	- 16%	35	7%	-56%
0919O[1]	21	0	0	715	21%	74	15%	641	19%	- 2%	23	5%	-10%
1911C	27	3	2	1147	34%	185	37%	548	16%	- 18%	79	16%	-21%
1913C	23	2+	0	1078	32%	164	33%	1068	31%	- 1%	164	33%	0
1989O	26	0+	0	892	26%	214	43%	790	23%	- 3%	214	43%	0
2016A	25	5	0	1103	32%	323	65%	1015	30%	- 2%	323	65%	0
2080A[1]	25	4	2	1178	35%	168	34%	1105	32%	- 3%	151	30%	-4%
2211O[1]	23	5	1	1438	42%	262	52%	1361	40%	- 2%	253	51%	-1%
2212A	24	6	3	730	21%	97	19%	387	11%	- 10%	75	15%	-4%
2213O[1]	23	0	0	741	22%	204	41%	550	16%	- 6%	148	30%	-11%
2248O[1]	24	6	0	1256	37%	151	30%	1046	31%	- 6%	113	23%	-7%
2274O[1]	24	4	2	1058	31%	354	71%	716	21%	-10%	172	34%	-37%
2298A	24	6	5	1093	32%	176	35%	939	28%	- 4%	175	35%	0
2619O	12	No survey	No survey	2253	66%	368	74%	2237	66%	0	368	74%	0
2622A	23	5	0	965	28%	173	35%	851	25%	- 3%	173	35%	0
2664O[1]	13	0	0	1352	40%	385	77%	563	17%	- 23%	256	51%	-26%
3271O[1]	22	0	0	1138	33%	322	64%	953	28%	- 5%	318	64%	0

SITE (Territory)	Pre-Fire NRF on Federal Lands							Post-Fire NRF on Federal Lands					
	# Of Years Survey	#Years With Pairs[2] last 6 years	# Young last 6 years	Home Range Acres	Home[3] Range %	0.5 Mile Core Acres	0.5 Mile Core[4] %	Home Range Acres	Home[3] Range %	Home Range Change	0.5 Mile Core[4] Acres	0.5 Mile Core %	0.5 Mile Core Change
4515O	17	3	1	911	27%	201	40%	858	25%	- 2%	199	40%	0
4534O	16	5	2	920	27%	158	32%	866	25%	- 2%	157	31%	-1%
4565O	14	3	1	746	22%	152	30%	489	14%	- 8%	151	30%	0
4575A	13	4	1	976	29%	155	31%	789	23%	- 6%	155	31%	0
4577A	13	2	2	1425	42%	299	60%	525	15%	- 27%	81	16%	-44%
4578O[1]	13	0	0	998	29%	213	43%	977	29%	0	199	40%	-3%
4579O	13	1	0	1514	45%	163	33%	1463	43%	- 2%	163	33%	0
4603B[1]	12	1[+]	0	1012	30%	162	32%	870	26%	- 4%	140	28%	-4%
4604O	12	6	1	833	24%	124	25%	529	16%	- 8%	101	20%	-5%
4605O	12	6	1	942	28%	111	22%	521	15%	- 13%	51	10%	-12%
4606O	12	6	4	797	23%	94	19%	490	14%	- 9%	50	10%	-9%
4607O	12	0	0	747	22%	152	30%	699	21%	- 1%	150	30%	0
4623O	11	0+	0	848	25%	101	20%	829	24%	- 1%	101	20%	0
4670O[1]	10	2+	0	967	28%	193	39%	751	22%	- 6%	169	34%	-5%
4690O	12	4+	4	1348	40%	204	41%	1166	34%	- 6%	187	37%	-4%

[1]Barred owl response multiple years
[2]Pairs or male and female with unknown status
[+] Two or more years with resident single owl responses (in addition to any Pair years)

Northern Spotted Owl Habitat

For the purposes of this analysis, the vegetation within the Douglas EA Project Area was typed into habitat categories pertinent to the northern spotted owl. These habitat types are used throughout this document to describe and quantify habitat conditions across the landscape.

Nesting, Roosting, and Foraging (NRF) Habitat for the northern spotted owl consists of habitat used by owls for nesting, roosting, and foraging. Generally, this habitat is multistoried, 80 years old or older (depending on stand type and structural condition), and has sufficient snags and down wood to provide opportunities for nesting, roosting, and foraging. The canopy closure generally exceeds 60 percent, but canopy closure or age alone does not qualify a stand as NRF. Other attributes include a high incidence of large trees with various deformities (e.g. large cavities, broken tops, mistletoe infestations, and other evidence of decadence), large snags, large accumulations of fallen trees and other woody debris on the ground, and sufficient open space below the canopy for owls to fly (Thomas et al., 1990). In southwest Oregon, NRF habitat varies greatly, but is typified by mixed-conifer habitat, recurrent fire history, patchy habitat components, and a higher incidence of woodrats (a high quality spotted owl prey species). It may consist of somewhat smaller tree sizes. One or more important habitat components, such as dead down wood, snags, dense canopy, multistoried stands, or mid-canopy habitat, might be lacking or even absent in portions of southwest Oregon. NRF habitat also functions as dispersal habitat.

Post-Fire Foraging habitat (PFF) conditions for the northern spotted owl is habitat that functioned as NRF before the fire and burned at high and moderate burn severity levels (BARC soil severity data). Even with the loss of canopy cover and key habitat components, this habitat may still provide some foraging habitat after the fire, depending on patch size, edge type, and proximity to known owl sites (Bond et al 2002, Bond et al. 2009; Clark et al. 2011, and Clark et al. 2013), but no longer meets the full function of suitable (NRF) habitat. Research has indicated that the quantity and configuration of "older forest" (analogous to NRF Habitat) provides a valid inference into the likelihood of occupancy (Hunter et al 1995), survival, and reproduction. (Franklin et al 2000, Zabel et al 2003, Olson et al 2004, Dugger et al, 2005, Dugger et al 2011). Post-fire foraging habitat doesn't provide "older forest" conditions described in the research. The increased vulnerability to small rodents provides a temporary increase in prey availability for several years particularly near the edges of the disturbance. The pre-and post- fire NRF habitat acres for spotted owl sites in the Medford Douglas Action Area are displayed in Table 21. This table demonstrates the degree of change from the fires at the home range and 0.5 mile core area scales and will provide the current habitat baseline on Federal lands and to help with effects determinations from the proposed actions.

Highly suitable, or RA 32 habitat (Recovery Action 32 in the spotted owl Recovery Plan), is a sub-set of NRF habitat. Under the NSO Recovery Plan, the US Fish and Wildlife Service recommends agencies maintain substantially all of the older and more structurally complex, multilayered conifer forests on Federal lands. These forests are characterized as having large diameter trees, high amounts of canopy, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags and large coarse wood (USFWS 2011). Stands proposed for harvest in the Douglas EA Project Area were evaluated for RA 32.

Dispersal habitat will be used to describe dispersal-only habitat. Thomas et al (1990), defined dispersal habitat as forested habitat more than 40 years old, with canopy closure more than 40 percent, average diameter greater than 11 inches, and flying space for owls in the understory and does not provide the components found in NRF. It provides temporary shelter for owls moving through the area between NRF habitats and some opportunity for owls to find prey; but it does not provide all of the requirements to support an owl throughout its life. Dispersal will be used throughout this document to refer to habitat that does not meet the criteria to be NRF habitat, but

has adequate cover to facilitate movement between blocks of NRF habitat. Dispersal habitat is variable, and may include hardwood stands.

Capable habitat is currently not spotted owl habitat, but can become NRF or dispersal in the future as trees mature and canopy fills in.

Non-suitable habitat does not provide habitat for spotted owl and would not develop into NRF or dispersal in the future (open prairies, meadows, shrub lands, etc.)

Spotted Owl Prey Base includes dusky-footed woodrats, a primary prey species for spotted owls in southwest Oregon, found in high densities in early-seral or edge habitat (Sakai and Noon 1993, 1997). Down wood is an important habitat feature for these major prey species in southwest Oregon. Dusky-footed woodrats build stick nests, sometimes incorporating logs or the base of trees as part of the structure. Northern flying squirrels are another major source of owl prey in southwest Oregon, while red tree voles (RTVs) may comprise only approximately 2.6 % of the diet of spotted owls in this area (Forsman 2004). In a post-wildfire environment, there may be a shift in prey species to rodents on the forest floor where fire has removed cover, making rodents more vulnerable.

Northern Spotted Owl Critical Habitat
Critical habitat is designated under the Endangered Species Act of 1973 and was designated for the northern spotted owl first in 1992. Portions of the proposed action are within the 2012 designated critical habitat and the effects to critical habitat are addressed below. The final CHU rule was published in the Federal Register on December 4, 2012 (Federal Register 2012) and became effective January 3, 2013.

The 2012 critical habitat designation encompasses approximately 9.6 million acres; 1.2 million acres of that is BLM-OR Oregon and California Lands/Coos Bay Wagon Road lands (O&C). Of the 1.2 million acres: approximately 78% (~937,000 acres) is Congressionally reserved or designated as" Late Successional Reserve" under the Northwest Forest Plan (NWFP) and approximately 22% (~263,000 acres) is designated as "Matrix" under the NWFP. The proposed action is within Critical Habitat Unit 9, subunit KLW-1.

Unit 9: Klamath West (KLW) Critical Habitat Unit
Unit 9 contains nine subunits, and consists of the western portion of the Klamath Mountains Ecological Section. This region is characterized by very high climatic and vegetative diversity resulting from steep gradients of elevation, dissected topography, and the influence of marine air (relatively high potential precipitation). These conditions support a highly diverse mix of mesic forest communities such as Pacific Douglas-fir, Douglas-fir tanoak, and mixed evergreen forest interspersed with more xeric forest types. Overall, the distribution of tanoak is a dominant factor distinguishing the Western Klamath Region. Douglas-fir dwarf mistletoe is uncommon and seldom used for nesting platforms by northern spotted owls. The prey base of northern spotted owls within the Western Klamath is diverse, but dominated by woodrats and flying squirrels.

KLW-1 Subunit Analysis Area
The KLW-1 subunit consists of approximately 147,326 acres and occurs in Douglas, Josephine, Curry, and Coos Counties, Oregon, and comprises lands managed by the State of Oregon and the

BLM. Of this subunit 7,682 ac (3,109 ha) are managed by the State of Oregon for multiple uses including timber revenue production, recreation, and wildlife habitat. Federal lands are managed as directed by the NWFP (USDA and USDI 1994, entire). Special management considerations or protection are required in this subunit to address threats to the essential physical or biological features from current and past timber harvest, losses due to wildfire and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function for demographic support to the overall population and for north-south and east-west connectivity between subunits and critical habitat units. This subunit sits at the western edge of an important connectivity corridor between coastal Oregon and the western Cascades.

500 Acre Core Area Scale

According to the 2012 Final CHU rule (Federal Register 2012), Section 7 consultations need to consider the temporal and spatial scale of impacts a proposed action may have on the PCEs. The USFWS recommends using a scale that is relevant to the needs and biology of the spotted owl and believes the 500 acre core area scale is a reasonable metric for land managers to use as a screen when assessing effects on critical habitat. This 500 acre analysis approach was recommended in the final critical habitat rule, and in order to be consistent with recent critical habitat effects analyses, the 500 acre analysis will be used in this BA. To conduct this recommended analysis, the BLM delineated 500 acre (0.5 mile radius) circles around centroids of proposed treatment units that would remove or downgrade NRF habitat acres within critical habitat. These units represent the areas of critical habitat that would be most impacted by the proposed action and were used to determine potential localized effects to the critical habitat.

Based on current research on the life history, biology, and ecology of the northern spotted owl and the requirements of the habitat to sustain its essential life history functions, the Service has identified the following primary constituent elements (PCEs) for the spotted owl:

1) Forest types that may be in early, mid, or late-seral states and support the spotted owl across its geographical range.

2) Habitat that provides for nesting and roosting (NR). This habitat must provide:

a. Sufficient foraging habitat to meet the home range needs of territorial pairs of northern spotted owls throughout the year.
b. Stands for nesting and roosting that are generally characterized by:
    i. Moderate to high canopy closure (60 to over 80 percent),
    ii. Multilayered, multispecies canopies with large (20- 30 in (51-76 cm) or greater DBH) overstory trees,
    iii. High basal area (greater than 240 ft2/acre (55 m2/ha)),
    iv. High diversity of different diameters of trees,
    v. High incidence of large live trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence)
    vi. Large snags and large accumulations of fallen trees and other woody debris on the ground, and
    vii. Sufficient open space below the canopy for northern spotted owls to fly.

3) Habitat that provides for foraging (F), which varies widely across the northern spotted owl's range, in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions (see specific description for the Klamath province below).

4) Habitat to support the transience and colonization phases of dispersal (D), which in all cases would optimally be composed of nesting, roosting, or foraging habitat (PCEs (2) or (3)), but which may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat. In cases where nesting, roosting, or foraging habitats are insufficient to provide for dispersing or nonbreeding owls, the specific dispersal habitat PCEs for the northern spotted owl may be provided by the following:

a) Habitat supporting the transience phase of dispersal, which includes:
   i. Stands with adequate tree size and canopy closure to provide protection from avian predators and minimal foraging opportunities; in general, this may include, but is not limited to, trees with at least 11 in (28 cm) DBH and a minimum 40 percent canopy closure; and
   ii. Younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, if such stands contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase.
b) Habitat supporting the colonization phase of dispersal, which is generally equivalent to nesting, roosting, and foraging habitat as described in PCEs (2) and (3), but may be smaller in area than that needed to support nesting pairs.

Specific Klamath Province Foraging Habitat PCEs:

- Stands of nesting and roosting habitat; in addition, other forest types with mature and old-forest characteristics;
- Presence of the conifer species, incense-cedar, sugar pine, Douglas-fir, and hardwood species such as big leaf maple, black oak, live oaks, and madrone, as well as shrubs;
- Forest patches within riparian zones of low-order streams and edges between conifer and hardwood forest stands;
- Brushy openings and dense young stands or low-density forest patches within a mosaic of mature and older forest habitat;
- High canopy cover (87 percent at frequently used sites);
- Multiple canopy layers;
- Mean stand diameter greater than 21 in (52.5 cm);
- Increasing mean stand diameter and densities of trees greater than 26 in (66 cm) increases foraging habitat quality;
- Large accumulations of fallen trees and other woody debris on the ground;
- Sufficient open space below the canopy for northern spotted owls to fly.

Table 22: Critical Habitat Baseline Critical Habitat Subunit KLW-1

CHU / Sub-Unit	NRF	Dispersal - Only	Dispersal (NRF + Dispersal Only)	Unsuitable	Non-Habitat	Total (Dispersal + Unsuitable + Non-Habitat)
9/ KLW-1	72,396	46,649	119,045	27,396	560	147,001

* Total Unit acres, Source: NRF/Dispersal removal and downgrade acres from Medford BAs and changes from fires, subtracted from the USFWS NSOCH_2012_Baseline_Summaries_Dec19_2012 Data.

Survey and Manage Species With Ranges Overlapping the Project Area

Red Tree Vole

The Project Area area occurs within the range of the red tree vole, a 2001 ROD Survey and Manage species (Category C, survey and manage known sites). The red tree vole (RTV) is an arboreal rodent species found primarily in late-successional (late-successional, old-growth, large conifer, mature, structurally complex) forests (Gillesburg and Carey 1991, Carey 1991), feeding on conifer needles and the tender twig bark. Swingle and Forsman (2009) found that home ranges varied from a nest tree and a few adjacent trees, to nests spaced up to 532 feet apart in different trees, with mean home ranges approximately 0.43 acres. Trees containing tree vole nests are significantly larger in diameter and height than those without nests (Gillesberg and Carey 1991). They have very low dispersal capabilities. Red tree voles have been known to cross logging roads, first-order streams, small canopy gaps, suggesting that small gaps (up to 82 feet) may not greatly impair tree vole movement (Federal Register 2011 Vol 76).

Red tree voles depend on conifer tree canopies for nesting, foraging, travel routes, escape cover, and moisture (Carey 1991). Douglas-fir needles provide the primary food and building materials for nests. The broad management objective for this species under the Survey and Manage program is to retain sufficient habitat to maintain its potential for reproduction, dispersal, and genetic exchange, and to provide for reasonable assurance of species persistence. They are currently grouped into Category C (not all known sites or populations are likely to be necessary for reasonable assurance of persistence, (USDA USDI 2001 ROD S&G p.10). RTV surveys were conducted (approximately 135 acres) where green tree patches approximately 0.3 acres in size and at least 80 years old or older, which may have habitat removed to facilitate the harvesting of fire-killed trees, and to aid in the determination of significant negative effects (USDA USDI 2001 ROD S&G p.22). Surveys located 6 active sites.

Great Gray Owl

The Project area occurs within the range of the great gray owl, a 2001 ROD Survey and Manage species (Category C, survey and manage known sites). Great gray owls nest in a varied array of open forests associated with grassy areas suitable for their preferred prey species (e.g., voles, moles, gophers). Broken-top trees, abandoned raptor nests, mistletoe clumps, and other platforms provide suitable nest structures (USDA and USDI 2004). Foraging habitat is described as relatively open, grassy habitats, such as bogs, natural meadows, open forests and recent selective/regeneration harvest areas. The majority of the forested stands present around the Project Area are dense, steep and do not provide an open, grassy understory condition typical of GGO habitat. Late-successional stands offer potential nesting habitat adjacent to foraging habitat in agricultural pastures or natural meadows, however, the forest stands are typically

densely vegetated with high overstory canopy, and moderate understory, and are not typical of the open understory described in the protocol. The natural forest opening often have brush, and serpentine rock or basalt surface rock intrusions and are not typical of known occupied sites. The protocol does not recommend surveys for man-made openings. Historical surveys conducted within Grave Creek and Middle Cow Creek watersheds west of highway I-5 (1998-2011), have not detected resident owls. The Project Area is not considered suitable habitat for owls. It is unlikely that populations reside in the Planning Area, and no significant negative effects are expected to occur from the Proposed Action toward the continued persistence and viability of the species, and this species will not be analyzed further.

Del Norte Salamander

The planning area occurs within the range of the Del Norte salamander, a 2001 ROD Survey and Manage species (Category D, manage known sites). This species occurs in talus slopes protected by overstory canopy that maintains cool, moist conditions on the ground. The species is a slope-valley inhabitant, and sometimes occurs in high numbers near riparian areas. Riparian Reserves, in combination with Late-Successional Reserves and other reserves, will offer some protection to the species but significant numbers also occur in upland areas. Occupied talus areas have been recorded from past project surveys or incidental observations, throughout the planning area, with occupied talus occurring in and adjacent to proposed action units. Suitable habitat (talus and sufficient canopy cover to provide suitable microclimate conditions) occurs throughout the planning area, and in adjacent 5th field watershed outside of the project area. Historical occupied talus patches (approximately 350 acres) occur within or overlap portions of proposed units 3-1, 9-1, 9-1D, 9-4, 11-2, 11-4, 12-5A, 13-4, 13-4A, 17-2 , 21-4, 23-A, 23-10C, 25-6 , 27-2A (Table 4). Approximately 50% of all detections within the planning area have occurred in riparian reserves. Approximately 50% of the occupied talus area that overlaps proposed units occurs outside of proposed units. Approximately 150 acres of previously occupied talus occurs within proposed units within severe burned areas that no longer provide suitable microclimate habitat conditions for Del Norte salamanders (Welsh and Lind 1995). Fire severity has removed overstory canopy to well below 40% canopy, and removed duff, brush, and understory vegetation. Salamanders may still occur in the severe burned areas where rock talus depth was sufficient to protect from heat and smoke and depleted oxygen. However, the change in surface conditions is likely to result in reduced surface activity (foraging, breeding, dispersal) due to less cover, food, and increased climatic extremes (surface freezing and heating, dessication) and reduced numbers of adults. These sites are not expected to contribute significantly to population persistence within the project areas. Retention of existing down coarse wood, and 4 snags per acre provides a source of future legacy coarse wood and bark as cover objects and surface microclimate habitat.

Discretionary and Non-discretional road safety actions may occur along road systems in the severely burned talus areas. The felling of trees and potential removal of hazardous trees may cause disturbance to the historically occupied talus and may overlap or be adjacent to proposed action units (Table 5). Non-discretionary and safety-related felling and removal of trees is exempt from Survey and Manage Guidelines, and may occur at any time of the year, causing disturbance to talus that may lead to compaction and reduction of the interstitial spaces, and disturbance to surface feeding or breeding. This would lead to degradation of affected talus areas already no longer suitable due to vegetation removal from the fire. Due to the large and expansive size of most talus areas that tend to ungulate across slopes and drainages, and that

talus quality tends to improve as it descends toward lower slopes and riparian areas and away from most roads, it is unlikely these actions would cause a measurable decrease in local salamander distribution and populations.

As natural or replanted revegetation, duff recruitment, and vegetative canopy cover occurs to improve and stabilize microclimate, the talus areas will regain suitability.

Oregon shoulderband snail
(Survey and Manage and Special Status Species)
The planning area occurs within the range of the Oregon shoulderband snail, a 2001 ROD Survey and Manage species (Category B_4, equivalent effort surveys, manage known sites) and BLM Special Status Species. The typical habitat of known sites of the Oregon shoulderband snail within the Grave Creek Watershed occur in Riparian Reserves, hardwood/grasslands, shrub/talus, exposed serpentine rock or rocky outcrops. The presence of seeps, springs and intermittent flows through these area tend to increase occupancy (USDA USDI 2004c). The species is not dependent on late-successional habitat. The Oregon shoulderband snail may occur within the project area based on the species general habitat type, and known sites adjacent to the planning area. Historical mollusk pre-project clearance surveys surveyed approximately 2000 acres within the Planning Area, and had no detections. Additional Del Norte salamander surveys for multiple projects within the Planning Area also surveyed talus and rock outcrops in forested areas and did not detect any shoulderband snails. This species has adapted to a fire environment, and during dry months and dry conditions, retreats to cracks and crevices to avoid desiccation, and would survive fire events. The fire has removed most duff and surface leaf litter, and exposed talus areas, which may reduce habitat suitability in the severely burned areas, but is unlikely to remove rock outcrop/talus habitat or potential occurrence within the habitat. The increase of fire-killed trees in riparian reserves and untreated upland moderate and high severity burn areas is expected to provide an abundant source of undisturbed talus, and a net increase of snags with and down wood across the landscape, providing bark and coarse wood as surface cover objects. The proposed action is not expected to remove suitable habitat, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

<u>BLM Bureau Sensitive Species</u>
Bureau Special Status Species (SSS) are species listed or proposed for listing under the ESA and species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. The SSS list was most recently updated in January 2012 (USDI BLM IM-OR-2012-018). This list has two categories: Sensitive and Strategic. Medford 1995 RMP guidance states, “Manage for the conservation of Federal candidate and Bureau-sensitive species and their habitats so as not to contribute to the need to list, and to contribute to the recovery of the species.” Per BLM Manual 6840 (Section .06), Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA or other provision of the BLM Manual 6840.02. The RMP requires that the BLM manage, over time and across the landscape, so as to not contribute to the need to list a species, and not for every action, to contribute to the recovery of the species. Project implementation will adhere to the requirements set forth in Section 6840.2.C. According to BLM Special Status Species Management (USDI BLM 2008), only

Sensitive species are required to be addressed in NEPA documents. All Sensitive species were considered and evaluated for this project, and only those that could be impacted by the proposed actions are discussed in more detail.

Fisher

Fisher, a mammal from the weasel family, is found in forest woodland landscape mosaics that include conifer-dominated stands. Their occurrence is closely associated with low- to mid-elevation forests (generally less than 4,100 feet) with a coniferous component, large snags or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor (Aubry and Lewis 2003). Forest type is probably not as important to fishers as the vegetative and structural complexity that lead to abundant prey populations and potential den sites (Lofroth et al. 2010). Fishers do not appear to occur as frequently in early-successional forests as they do in late-successional forests in the Pacific Northwest (Powell and Zielinski 1994), but they will use harvested areas if patches of habitat with residual components (i.e., logs, hardwoods) and areas where patches of larger trees are left in the landscape (Lofroth et al. 2010). In addition, Buskirk and Powell (1994) hypothesized that the physical structure of the forest and prey associated with forest structures are the critical features that explain fisher habitat use, not specific forest types. Prey and scavenged remains recovered from den and rest sites in southwest Oregon include rabbit, ground squirrel, flying squirrel, woodrat, opossum, skunk, porcupine, bobcat, deer and elk carrion, jay, woodpecker, grouse, berries, and yellow jackets (Lofroth et al. 2011; Aubry and Raley 2006.

The U.S. Fish and Wildlife Service (FWS) published a finding in April 2004 that a petition to list fishers as a “Federally Threatened” species was warranted but precluded by higher priority listing actions. The species remains a USFWS candidate species (Federal Register 2004 Vol. 69 No.68). An interagency team of Federal agency and State biologists from British Columbia, Washington, Oregon, and California completed a draft Conservation Strategy (LeFroth et al 2011). The FWS announced the opening of an information gathering period regarding the Status Review of the West Coast Distinct Population Segment of the Fisher as Endangered or Threatened throughout the range of its West Coast distinct population segment (DPS) in the Federal Register (2013 Vol. 78, No. 53) on March 19, 2013. Fishers currently remain a BLM Bureau Sensitive Species.

Fisher surveys using camera stations have been conducted at a cumulative 31 locations within the Planning Area in 2000, 2001, 2002, and 2009 with no detections. The extent (dispersal, foraging, or breeding) to which the Douglas Fire Complex Recovery Project area is used by fisher is not known, however, the absence of detections from camera surveys and hair tubes and few reported potential sightings from BLM field personnel, indicates that no resident population occurs and that it is likely unoccupied, or an area of low and or incidental use. Retained large snags and down wood and untreated riparian and upland burn areas provides abundant snags and large down wood. The proposed action is not expected to remove suitable habitat, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Bald Eagle

The bald eagle is a Bureau Sensitive Species and is also protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. There are no known bald eagle nests in

or adjacent to the Planning Area, although occasional observations occur near Cow Creek and West Fork Cow Creek that foraging occurs along these major creeks. The proposed action is not expected to remove suitable habitat, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Townsend's big-eared bat

Townsend's big-eared bat**s** are found in the western U.S. in habitats that include conifer forest (Verts and Carraway 1998). Townsend's big-eared bats typically roost and hibernate in mines and caves, but have been found roosting in hollow trees, as well (Fellers and Pierson 2002). Townsend's big-eared bats are known to occur with the planning area due to the presence of mining adits and shafts which may provide some suitable habitat. There are no known suitable or occupied caves, adits, shafts, hibernacula or maternal colonies that are expected to be negatively impacted by the proposed action. The proposed action is not expected to remove suitable habitat, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Pallid bat

Pallid bat**s** west of the Cascade Range are restricted to the drier interior valleys of the southern portion of the state. They are usually found in brushy, rocky terrain, but have been observed at edges of coniferous and deciduous woods and open farmland (Verts and Carraway 1998). Roost habitat includes buildings, bridges, large decadent snags, and rock outcrops. Pallid bats have not been confirmed but could be present within in the project area. Retention of large snags and dominant trees with cavities within units, and surrounding large rock outcrops to maintain suitable spotted owl habitat also provides potential habitat for the pallid bat. The increase of fire-killed trees in riparian reserves, areas withdrawn from harvest, and untreated upland moderate and high severity burn areas is expected to provide a net increase of snags for the species in the form of snags with loose bark or cavities. The proposed action would maintain an increased level of snags for the pallid bat in the planning area and would not negatively affect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Fringed myotis bat

Fringed myotis bats appear adapted to live in areas with diverse vegetative substrates. They are associated with a variety of habitats including conifer forests and oak woodlands, boulders with cracks. They roost in buildings, bridges, caves and mines, and in crevices and cavities in large trees and snags. (Verts and Carraway 1998). Fringed myotis bats have not been confirmed but could be present within in the Planning Area. The increase of fire-killed trees in riparian reserves, areas withdrawn from harvest, and untreated upland moderate and high severity burn areas is expected to provide a net increase of habitat for the species in the form of snags with loose bark or cavities. The proposed action would maintain an increased level of snags for the pallid bat in the planning area and would not negatively affect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Johnson's Hairstreak Butterfly

The Johnson's hairstreak butterfly is dependent on conifer mistletoe for egg-laying and for food in its larval stage. The host plants are dwarf mistletoes and other mistletoes. It spends much of its lifespan in and near the tops of conifer trees, although it descends to ground level for nectaring (including Oregon grape, Pacific dogwood, ceanothus, pussy paws, and rasberry/blackberry species), and to visit moist muddy areas as a source of water. Surveys for the species are difficult as it spends the majority of its lifecycle high in the canopy of older conifers with mistletoe infection (USDA USDI 2014). It is not known or suspected to occur in the Planning Area. Removal of fire-killed trees and incidental live trees is not expected to affect the species. The proposed action is not expected to remove suitable habitat, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Western Bumblebee

This species was until recently common across much of the western United States. This species is associated with flowering plants and crops, and open grassland/ shrubland where abundant flowering plants occur and serve as a food source. The species has experienced a population decline in the last decade, likely due to introduction of non-native pathogens. (USDA USDI 2010b). It is not known or suspected to occur in the Planning Area. The proposed action is not expected to remove suitable habitat, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Pond Turtle

The pond turtle is associated with streams and ponds throughout southwestern Oregon. Egg laying sites are terrestrial and located near water sources. Over-wintering sites may be aquatic or terrestrial, sometimes several hundred yards from water. Pond turtles have been documented in Grave Creek and likely occur in the lower portions of major tributaries, and man-made ponds within the Planning Area. The proposed action avoids treatment within in riparian reserves, and therefore is not expected to affect the persistence of this species or contribute to the need list this species as threatened, therefore it will not be analyzed further.

Foothill Yellow-legged Frog

The foothill yellow-legged frog is a stream-breeding frog, often associated with larger streams with coarse substrates. However, they also have been found in smaller tributaries, and in areas with finer substrates or bedrock. They can occur in backwater habitat, such as slow water areas created by instream wood, as well as low-flow and fast-flow glide/riffle/rapid habitats, and along shallow-sloping stream banks. Breeding is documented in larger streams, but not in smaller tributaries, for example, which may be used as foraging or dispersal habitat. Adult frogs are not usually found in stream sections with moderately high or high overhanging vegetation or shade (Olson and Davis 2009). Meeting the objectives of the Aquatic Conservation Strategy would provide management for this species. No adverse effects are expected to this species, therefore it will not be analyzed further.

Peregrine Falcon

The peregrine falcon is a Bureau Sensitive species. This species nests on rock cliffs and outcrops and feeds on a variety of birds including pigeons and waterfowl. Suitable habitat does not occur within the Planning Area. The proposed action is not expected to remove suitable habitat, cause

disturbance, or effect species persistence within the planning area or project area units, or contribute to the need to list the species as threatened, therefore it will not be analyzed further.

Other Wildlife Species of Concern That May Occur Within the Planning Area
USFWS Birds of Conservation Concern and Game Birds Below Desired Condition
Resident (found year-round) and Neotropical bird species are addressed here due to widespread concern regarding downward population trends and habitat declines. The BLM has interim guidance for meeting Federal responsibilities under the Migratory Bird Treaty Act and Executive Order (EO) 13186 (Federal Register 2001). Both the Act and the EO promote the conservation of migratory bird populations. The interim guidance was transmitted through Instruction Memorandum No. 2008-050. The Instruction Memorandum relies on two lists prepared by the US Fish and Wildlife Service in determining which species are to receive special attention in land management activities; the lists are *Bird Species of Conservation Concern* (BCC) (USDI USFWS 2008a) found in various Bird Conservation Regions (Project Area is in BCR 5) and *Game Birds Below Desired Condition* (GBBDC).

Band-tailed pigeons (GBBDC) are likely to occur throughout the Planning Area. They are generally found in temperate and mountain coniferous and mixed forests and woodlands, especially pine-oak woodland, and typically nests in forested lower and mid elevation mountain areas in conifers and some hardwoods (Marshall et al. 2003 p.300). They will often forage in diverse habitats not used for nesting, including cultivated areas, suburban gardens and parks. Mineral springs and mineral graveling sites are important for mineral intake by adults, especially during the nesting season. Pigeons are highly mobile habitat generalists. Pigeons show strong fidelity to mineral sites and have been documented traveling 32 miles from a nesting site to a mineral spring (Sanders, 2012). The proposed action is not expected to remove any significant nesting habitat, or affect springs or foraging habitat. The proposed action is not expected to negatively affect the species persistence within the Planning Area, therefore it will not be analyzed further.

Mourning doves (GBBDC) are likely to occur throughout the Planning Area. They breed in variety of open habitats, including agricultural areas, open woods, deserts, open forests, clearcuts, forest edges, cities and suburbs, and is a nesting generalist (Marshall et al. 2003 p.304). A dove may have up to five or six clutches in a single year. Human alteration of original vegetation in North America is generally beneficial for this species, with creation of openings in extensive forests and plowing of grasslands for cereal-grain production of particular importance. Mourning doves are one of the most widespread avian species in North America. The proposed action is not expected to negatively affect available nesting or foraging habitat, or the species persistence within the Planning Area, therefore it will not be analyzed further.

Northern goshawk (*Accipiter gentilis laingi)* (BCC) is a subspecies that is not expected to breed as far south as southwestern Oregon, and therefore is not affected. The local subspecies (*Accipiter gentilis atricapillus)* known to occur near the proposed action is not a listed Sensitive/BCC species. It is not listed as Sensitive or Strategic species in Final State Director's Special Status Species List (USDI BLM 2011) or USFWS Birds of Conservation Concern for BCR 5. In southwestern Oregon, Northern Goshawks generally prefer mature or old-growth conifer, mixed hardwood-conifer forest with high canopy cover, for nesting. However, they have been found to also be generalists in terms of the types and ages of forests they can utilize, and

can also found in younger forests intermingled with mature trees with high canopies for nesting; foraging areas include a mosaic of large trees, snags, down logs, interspersed with openings (Marshall et al. 2003 p.152). The proposed action would not remove suitable nesting habitat. One historical site occurs within the planning area. No harvest would occur within 250 meters of the nest site. The fire did not degrade habitat within the nest area, but burned severely in adjacent forest stands. Creation of openings from harvesting, and replanting within these areas, would create early successional diversity and benefit the species by providing habitat diversity for mammal and bird prey species on federal land. Units proposed for harvest would function as foraging habitat, and would continue to function as foraging habitat after harvest. The proposed action is not expected to negatively affect available nesting or foraging habitat, or the species persistence within the Planning Area, therefore it will not be analyzed further.

Rufus hummingbirds (BCC) are likely to occur throughout the Planning Area. Breeding habitat includes coniferous forest, second growth, thickets and brushy hillsides, foraging in adjacent scrubby areas and meadows with abundant nectaring flowers. It is the most common and widespread or Oregon hummingbirds (Marshall et al 2003 p.346). They are associated with secondary succession communities and forest openings. Nest sites are located in a variety of plants and sites including shrubs and drooping lower branches of conifers and oaks. No significant amount of nesting habitat would be removed, and early successional habitat has increased as a result of moderate and severe burn areas. The proposed action is not expected to reduce breeding or foraging habitat, or negatively affect the species persistence within the Planning Area, therefore it will not be analyzed further.

Olive-sided flycatchers (BCC) are likely to occur throughout the Planning Area. They are most often associated with conifer forest openings, forest edges near natural openings (e.g., meadows, canyons, rivers) or human-made openings (e.g., harvest units), or open to semi-open forest stands. In Douglas-fir forests of northwest California, Olive-sided Flycatcher is the only common species detected more often at forest edges than in forest interior (Rosenberg and Raphael 1986). In rain forests of western Oregon, which are characterized by dense canopy closure and function as unsuitable habitat, Olive-sided flycatchers occur primarily in harvest units where at least a few large snags and live trees are retained (Marshall et al. 2003 p.374). The proposed action retains snags within treatment areas, retains untreated burned areas, and is not expected to negatively affect the species persistence within the Planning Area, therefore it will not be analyzed further.

Willow flycatcher (BCC) may occur in the Planning Area in large riparian areas. The habitat of breeding Willow Flycatchers is characterized by dense shrubs and/or tall herbaceous plants with scattered openings of shorter herbaceous vegetation. Nesting and migratory habitat in eastern and southwestern Oregon is almost exclusively riparian zones, typically willows (Marshall et al. 2003 p.378). Riparian reserves are excluded from proposed action. The proposed action is not expected to negatively affect the species preferred habitat area or persistence within the Planning Area, therefore it will not be analyzed further.

P**urple finches** (BCC) are likely to occur in the Planning Area. They are most often associated with moderately moist, open conifer forests, and edge habitat at low -to-mid elevations. They use a variety of habitats including deciduous woodlands, riparian corridors and edge habitat. It breeds in mixed conifer-hardwood forests, riparian corridors, edge habitat, and regenerating clearcuts with partial stand retention (Marshall et al. 2003 p.598). The proposed action is not

expected to negatively affect conifer forest or edge habitat. The proposed action is not expected to negatively affect the species preferred habitat area or persistence within the Planning Area, therefore it will not be analyzed further.

The golden eagle is not known to nest in the Planning Area. It is not recognized as a federal or state listed species (under the Endangered Species Act) or under the Bureau's Special Status Species program. However, protection is afforded under the Bald and Golden Eagle Protection Act and under the 1995 Medford District RMP. In Oregon, golden eagles inhabit a wide range of habitats, including shrub steppe, grasslands, juniper, open ponderosa pine, and mixed conifer/hardwood/deciduous habitats. Nests are typically built in large live ponderosa pines or Douglas-fir (>30 inches DBH) or on ledges along rims. The preferred foraging habitat is generally open areas with a shrub component that provides food and cover for small mammal prey primarily black-tailed jackrabbit and ground squirrels (Marshall et al. 2003 p.160). No change to foraging habitat or prey availability would occur. The proposed action is not expected to negatively affect this species, therefore it will not be analyzed further.

Primary Cavity nesting birds require cavities (holes) in trees for nesting and reproduction. The availability of snags is a limiting factor for snag dependent species, and there is a direct correlation between abundance of snags, and abundance of cavity nesters. Primary cavity nesting species excavate their own holes, which may also be utilized by other birds or mammals. Primary cavity nesting birds that may occur in forested habitat within the project area include acorn woodpecker, red-breasted sapsucker, downy woodpecker, hairy woodpecker, northern flicker, and pileated woodpecker (Marshall et al. 2003. A minimum of two snags per acre ≥16' dbh, of the largest available, representative of the species of the stand, averaged over no larger than 40 acres (RMP p. 40) would be retained in units where sufficient snags are available, to meet 40% population level (Neitro et al. 1985; Thomas et al. 1979). Some units would have four snags per acre (Table 5). In addition to snag retention within proposed units, moderate and severe burned mature and older stands with tree diameters > 16" occur adjacent to proposed units in riparian and upland areas.

Environmental Effects

Impacts to wildlife from the proposed actions are best measured by the predicted potential changes in stand structure within different habitat types that would result from the activities proposed under each Alternative. Quantifying the predicted changes in wildlife habitat is the best method to evaluate the potential affects to wildlife species because they reflect the modification to and the resulting functionality of the residual stand after treatment. Each wildlife species will respond differently to these stand structure changes; some may be negatively affected, others may benefit, while still others may remain unaffected. The effects to key species associated with these habitats are linked to these changes in stand structures, as well as the magnitude (total treatment acres) and intensity of the treatments. Only Federal listed, Bureau Sensitive species, and Survey and Manage species known or suspected to occur within the Planning Area and with the potential to be impacted by the proposed actions are addressed further in this EA.

3.3.2 Alternative 1—No Action

Under the No-Action Alternative, no vegetation management (salvage, road construction or decommissioning, would be implemented from the proposed action and there would be no direct, indirect, or cumulative effects to wildlife species from the proposed action. Without replanting, high severity burn stands would likely revegetate with brush and hardwoods (Fryer 2008) and delay reforestation for decades. Natural regeneration would slowly develop coniferous components. Recent trends in southwest Oregon illustrate that fire has been converting mature forest structure into earlier seral stages at a higher rate than harvest. (Courtney et al. 2004; Spies et al. 2006).

Hazardous trees posing danger to public and forest workers using roadway systems are subject to OSHA regulations, and reciprocal right-of-way agreements allow parties to remedy trees posing hazardous conditions. Fire-killed and other dead or hazardous trees may be felled and harvested along travel routes to the extent necessary for safe conditions, which may be up to 2 ½ tree lengths upslope and 1 ½ tree lengths downslope of the travel routes.

Changes to NSO habitat may occur on the landscape in the Planning Area regardless of the Douglas Fire Recovery Project. Extensive private timber and salvage harvesting has already occurred since the fire, and is likely to continue. Reciprocal Agreement areas road building is likely to occur. Most private forest lands are managed as tree farms for production of wood fiber on forest rotations. It is expected that any remaining late-seral forests on private timber lands will be converted to early-seral forest over the next one or two decades. For those species dependent on early-seral habitat, private forest lands are not expected to provide quality early successional habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are regularly treated with herbicides to reduce competition with future harvestable trees.

Spotted owl suitable habitat on private land is expected to continue to be harvested, reducing both quantity and quality of habitat, particularly in and near moderate and severe burn areas to salvage dead trees, and reduce damage from beetle borers. Severe fire-killed stands on BLM land that are not harvested would provide foraging habitat for the spotted owl especially near live forest edges, however, this may be short term foraging habitat. In the long term, it is likely to be avoided as open space, and will be reduced to capable habitat. Barred owl population is likely to increase as it has elsewhere in Oregon and Washington. The reproduction and occupancy of spotted owl sites within the spotted owl analysis is likely to decrease as a result of private harvesting, barred owl occupancy, and loss of habitat and habitat quality from the Douglas fire.

3.3.3 Alternative 2

<u>Direct and Indirect Effects</u>

Federal Threatened Species—Northern Spotted Owl

When discussing changes to spotted owl habitat, the following definitions are used to describe the anticipated effects of the activities associated with the proposed action to the NSO habitat types within the Douglas Salvage Recovery Project Area. Canopy cover is used as one of the critical habitat thresholds because it is highly important to NSO nest site selection and general habitat use, because increased levels of canopy afford protection from predators, and regulate temperature extremes (Courtney et al. 2004).

When analyzing the impacts to spotted owls from timber harvest, the amount, intensity and duration of the harvest are not the only factors to consider. A critical factor to consider is the spatial distribution of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO sites. The areas surrounding a NSO site can be delineated into three concentric circles (nest patch, core area, and home range analysis areas). These concentric circles represent three scales of use during the course of breeding and non-breeding season, and provide a means of comparing effects similarly between owls and important threshold levels. The actual landscape habitat use is not circular, but follows drainages and lower topographic slopes (Blakesley et. al., 1992; Hershey et al., 1998, McDonald et. al. 2006).

The affects to spotted owl habitat is classified by amount of removal of understory, or midstory and overstory vegetation by basal area or canopy cover. Although these are not the only habitat characteristics of a forest stand, they represent general structural changes occurring at the stand level.

Treat and Maintain NRF or Dispersal Habitat is the treatment defined when an action or activity in NRF or dispersal habitat removes some trees, but does not change the conditions that would classify the stand as NRF or dispersal post-treatment, as defined by Thomas et al. (1990). The NRF stand will retain at least 60 percent canopy cover, large trees, multistoried canopy, standing and down dead wood, diverse understory adequate to support prey, and may have some mistletoe or other decay. Basal Area removal of midstory and overstory trees from the treatment units generally would not exceed approximately 20% at the unit level. Dispersal habitat will retain at least 40 percent canopy, flying space, and trees 11 inches diameter at breast height (dbh) or greater, on average. The habitat classification of the stand following treatment will be the same as the pretreatment habitat classification.

Downgrade NRF alters the condition of spotted owl NRF habitat so the habitat no longer supports nesting, roosting, and foraging behavior. Downgraded NRF habitat has enough tree cover to support spotted owl dispersal. Downgrade is defined when the canopy cover in a NRF stand drops to 40-60 percent at the stand level, and when conditions are altered such that an owl would be unlikely to continue to use that stand for nesting, roosting and foraging. Downgraded NRF continues to provide habitat for dispersal.

Remove NRF or Dispersal alters known spotted owl NRF so the habitat no longer functions as nesting, roosting, foraging or dispersal. Removal generally drops canopy cover to less than 40 percent, alters the structural diversity and dead wood in the stand or otherwise changes the stand so it no longer supports owls for nesting, roosting, foraging, or dispersal.

Table 23: Approximate Treatment Acres and Effects by NSO Sites

NSO SITE	NRF Acres Removed			NRF Acres Downgraded			NRF Acres Maintained			PFF Acres Removed			Dispersal Acres Removed			Dispersal Acres Maintained			Effect[1]	NSO sites in CHU
	HR	Core	NP	HR	Core	NP	HR	Core	NP	HR	Core	NP	HR	Core	NP	HR	Core	NP		
0376O	0	0	0	0	0	0	1	0	0	19	0	0	0	0	0	0	0	0	NLAA	Y
0377B	0	0	0	0	0	0	1	0	0	0.1	0	0	0	0	0	0	0	0	NLAA	
0895B	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	NLAA	Y
0896O	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	NLAA	Y
0903O	0	0	0	4	0	0	19	0	0	101	5	0	0	0	0	4	0	0	Adverse	N
0906A	0	0	0	0	0	0	2	0	0	42	0	0	1	0	0	0	0	0	NLAA	Y
0907A	0	0	0	0	0	0	17	17	12	195	110	18	0	0	0	0	0	0	Adverse	N
0919O	0	0	0	0	0	0	1	1	0	28	19	8	0	0	0	0	0	0	NLAA	Y
1911C	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	NLAA	Y
1913O	1	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	NLAA	Y
1989O	0	0	0	0	0	0	1	0	0	25	0	0	1	0	0	0	0	0	NLAA	Y
2016A	0.6	0	0	0	0	0	0	0	0	38	0	0	2	0	0	0	0	0	NLAA	Y
2080A	0	0	0	0	0	0	0	0	0	23	1.5	0	0	0	0	0	0	0	NLAA	Y
2211O	0	0	0	0	0	0	0	0	0	17	.7	0	0	0	0	0	0	0	NLAA	Y
2212A	3	0	0	0	0	0	0	0	0	108	45	0	0	0	0	0	0	0	Adverse	Y
2213O	0	0	0	0	0	0	3	0	0	25	9	0	1	1	0	0	0	0	NLAA	Y
2248O	1	0	0	10	0	0	0	0	0	31	0	0	0	0	0	0	0	0	Adverse	N
2274O	0	0	0	11	0	0	5	1	0	129	38	2	0	0	0	0	0	0	Adverse	N
2298A	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	66	0	0	NLAA	Y
2619O	0.4	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	NLAA	Y
2622A	1	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	NLAA	Y
2664O	0	0	0	6	0	0	31	2	0	417	88	2	0	0	0	4	0	0	Adverse	N
3271O	1	0	0	0	0	0	0	0	0	102	2	0	0	0	0	0	0	0	Adverse	Y
4515O	0	0	0	4	4	0	3	2	0	1	.2	0	0	0	0	0	0	0	Adverse	N

NSO SITE	NRF Acres Removed			NRF Acres Downgraded			NRF Acres Maintained			PFF Acres Removed			Dispersal Acres Removed			Dispersal Acres Maintained			Effect[1]	NSO sites in CHU
	HR	Core	NP	HR	Core	NP	HR	Core	NP	HR	Core	NP	HR	Core	NP	HR	Core	NP		
4534O	5	0	0	0	0	0	0	0	0	37	0.6	0	0	0	0	0	0	0	NLAA	N
4565O	0	0	0	0	0	0	39	0	0	82	0	0	0	0	0	4	0	0	NLAA	N
4575A	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	NLAA	Y
4577A	1	0	0	0	0	0	13	0	0	444	108	19	0	0	0	0	0	0	Adverse	N
4578O	0	0	0	0	0	0	1	0	0	6	0	0	0	0	0	0	0	0	NLAA	N
4579O	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	NLAA	Y
4603B	0.4	0	0	0	0	0	0	0	0	37	8	0	1	.3	0	0	0	0	Adverse	Y
4604O	0	0	0	4	0	0	5	0	0	148	9	0	0	0	0	0	0	0	Adverse	N
4605O	0	0	0	0	0	0	3	0	0	181	24	0	0	0	0	0	0	0	Adverse	N
4606O	2	0	0	0	0	0	3	3	0	125	30	1	0	0	0	0	0	0	Adverse	N
4607O	0	0	0	1	0	0	4	1	0	47	2	0	0	0	0	0	0	0	NLAA	Y
4623O	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	NLAA	N
4670O	1.2	0.6	0	0	0	0	0	0	0	61	4	0	2	0	0	0	0	0	NLAA	Y
4690O	1	0	0	0	0	0	0	0	0	34	0	0	0.3	0	0	0	0	0	NLAA	Y

[1]NLAA= Not likely to Adversely Affect site occupancy or reproduction

Table 24: Post Fire NSO NRF/PFF Habitat on BLM managed land

	Table 1 of 2 - Post Fire NSO NRF / PFF Habitat on Federal Lands –											
NSO SITE	**HR Post Fire NRF**	**% of HR**	**Core Post Fire NRF**	**% of core**	**HR Post Fire PFF**	**% of HR**	**Core Post Fire PFF**	**% core**	**HR Post Fire NRF+PFF**	**% of HR**	**Core Post Fire NRF+PFF**	**% of core**
0376O	558	16%	30	6%	51	2%	0	0%	609	18%	30	6%
0377B	734	22%	196	39%	0.1	0%	0	0%	734	22%	196	39%
0895B	851	25%	205	41%	6	0%	0	0%	857	25%	205	41%
0896O	1,003	30%	164	33%	18	1%	0	0%	1,021	30%	164	33%
0903O	767	23%	240	48%	153	5%	5	1%	920	27%	245	49%
0906A	708	21%	173	35%	133	4%	7	1%	841	25%	180	36%
0907A	210	6%	35	7%	520	15%	275	55%	730	21%	310	62%
0919O	641	19%	23	5%	72	2%	51	10%	713	21%	74	15%
1911C	548	16%	79	16%	15	0%	0	0%	563	17%	79	16%
1913O	1,068	31%	164	33%	11	0%	0	0%	1,079	32%	164	33%
1989O	790	23%	214	43%	100	3%	0	0%	890	26%	214	43%
2016A	1,015	30%	323	65%	83	2%	0	0%	1,098	32%	323	65%
2080A	1,105	32%	151	30%	74	2%	17	3%	1,179	35%	168	34%
2211O	1,361	40%	253	51%	77	2%	8	2%	1,438	42%	261	52%
2212A	387	11%	75	15%	343	10%	22	4%	730	21%	97	19%
2213O	550	16%	148	30%	146	4%	54	11%	696	20%	202	40%
2248O	1,046	31%	113	23%	194	6%	37	7%	1,240	36%	150	30%
2274O	716	21%	172	34%	311	9%	153	31%	1,027	30%	325	65%
2298A	939	28%	175	35%	29	1%	0	0%	968	28%	175	35%
2619O	2,237	66%	368	74%	15	0%	0	0%	2,252	66%	368	74%
2622A	851	25%	173	35%	78	2%	0	0%	929	27%	173	35%
2664O	563	17%	256	51%	737	22%	116	23%	1,300	38%	372	74%
3271O	953	28%	318	64%	185	5%	4	1%	1,138	33%	322	64%
4515O	858	25%	199	40%	51	2%	2	0%	909	27%	201	40%
4534O	866	25%	157	31%	54	2%	1	0%	920	27%	158	32%
4565O	489	14%	151	30%	249	7%	0	0%	738	22%	151	30%
4575A	789	23%	155	31%	188	6%	0	0%	977	29%	155	31%
4577A	525	15%	81	16%	842	25%	218	44%	1,367	40%	299	60%
4578O	977	29%	199	40%	23	1%	13	3%	1,000	29%	212	42%
4579O	1,463	43%	163	33%	51	2%	0	0%	1,514	45%	163	33%
4603B	870	26%	140	28%	129	4%	22	4%	999	29%	162	32%
4604O	529	16%	101	20%	285	8%	23	5%	814	24%	124	25%
4605O	521	15%	51	10%	373	11%	55	11%	894	26%	106	21%
4606O	490	14%	50	10%	256	8%	41	8%	746	22%	91	18%
4607O	699	21%	150	30%	54	2%	4	1%	753	22%	154	31%
4623O	829	24%	101	20%	20	1%	0	0%	849	25%	101	20%
4670O	751	22%	169	34%	191	6%	20	4%	942	28%	189	38%
4690O	1,166	34%	187	37%	161	5%	16	3%	1,327	39%	203	41%

	Treatment Acres				Table 2 of 2 - Post Treatment NSO NRF / PFF Habitat on Federal Lands											
NSO SITE	NRF Acre Remove / Downgrade		PFF Acres Remove		HR Post Treat NRF	%	Core Post Treat NRF	%	HR Post Treat PFF	%	Core Post Treat PFF	%	HR Post Treat NRF/ PFF	%	Core Post Treat NRF/ PFF	%
	HR	Core	HR	Core												
0376O	0	0	19	0	558	16%	30	6%	32	1%	0	0%	590	17%	30	6%
0377B	0	0	0.1	0	734	22%	196	39%	0	0%	0	0%	734	22%	196	39%
0895B	0	0	3	0	851	25%	205	41%	3	0%	0	0%	854	25%	205	41%
0896O	0	0	11	0	1,003	30%	164	33%	7	0%	0	0%	1,010	30%	164	33%
0903O	4	0	101	5	763	22%	240	48%	52	2%	0	0%	815	24%	240	48%
0906A	0	0	42	0	708	21%	173	35%	91	3%	7	1%	799	24%	180	36%
0907A	0	0	195	110	210	6%	35	7%	325	10%	165	33%	535	16%	200	40%
0919O	0	0	28	19	641	19%	23	5%	44	1%	32	6%	685	20%	55	11%
1911C	0	0	3	0	548	16%	79	16%	12	0%	0	0%	560	16%	79	16%
1913O	1	0	6	0	1,067	31%	164	33%	5	0%	0	0%	1,072	32%	164	33%
1989O	0	0	25	0	790	23%	214	43%	75	2%	0	0%	865	25%	214	43%
2016A	.6	0	38	0	1,014	30%	323	65%	45	1%	0	0%	1,059	31%	323	65%
2080A	0	0	23	1.4	1,105	32%	151	30%	51	2%	15.6	3%	1,156	34%	166.6	33%
2211O	0	0	17	0.7	1,361	40%	253	51%	60	2%	7.3	1%	1,421	42%	260.3	52%
2212A	3	0	101	0.9	384	11%	75	15%	242	7%	21.1	4%	626	18%	96.1	19%
2213O	0	0	25	9	550	16%	148	30%	121	4%	45	9%	671	20%	193	39%
2248O	11	0	31	0	1,035	30%	113	23%	163	5%	37	7%	1,198	35%	150	30%
2274O	11	0	129	38	705	21%	172	34%	182	5%	115	23%	887	26%	287	57%
2298A	0	0	2.4	0	939	28%	175	35%	27	1%	0	0%	965	28%	175	35%
2619O	.4	0	1.4	0	2,237	66%	368	74%	14	0%	0	0%	2,250	66%	368	74%
2622A	1	0	29	0	850	25%	173	35%	49	1%	0	0%	899	26%	173	35%
2664O	6	0	417	88	557	16%	256	51%	320	9%	28	6%	877	26%	284	57%
3271O	1	0	102	2	952	28%	318	64%	83	2%	2	0%	1,035	30%	320	64%
4515O	4	4	0.7	0.2	854	25%	195	39%	50	1%	1.8	0%	904	27%	196.8	39%
4534O	5	0	37	0.6	861	25%	157	31%	17	1%	0.4	0%	878	26%	157.4	31%
4565O	0	0	82	0	489	14%	151	30%	167	5%	0	0%	656	19%	151	30%
4575A	0	0	23	0	789	23%	155	31%	165	5%	0	0%	954	28%	155	31%
4577A	.8	0	444	108	524	15%	81	16%	398	12%	110	22%	922	27%	191	38%
4578O	0	0	6	0	977	29%	199	40%	17	1%	13	3%	994	29%	212	42%
4579O	0	0	12	0	1,463	43%	163	33%	39	1%	0	0%	1,502	44%	163	33%
4603B	.4	0	37	8	869	26%	140	28%	92	3%	14	3%	961	28%	154	31%
4604O	4	0	148	9	525	15%	101	20%	137	4%	14	3%	662	19%	115	23%
4605O	0	0	181	24	521	15%	51	10%	192	6%	31	6%	713	21%	82	16%
4606O	1.8	0	125	30	488	14%	50	10%	131	4%	11	2%	619	18%	61	12%
4607O	1	0	47	2	698	21%	150	30%	7	0%	2	0%	705	21%	152	30%
4623O	0	0	4	0	829	24%	101	20%	16	0%	0	0%	845	25%	101	20%
4670O	1.2	0.6	61	4	750	22%	168.4	34%	130	4%	16	3%	880	26%	184.4	37%
4690O	0.9	0	34	0	1,165	34%	187	37%	127	4%	16	3%	1,292	38%	203	41%

Spotted Owl Sites With Potentially Adverse Effects from habitat modification

Removal of fire-killed trees and associated incidental green trees from proposed harvest units, logging corridors and landings, helicopter landings, and route construction, would remove roosting, foraging, and dispersal habitat that would have negative effects that are likely to adversely affect the feeding, breeding, sheltering, and dispersal of spotted owls at 13 occupied spotted owl sites and may adversely affect site occupancy (Table 23 and Table 24). Adverse effects to owls are primarily based on three factors 1) if NRF habitat is reduced at the home range and core scales, 2) if significant PFF is removed at the home range and core scales, 3) if treatments occur in the nest patch, and 4) likelihood of occupancy based on survey data. Effect determinations for this BA were based on results from recent post-fire studies on spotted owls. Results from the three radio-telemetry studies of spotted owls in post-fire landscapes indicate that spotted owls use forest stands that have been burned, but generally do not use stands that have been burned and logged. Studies suggest a negative influence of high severity wildfire on spotted owl occupancy and survival may be compounded by prior forest management or post-fire management activities (Clark et al. 2011, Clark et al. 2013). Therefore, these potential added effects from large acres of post-fire salvage are likely to result in adverse effects to the spotted owl sites. Many of these sites were also very productive sites prior to the fire. All of the adversely affected sites described below would be measurable are expected to adversely impact essential habitat for foraging, which could affect reproduction and survival of the owls the site. When foraging habitat is removed, especially in areas deficient of NRF habitat, the pair may not be able to obtain enough food to successfully fledge their young.

#0903O

Pairs have been detected at this site in 21 of the 26 years the site was surveyed and nesting occurred in 12 of these years. This site is on the edge of the fire perimeter and 16 % of the NRF habitat on federal lands at the home range was severely burned. The proposed action would remove 101 acres of PFF at the home range scale and 5 acres at the core scale, which would result in a 66% and 100% reduction of PFF at the home range and core scales. The majority of the units in the home range and all of the units in the core area occur within low habitat suitability according to the Relative Habitat Suitability (RHS) output from the MaxEnt model, indicating locations on the landscape that would not support owls over the long term. Four acres of NRF removal would occur outside of the core area, but within the home of this site from landing and route construction. The core still has contiguous NRF that extends west beyond the fire perimeter.

The proposed action is likely to have negative effects that adversely affect the occupancy of the site due to the NRF removal in a deficit home range, the high amounts of PFF removal within home range. The effects from the proposed action would be measurable and would negatively impact the site by removing habitat that may be used for foraging, which could affect reproduction, survival and occupation of owls at the site.

#0907A

No owls were detected during the 2013 survey season, but a female was located in the nest patch in late September after the fire. This demonstrates the potential site tenacity as suggested in the literature that may occur at spotted owl sites post fire. Clark (2007) found that in some instances

spotted owls were observed temporarily returning to territories even though the territory no longer functioned to support spotted owl occupancy into the future.

The majority of this site burned at high and moderate severity levels. After the fire only 6% of the home range and only 7% of the core area on federal lands contains NRF habitat, which is a reduction of 16% at the home range and 56% at the core scale. The majority of the pre-fire NRF that burned at high severity now serves as PFF. The proposed action would remove 195 acres of PFF at the home range scale and 110 acres at the core scale, which would result in a 38% and 40% reduction of PFF at the home range and core scales. Approximately 18 of the 32 acres of PFF in the nest patch would be removed. NRF would not be removed at the home range, core, or nest patch scales at this site. Only 23 acres of NRF remain in the nest patch post-fire, compared to 62 acres of NRF before the fire.

The proposed action is likely to have negative effects that adversely affect the occupancy or reproduction of the site because high amounts of PFF removal within the nest patch, core, and home range scale would be measurable and would negatively impact essential habitat for foraging, which could affect reproduction and survival of the owls the site. This site is located in a very intensively burned area of the Douglas Complex Fire.

#2112A (B,O)
This site has three nest site locations, and is analyzed as one territory based on the owl pattern of use at all three locations. Pairs have been detected at this site in 18 of the 24 years of surveys and nesting occurred in 11 of the years. A pair has been detected in 6 of the last 6 years, and the pair nested 3 of the last six years, producing 3 young. NRF habitat levels were already low at the core and home range scales of these sites and were reduced even more from the fire, especially at the Original site location. The current post-fire percentage of NRF at home range on federal lands ranges from 11-14%. The current post-fire percentage of NRF at the core scales on federal lands ranges from 13-15%. The proposed action would remove large amounts of PFF at the home range scale. The reduction of PFF measured at the home range would be approximately 29% (101ac), 33%(102ac), and 28%(108ac) when measured at the 2212A, B and O sites, respectively. The reduction of PFF at the core scale would be 4%(0.9ac) and 23%(45ac) when measured at the A and O site. PFF would not be removed within the core of the B site. The majority of the PFF removal is located on the upper slopes/ridgetops and is within low habitat suitability according to the Relative Habitat Suitability (RHS) output from the MaxEnt model. The proposed action would remove approximately 3 acres NRF habitat from road/route and landing construction that would affect the home range of all three locations.

Even though most salvage has been dropped within the core areas, the proposed action is likely to have negative effects that adversely affect the occupancy or reproduction of the site because the effects from high amounts of PFF removal in the home range would be measurable and would remove habitat for foraging, which could affect reproduction and survival of the owls the site.

#2248O/4071O
These multiple alternate and original site locations are analyzed as one territory based on the owl pattern of use at both locations. These sites are on the SW edge of the Dad's Creek fire perimeter

where primarily low to moderate burn severity occurred, so NRF habitat reduction from the fire was minimal compared to other sites. The proposed action would remove a total of 39 acres of PFF at the home range scale between these two sites. The proposed action would downgrade approximately 10 acres and remove 1.4 acres (1.08%) of NRF habitat at the home range scale of these sites. NRF habitat is below thresholds at the home range of sites in this territory. However, contiguous amounts of NRF still exist at the home range, core, and nest patch scales after the fire.

The removal and downgrade of habitat within an occupied site that is below habitat threshold at the home range is likely to have negative effects that adversely affect the occupancy of the site because NRF downgrade and removal in a deficit home range would be measurable and would negatively impact essential habitat for nesting and foraging, which could affect reproduction and survival of the owls the site.

#2274O

This site is one of the high priority sites based on the high pair and reproductive rates. The site has had pairs in 22 of the last 24 years. Most recently pairs have been observed at the site in 4 of the last 6 years and two young have been produced. Contiguous amounts of NRF still exist at the home range, core, and nest patch scales after the fire. The proposed action would downgrade approximately 11 acres of NRF habitat at the home range scale, which would result in a 1.5 % reduction of NRF at the home range scale. No NRF would be removed at the core or nest patch scales. The proposed action would remove 129 acres of PFF at the home range scale and 38 acres at the core scale, which would result in a 41% and 25% reduction of PFF at the home range and core scales. Approximately 1.6 acres would also be removed within the nest patch.

The proposed action is likely to have negative effects that adversely affect the reproduction or survival of the owls of the site in this this highly productive site because high amounts of PFF removal in the core and home range scales would be measurable and would negatively impact essential habitat for foraging, which could affect reproduction and survival of the owls the site. It would further reduce habitat levels below thresholds at the nest patch and home range levels, at an already habitat-limited site.

#2664O

This site has only had a pair once (2007) and has never produced young in the last 13 years, and no resident owls have been observed in the last 6 years. Barred owls have also been present at this site. After the fire only 17% of the home range on federal lands contains NRF habitat, and 51% of the 0.5 mile core area on federal lands contains NRF habitat. The proposed action would downgrade approximately 6 acres of NRF habitat at the home range scale, which would result in a 1 % reduction of NRF habitat at the home range scale. No NRF would be removed at the core or nest patch scales. The proposed action would remove 417 acres of PFF at the home range scale and 88 acres at the core scale, which would result in a 57% and 76% reduction of PFF at the home range and core scales. Approximately 2 acres PFF would also be removed within the nest patch.

The proposed action is likely to have negative effects that adversely affect this site, because the effects from high amounts of PFF removal in the core and home range scales would be

measurable and would negatively impact essential habitat for foraging, which would reduce foraging habitat at a site that even though habitat levels area already low, may be able support foraging owls.

#3710O
This site has only had a pair in four of the last 22 years, and no resident owls have been observed in the last 6 years. Only two nesting attempts occurred at this site and only one young was produced. This site has had a heavy barred owl presence in the past several years. The fire burned at a lower severity in the majority of this home range. After the fire 28% of the home range and 64% of the core area on federal lands contains NRF habitat. Only one acre of NRF removal would occur in the home range from landing construction. The proposed action would remove 102 acres of PFF at the home range scale and 2 acres at the core scale, which would result in a 55% and 50% reduction of PFF at the home range and core scales.

The proposed action is likely to have negative effects that adversely affect this site due to the NRF removal in a deficit home range and the large amounts of PFF removal at the home range. The effects from the proposed action would be measurable and would remove habitat for foraging, which could affect potential reproduction and survival of the owls that could occupy this site.

#4515O
This site has had a pair in 6 of the last 17 years. Recently there has been a pair detected at the site in 3 of the last 6 years and only one young was produced at the site in the last 6 years. No owls were detected during the 2013 survey season. Based on demographic analysis, this site has a pair occupancy rating of 35% and has nested 3 times in the past 17 years. This site has had a heavy barred owl presence in the past few years. Contiguous amounts of NRF still exist at the home range, core, and nest patch scales after the fire. The proposed action would downgrade approximately 4 acres of NRF habitat at the home range scale and 4 acres of NRF at the core scale, which would result in a 0.5% and 4% reduction of NRF at the home range and core scales. While these acres are relatively small they occur in contiguous patches of NRF and NRF levels are deficit at both the home range and core scales. No NRF would be removed at the nest patch scale. The proposed action would remove 0.7 acres of PFF at the home range scale and 0.2 acres at the core scale. No PFF would be removed at the nest patch scale. No harvest occurs within the core area of an alternate nest location #4515A which is mostly outside the fire perimeter.

The proposed action is likely to have negative effects that adversely affect the occupancy of the site because NRF downgrade at deficit home range and core scales would be measurable and would negatively impact essential habitat for nesting and foraging, which could affect reproduction and survival of the owls the site.

#4577A/O, 0965O
These multiple alternate and original site locations are analyzed as one territory based on the owl pattern of use at all three locations. Pairs have been detected at this territory in 8 of the last 13 years. Most recently this site was unoccupied in 2012-2013 and barred owls have been present.

The majority of the core and home range sites associated with this territory burned at high and moderate severity levels, resulting in high losses to NRF habitat. The majority of the pre-fire NRF that burned at high severity now serves as PFF.

The proposed action would remove large amounts of PFF at the home range and core scales at this territory. The reduction of PFF at the home range would be 50, 53, and 56 % at 0965O, 4577A, and 4577O, respectively. The reduction of PFF at the core scale would be 38, 50, and 59 % at 0965O, 4577A, and 4577O, respectively. The largest amounts of PFF removal at a nest patch at this territory would occur at the 04577A location, where 19 acres would be removed. The proposed action would remove approximately 0.8 acres and 0.4 acres of NRF habitat at the home range scale and core scales. NRF habitat is below thresholds at the home range and core scales at this territory.

The proposed action is likely to have negative effects that adversely affect the occupancy of the site because the high amounts of PFF removal in the nest patch, core, and home range scale would be measurable and would negatively impact essential habitat for foraging, which could affect reproduction and survival of the owls the site.

#4603B,O
These multiple alternate and original site locations are analyzed as one territory based on the owl pattern of use at both locations. Pairs have been detected at this territory in 6 of the last 12 years. Most recently this site has not had a pair since 2008. After 2008, the site was vacant in 2009, singles were present in 2010-2011, and vacant again from 2012-2013. This site was unoccupied in 2012-2013. Multiple barred owl responses have also occurred at this site in the past few years. NRF habitat levels were already low at the core and home range scales of these sites and were reduced even more from the fire. The proposed action would remove a total of 128 acres and 17 acres of PFF at the home range and core scales at this territory (between the two sites). PFF would not be removed within the nest patch. The proposed action would remove a combined total of 1.7 acres of NRF habitat at the home range scale of these sites and NRF habitat is below thresholds at the home range scale. NRF removal would also occur within high habitat suitability according to the Relative Habitat Suitability (RHS) output from the MaxEnt (Appendix C in USDI FWS 2011) model, indicating locations on the landscape to support owls over the long term. NRF would not be removed or downgraded at the core or nest patch scale. Harvest would also occur at similar levels within the original core area (#4603O).

The proposed action is likely to have negative effects that adversely affect the occupancy of the site due to the NRF removal within a deficit home range. Since this territory still has contiguous stands of NRF and singles have been present in the past few years, the site could still be occupied in the future, so effects from the proposed action would be measurable and would negatively impact essential habitat for foraging, which could affect reproduction and survival of the owls the site.

#4604O
Pairs have been detected at this site in 12 of the last 12 years and nesting occurred 6 times in the past 12 years, producing 4 young. NRF habitat levels were already low at the core and home

range scales of these sites and were reduced even more from the fire. Even though this site was productive with low NRF amounts within the core and home range prior to the fire, after the fire only 16% of the home range and 20% of the core area contain NRF on federal lands. The remaining NRF habitat post -fire, is also distributed in patchy conditions. The low habitat amounts and NRF configuration within the home range and core scales may make this site unlikely to be occupied in the future. The proposed action would remove 148 acres of PFF at the home range scale and remove 9 acres of PFF at the core scale. This would result in a 52% reduction of PFF at the home range. The proposed action would downgrade approximately 4 acres of NRF habitat at the home range scale.

The proposed action is likely to have negative effects to this site due to the NRF removal in a deficit home range and the large amounts of PFF removal at the home range. Since this has been an active site recently, the effects from the proposed action would be measurable and would remove habitat for foraging, which could affect reproduction and survival of the owls the site.

#4605O
This site is one of the high priority sites based on the high pair and reproductive rates. Pairs have been detected at this site in 12 of the last 12 years and nesting occurred in 5 of these years. The male has been located during early surveys in 2014 and the female has moved to site #4606. This site was heavily impacted from the fire with a reduction of 55% and 46% of the NRF on federal lands at the home range and core area scales. The majority of the pre-fire NRF that burned at high severity now serves as PFF. The proposed action would remove 181 acres of PFF at the home range scale and 24 acres at the core scale, which would result in a 49% and 44% reduction of PFF at the home range and core scales. PFF would not be removed in the nest patch. NRF would not be removed at the home range, core, or nest patch scales at this site. The site is currently below thresholds at the core and home range areas.

The proposed action is likely to have negative effects that adversely affect the occupancy of the site because high amounts of PFF removal in the core and home range scales would be measurable and would negatively impact essential habitat for foraging, which could affect reproduction and survival of the owls the site.

#4606O,A,B
These multiple alternate and original site locations are analyzed as one territory based on the owl pattern of use at all three locations. Pairs have been detected at this territory in 12 of the last 12 years. A pair has been located early in 2014. The female has moved from site #4605. To date, one non-nesting protocol visit has been completed. NRF habitat levels were already low at the core and home range scales of these sites and were reduced even more from the fire, especially at the original site location. The proposed action would remove large amounts of PFF at the home range and core scales at this territory. The reduction of PFF at the home range would be 33, 37, and 49% at 4606A, 4606B, and 4606O, respectively. The reduction of PFF at the core scale would be 18, 34, and 73% at 4606A, 4606B, and 4606O, respectively. The largest amounts of PFF removal at a nest patch at this territory would occur at the 4606B location, where 2.6 acres would be removed. PFF would not be removed at the nest patch of the 4606A location. The proposed action would remove a 1.8 acres and 0.9 acres of NRF habitat at the home range and core scales of these sites. These are the same unit, road and landing construction acres that are

shared by all three site locations. NRF habitat is below thresholds at the home range scale and core scales prior to treatment. NRF would not be removed or downgraded in the nest patch.

The proposed action is likely to have negative effects that adversely affect the occupancy of the site due to the NRF removal in a deficit home range and core area and the large amounts of PFF removal at the home range and core scales. Since this has been an active site recently, the effects from the proposed action would be measurable and would negatively impact essential habitat for foraging, which could affect reproduction and survival of the owls the site. Although the individual core areas and home range are below thresholds found at most viable sites, the conglomeration of these as a territory are likely to continue as viable site.

Effects to Unsurveyed Suitable Habitat

The original nest site for site #2622 has not been used for nesting since 1994 and last had a resident in 1995. The owls using the alternate location consistently for most of the years during 2001-2013 have a site center approximately 1.5 miles away from the original location. The area around the original site has existing blocks of late-successional habitat on federal land that may be sufficient to support a core area (500acre/ ½ mile radius circle) for other owls, although the resident owls found at the alternate location have been observed near original site in 2011-2112. Approximately 200 acres of late-successional habitat occur near the original site may be able to support a core area that would not overlap with other existing owl core areas, and would have little overlap with other owl site home ranges, however, the home range area would be extensively overlapping with home range area with other sites (#2622A, 4603, 4579, 2213, 1911). The proposed action would likely adversely affect the potential for owls to occupy this location because approximately 126 acres of PFF habitat would be removed in this area not covered by other owl core areas, and occurs in the outer portions (overlapping) of other home ranges. The concentration of units could reduce foraging opportunities within a potential core area that occasionally is surveyed for owls, but not regularly or to protocol. Disturbance to potential owls is not anticipated at this location because the harvest activities within the disturbance distance of nesting habitat would be restricted during the critical breeding period.

Spotted owl Sites Not Likely to be Adversely Affected from Habitat Modification

Removal of fire-killed and fire-injured trees and associated incidental green trees from proposed harvest units, logging corridors, landings, and road construction, would remove roosting, foraging, postfire foraging, and dispersal habitat that would have effects that would likely be negative, but would not be expected to have significant adverse effects or impair site occupancy through the feeding, breeding, sheltering, and dispersal of spotted owls at 25 occupied and unoccupied spotted owl sites (Table 25), because of nonoccupancy, low likelihood of occupancy due to low amounts of NRF habitat on federal land, or unit locations are in lower use areas such as upper slopes, ridgetops, outer home range, and in areas of low habitat suitability (RHS) output from the MaxEnt model (Appendix C in USDI FWS 2011).

No habitat removal is proposed within nest patches of occupied sites. Within occupied owl sites, limited removal would occur in core and home range areas near ridgetops or other areas where long-term demographic breeding season surveys have not detected high spotted owl use.

Table 25: Northern Spotted Owl Sites Potentially Not Adversely Affected

Spotted Owl Sites Potentially Not Adversely Affected		
Sites (Territories)	**Reason for Determination**	**Supporting Information (see Table 20)**
0896O	Unoccupied/Low Likelihood of Occupancy	Low habitat amounts post-fire and site has only been occupied once in 21 years. Heavy barred owl presence.
0906A	Unoccupied/Low Likelihood of Occupancy	Low habitat amounts post-fire. PFF removal occurs outside of the core
0919O	Unoccupied/Low Likelihood of Occupancy	Low habitat amounts post-fire and site has not been occupied in 21 years. Last pair was in 1983.
2213O	Unoccupied/Low Likelihood of	Low habitat amounts post-fire and site has not been occupied in the last 6 years. Barred owls present.
4579A,O	Unoccupied/Low Likelihood of Occupancy	Only 1 pair response in the last 6 years and limited single responses in other years. Low habitat amounts post-fire (see Table 9). No NRF removed or downgraded. 55 (4579A) and 12 (4579O) acres of PFF removed at the home range scale.
4607O	Unoccupied/Low Likelihood of Occupancy	Low habitat amounts post-fire and low occupancy rate. No pair responses in 21 years and no responses in last 6 years.
4670O	Unoccupied/Low Likelihood of Occupancy	The site center is the outer edge of the fire perimeter. The site is low productive owl site, with limited single male responses in the past several years. Barred owls are also present at this site. 1.2 acres and 0.6 acres of NRF removed at the home range and core scales from landing and road construction. 61 acres and 4 acres of PFF removed at the home range and core scales. One nesting protocol visit has been confirmed at the alternate site location in 2014. The alternate location is located outside of the fire perimeter and on the edge of the act ion area.
0376O	Unit Location	19 acres of PFF removed and the unit is on the outer edge of the home range. Approximately half of the units are also in low RHS.
0377B	Unit Location	Only 0.1 acres of PFF removed and the unit is on the outer edge of the home range and in low RHS. The majority of the home range is outside of the fire
0895B	Unit Location	3 acres of PFF removed and the unit is on the outer edge of the home range.
0911C	Unit Location	3 acres of PFF removed and the unit is on the outer edge of the home range
0913C	Unit Location	6 acres of PFF removed and 1 acre of NRF removed and the units are on the outer edge of the home range and in low RHS.
1989O	Unit Location	25 acres of PFF removed and the units is on the outer edge of

Spotted Owl Sites Potentially Not Adversely Affected		
Sites (Territories)	**Reason for Determination**	**Supporting Information (see Table 20)**
		the home range. Only 2/3 of this home range is in the fire perimeter, so habitat exists outside of the fire perimeter.
2016A	Unit Location	38 acres of PFF removed, but outside of the core area. This site is on the outer edge of the fire perimeter, so the core is still very intact, with approximately 65% of the core on federal lands containing NRF habitat. Approximately 0.6 acres of NRF would be removed for landing and road/route construction, but the locations are on the outer edge of the HR or outside of the core in low RHS.
2080A/C	Unit Location	23 and 1.4 acres of PFF removed at the home range and core scales of 2080A. The majority of the units are in low RHS. Contiguous and intact NRF still present at the 2080A core. Only 2 acres of PFF removal in the HR of 2080C and no PFF removal within the core and nest patch. Barred owls have been at this territory.
2211O/3928O	Unit Location	17 acres of PFF removal in the HR and only 0.7 in the core areas. HR treatments are in low RHS. All treatments, including the core area treatments are away from the high use areas, which are still intact after the fire. (At the Alternate location (3928O) 1.5 acres of PFF and 0.4 acres of NRF removed on the outer edge of the home range and in low RHS).
2298A	Unit Location	2.4 acres of PFF removal and units are on the outer edge of HR. Most of the HR is outside of fire and still plenty of contiguous NRF available.
2619O	Unit Location	Only 1.4 acres of PFF removed and 0.4 acres of NRF removed. The units are on the outer edge of the home range and in low RHS. The majority of the home range is outside of the fire
2622A	Unit Location	29 acres of PFF removed at the HR scale and outside of the 0.5 mile core areas. Most of the HR and contiguous NRF is outside of the fire
4534A,O	Unit Location	This has been a productive owl site. Efforts were made to reduce impacts at the core scale of 4534A, where the most recent activity has been. The majority of the PFF removal in the HR is in low RHS. 7 acres and 37 acres of PFF would be removed at the home ranges of sites 4534A and 4534O. 0.1 acres and 0.6 acres of PFF would be removed within the core areas.
4565O	Unit Location	82 acres of PFF removed will be removed at HR, but not in core. Units are either on the edge of the home range or in low RHS. The core still has contiguous NRF. This site is on the edge of the fire perimeter and half of the home range was not burned.

Spotted Owl Sites Potentially Not Adversely Affected		
Sites (Territories)	**Reason for Determination**	**Supporting Information (see Table 20)**
4575A,O	Unit Location	23 (4575A) and 2.5 (4575O) acres of PFF removed in the HR, but outside of the core. The majority of the units are in low RHS. The core will still be intact with contiguous NRF. This is a productive site so efforts were made to eliminate effects at the core scale.
4578O	Unit Location	6 acres of PFF removed and the unit is on the outer edge of the home range. The site has only had a pair response 1 year out of the last 13 years.
4623O	Unit Location	4 acres of PFF removed and the unit is on the outer edge of the home range. No owls have been detected in the last 6 years.
4690A,O	Unit Location	2.6 (4690A) and 34 (4690O) acres of PFF removed at the home range scales. The unit is on the outer edge of the home range of 4690A and in low RHS. 0.9 acres of NRF removal at the home range scale of 4690O. This site nested and had 1 young in 2013 at 4090A. So far one nesting confirmation has been made in 2014, close to the 4690A location.

High quality spotted owl habitat still functioning as NRF habitat was identified and deferred from proposed treatment units as a recovery measure for the spotted owl, as identified as Recovery Action #32 in the spotted owl Recovery Plan. Stands evaluated and meeting the definitions in the methodology are referred to as RA 32 stands. Through field evaluations, four patches totaling approximately 23 acres were determined to meet RA 32 stand conditions and would not be treated, which also occurred within the riparian reserves. Maintaining or restoring forests with high-quality habitat will provide additional support for reducing key threats faced by spotted owls. Protecting these portions of forests stands should provide spotted owls high-quality refugia habitat from the negative competitive interactions with barred owls.

Effects to Northern Spotted Owl Prey

Woodrats (both bushy-tailed and dusky-footed) are important components of the spotted owls' diet in in the Project Area (Forsman et al. 2004). Bushy-tailed woodrat presence is more dependent on cover and food availability than on a stand's seral stage (Sakai and Noon 1993; Suzuki and Hayes 2003). Red tree voles are a lower percentage of the spotted owl diet in Southwestern Oregon. Northern flying squirrels are another major source of owl prey in southwest Oregon, while red tree voles (RTV) comprise only 2.6 % of the diet of spotted owls in this area (Forsman 2004). Woodrats are expected to continue to utilize burned edge habitat near green forest areas and riparian areas.

Habitat for flying squirrels is described as both younger and older forests (Wilson 2010; Holloway and Smith 2011), but not severely burned forests, or where very few live conifers are left. Hypogeous sporocarps (underground fungi), which is an important food factor in determining flying squirrel abundance, decreased in abundance after increased fire severity (North and Rosenthal 2006). The limited amount of low or unburned forest stand impacted from logging corridors, landings, or route construction, and removal of stands of fire-killed trees, with

snag retention, and untreated riparian reserves, is not expected to measurably reduce flying squirrel populations.

Severe and moderately burned stands are not suitable habitat for red tree voles, which live in forested stands with moderate and high canopy cover. Red tree vole surveys were conducted in suitable habitat in mature and older live stands that may be affected by landings, route/road construction, or cable corridors. None of the identified RTV nests would be removed. Removal of dead and dying trees, and incidental live trees is not expected to change population levels of red tree voles or decrease prey availability for the spotted owl.

Deer mice populations are expected to increase in the burned areas, and not be negatively affected in the short term from salvage logging (Fontaine 2007). The limited salvage, with coarse wood retention in riparian reserves, 100 acre owl cores, other withdrawn stands, is expected to provide high density of long-term coarse wood abundance across the fire area for small mammal prey such as mice and chipmunks.

Treatments that would remove or maintain spotted owl habitat may impact foraging by changing foraging patterns for the spotted owl. Interior portions of larger salvaged units may be avoided, and edges utilized.

Edges created from harvest can be areas of good prey availability and potentially increased prey vulnerability and better hunting for owls (Zabel et al.1995). Prey animals may be more exposed in the disturbed area or could move away from the disturbed area for the short-term. Changes in prey availability occur as cover is disturbed and prey species move around in the understory. As a result, they can become more vulnerable and exposed. The disturbance could attract other predators such as hawks, other owls, and mammalian predators. This may increase foraging competition for owls in the treatment area, but the exposure of prey will also improve prey availability for northern spotted owls.

Residual trees, snags, and down wood retained in treated areas would provide some cover for prey species over time, and would help minimize harvest impacts to some prey species, such as dusky-footed woodrats, and provide long-term source of habitat structure. Treatment implementation would be spread out temporally and spatially within the Project Area, which would provide areas for spotted owl foraging during project implementation and reduce the impact of these short-term effects at the project level.

Bingham and Noon (1997) reported that a spotted owl core area (closest to the nest) is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Rosenberg and McKelvey (1999) reported that spotted owls are “central place” animals with the core area being the focal area. Therefore, effects to prey species are most critical at the nest patch and core areas. Several studies (Dugger et al. 2005; Zabel et al. 2003; Bingham and Noon 1997) indicate the core area size for the Klamath province is 0.5 miles from the nest site (or 500 acres). Effects to prey species should then be assessed by the amount of habitat treated within the core area and level of treatment. Due to the spatial distribution of the proposed treatments, retaining more untreated areas in mid to lower slopes of drainages, mosaic of untreated riparian areas, and plant or animal buffers from

Survey and Manage known sites, the proposed action would continue to provide habitat for prey within known spotted owl sites.

Implementation of Project Design Features that would retain class 1 and 2 large down wood (Bartels et al. 1985) and snags (Bartels et al. 1985; Thomas et al. 1979) (to the extent safely feasible during operations) in the treatment units will provide coarse wood structure for prey species, and will help minimize harvest impacts to prey habitat.

Spotted Owl Recovery Action 10: "Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population (USDI UFWS 2011)."

No treatments are proposed in in forest stands identified as structurally complex (RA 32).

No salvage for economic recovery would occur within Known Spotted Owl Activity Centers (KSOAC) which are the best 100 acres of suitable habitat around spotted owl sites that were documented as of January 1, 1994 on Matrix lands, and are managed as Late Successional Reserves (LSR). Riparian reserve areas, a high nesting, roosting, foraging, and dispersal area, were deferred from proposed treatment. Owl sites were evaluated by occupation, recent pair status and reproduction, to estimate site viability and likelihood of occupancy. Proposed salvage was reduced at the nest patch and core area at these pair and reproduction sites by reducing salvage to roadside treatment areas along roadside safety planning areas, or priority ridgetop areas for fire defensibility. Owl sites with multiple nest patch and alternate core use areas had reduced or no treatment in these areas to provide for possible territorial shifts as a result of loss of habitat due to fire and proposed salvage. Suitable habitat areas with high historical use as documented by owl surveys prior to the fire, were deferred within core areas of occupied sites unless it occurred with the roadside safety planning area.

Spotted Owl Recovery Action 12: "In lands where management is focused on development of spotted owl habitat, post-fire silvicultural activities should concentrate on conserving and restoring habitat elements that take a long time to develop (e.g., large trees, medium and large snags, downed wood) (USDI UFWS 2011)."

Existing post-fire levels of large down wood would be retained in owl core areas with recent reproduction and known pairs, and in spotted owl critical habitat units in lower and midslope units. Large snags would be increased to 4 snags per acre in these areas also. Retaining these habitat legacy components in treatment areas, in addition to untreated riparian reserves, and other deferred areas >80 years old that were burned, provides important habitat elements for future spotted owl habitat. Approximately 64% of moderately and severely burned forest ≥80 years old within the Douglas Fire is outside of the proposed action.

Effects to Northern Spotted Owl Critical Habitat

The proposed action is located within one designated critical habitat unit (Unit 9) sub-unit KLW1. The effects to the primary constituent elements (Forest Habitat, Nesting Roosting, Foraging, and Dispersal) are addressed in Table 26.

Table 26: Affects (acres) to CHU Sub-unit KLW-1

Sub Unit	NRF Removed	NRF Downgrade	NRF T&M	PFF Removed	Dispersal Removed	Dispersal T&M	Capable Treated
KLW-1	8	10	3	375	1	0	19

Effects from NRF Removal, NRF Downgrade, and Post-Fire Foraging Removal

The proposed access road construction and landing construction associated with the Douglas Fire Salvage project would remove 8 acres of NRF habitat. Areas in the Douglas Fire Recovery project with yarding corridors through NRF to access burned units would downgrade 10 acres and maintain a 3 acres of NRF. These proposed actions in NRF habitat would contribute to a reduction of suitable NRF habitat within one designated critical sub-unit (KLW1). The proposed Douglas Fire salvage would remove approximately 375 acres of Post-Fire Foraging habitat within sub-unit KLW1. Within CHU stands at least 80 years old moderately or severely burned, approximately 175 of 775 acres (23%) are proposed for treatment, therefore, most older stands providing post-fire foraging habitat, and long-term snag and down wood legacy structure are retained.

Areas of critical habitat that would be most impacted by the proposed action and were used to determine potential localized effects to the critical habitat. Pre-and post-treatment NRF habitat amounts within a 500 acre analysis area were compared to determine effects to primary constituent elements and primary biological features of critical habitat (Table 27).

Table 27: Pre and Post Treatment NRF and PFF Habitat Amounts within 500 Acre Buffers

Project	CHU Sub-unit	Unit ID	NRF Acres Pre-Treat	NRF Acres Post-Treat	Percent Changed	PFF Acres Pre-Treat	PFF Acres Post-Treat	Percent Changed	Effect to CHU
Douglas Fire Recovery project	KLW1	12-5a; 2 1-acre helicopter landings	307	292	- 5%	33	28	- 15%	LAA
Douglas Fire Recovery project	KLW 1	27-2a; 1 acre helicopter landing	50	49	-2%	257	175	-32%	LAA

NRF Removal and Downgrading

Based on the 500 acre analyses, the NRF downgrading and removal associated with the Douglas salvage project within the KLW1 sub-unit may affect and would likely to adversely affect (LAA) spotted owl critical habitat because the amount of NRF treatment relative to the existing NRF at the 500 acre scale would be measureable. The removal and downgrading of NRF habitat within the 500 acre landscape surrounding the treatment area is likely to decrease flying squirrel abundance by removing mid-story and overstory structure from those acres (Wilson 2010, Manning et al. 2012), which could reduce spotted owl foraging opportunities. Also, reducing canopy cover below 60 percent will likely introduce ecological edge effects to the affected stands as well as to adjacent stands of NRF habitat, extending the area of impact beyond the treated areas. These impacts to critical habitat primary constituent elements and principle biological features important to the conservation of spotted owls are not immeasurable, nor are they unlikely to occur. NRF removal or downgrade occurs in small areas, such as route and road

construction, landing construction, or is dispersed within a unit of moderate/mixed burn severity with individual burned trees mixed with live trees that untreated may still function as foraging habitat, but treated, will function more as dispersal habitat with spaced live trees .

Post-Fire Foraging Removal

The proposed salvage in the Douglas Matrix project will remove approximately 466 acres of post-fire foraging habitat in designated critical habitat. Based on the 500 acre analyses the district has determined the PFF removal associated with the Douglas salvage project within the KLW1 sub-unit may affect and would likely to adversely affect (LAA) spotted owl critical habitat because the amount of PFF treatment relative to the existing PFF at the 500 acre scale would be measureable. The removal of PFF habitat within the 500 acre landscape surrounding the treatment area is likely to available spotted owl foraging opportunities. As mentioned above, even with the loss of canopy cover and key habitat components, post-fire foraging habitat still provides foraging opportunities after the fire, depending on patch size, edge type, and proximity to known owl sites (Bond et al 2002, Bond et al. 2009; Clark 2007, Clark et al. 2011, and Clark et al. 2013). Clark (2007) determined that diffuse edges resulting from the fire are likely to be good habitat for woodrats, which are more likely to occur at high densities in early seral (brushy/sapling to pole-sized trees) and old-growth forests (Sakai and Noon 1993, 1997). Bond et al. (2009) also found that spotted owls were foraging in all burn severities, with a stronger selection for the edges of high-severity burns, presumably taking advantage of an increase in prey (particularly woodrats) during a period of abundant regrowth of shrub and herbaceous vegetation after the fire. Since foraging habitat is essential to provide a food supply for survival and reproduction, removal of PFF would result in a Likely to adversely affect (LAA) to foraging habitat (PCE 3). Snags and down wood are a primary constituent element of critical habitat. Four snags per acre >16" of largest available snags representative of the forest stand (to the extent safely and operationally feasible), and existing down wood would be retained in lower and midslope units as a habitat component important to prey species, and to provide a habitat legacy in the future stands.

Post-fire foraging habitat removed in CHU would retain four snags per acre of the largest available ≥16" dbh, clumped typically near sides or bottom of units or other logistically feasible areas, to reduce safety concerns with harvesting operational feasibility. Down wood ≥ 16" would be retained to the extent feasible without excessive fuel loading (approximately 120 to 400 feet per acre) or causing public safety concern on steep slopes. Additional smaller coarse wood (approximately ≥8" dbh) for soils stability at the bottom of some units would also contribute to down coarse wood. In treated units, snag and coarse wood retention in salvaged units provide primary constituent elements of spotted owl habitat that would be retained into the regenerating stands as structure for owl prey. Across the Douglas Fire project area, approximately 64% (1,500 acres) of moderate and severe burned areas in forest stands that were ≥ 80 years old are excluded from the proposed action and provide abundant snags and down wood, including within the owl critical habitat area.

Effects to the Sub-units

Even with the proposed NRF removal, NRF downgrading, and Post-Fire foraging within the critical habitat, KLW-1 is still expected to maintain intended function of providing demographic support for spotted owls because 106 of 109 (97 %) total historic spotted owl sites in this critical habitat sub-unit would not be adversely affected by the proposed action and would continue to

provide demographic support at their current level. Adversely affected sites may also continue to provide demographic support, however, the reduction in foraging habitat at these sites may lead to effects such as moving to new or less favorable locations, increased core or home range sizes to seek new sources of prey.

Even with the removal of NRF and dispersal-only habitat, the proposed action will not affect the intended conservation function because the proposed removal of NRF and dispersal-only habitat would result in a reduction of less than one percent of the dispersal habitat within sub-unit KLW1, and most NRF removal occurs in small (one acre or less) patches along existing roads and intersections, for helicopter landings. The removal of dispersal and NRF habitat would not preclude owls from dispersing within the adjacent landscape because the small openings are associated with existing roads, and owls easily disperse through small openings.

Survey and Manage (S&M) Species

Red Tree Voles

Six RTV active sites were detected in the project area as a result of protocol surveys (Huff et al. 2012) with the current accepted protocol with surveys completed in March 2014. Ten acres of suitable habitat or the remainder of suitable habitat if ten acres were not available, were attributed to each site as RTV management areas. Placement of route and landing construction has been modified to avoid removing active nest trees, and avoid significant negative effects to red tree vole sites and avoid or minimize the removal of large diameter conifer fir trees (approximately >20”). Some negative effects may occur from removal of dead trees or some live trees within one tree length of red tree vole sites.

Right-of way construction (T32S-R8W-Section 27 NW of the NW) to access unit 27-5 may remove several smaller conifer trees and hardwoods without nests, and would occur within approximately 50 feet of an active RTV nest. The construction, would remove approximately three conifers >16’’ and < 28” with little or no interconnectivity with other conifers in an area dominated with chinkapin and madrone hardwood stems. No nests were observed in the three conifers. No conifers with interconnected branches with the RTV nest tree would be removed. The ROW area does not meet RTV suitable habitat criteria. The forest stand below the proposed construction contains the mature and old growth conifers and provides 10 acres of suitable habitat area for the active red tree vole site. The removal of trees would occur within the recommended 1 tree length buffer of an active RTV site (USDA USDI 2001b), and increase exposure to the nest, but would not remove suitable habitat from the best available habitat in the 10 acre RTV habitat area. A narrow canopy gap may require RTVs to ground disperse between conifer habitat above and below the proposed route construction, however due to heavy density of small diameter hardwoods, this may be occurring already. Nests observed within the hardwoods were climbed and no RTV nests were located. No direct effects are expected to the nest tree or interconnected conifer branching. Douglas-fir needles provide the primary food and building materials for nests, and hardwoods would not contribute to foraging or nest building.

Potential helicopter landing construction (T32S-R7W-Section 23 SW of the SE) approximately 100 feet by 300 feet would remove burned canyon live oak hardwood habitat on a ridgetop up to the edge of an active RTV nest. The hardwood patch is a different stand and does not contribute as dominant or codominant structure to the suitable RTV stand, and as burned hardwoods, it

contributes little benefit as buffer habitat. It does not provide connectivity to another suitable habitat stand. Suitable red tree vole habitat would not be removed. Suitable habitat for the red tree vole extends north from the nest into an unentered forest stand with old-growth trees with more than 10 acres of suitable habitat. Removal of hardwoods up to the nest tree would not damage the nest or nest tree, but the red tree vole may use other adjacent nests due to disturbance. This nest is on a ridgetop, and the hardwoods offer minimal or no shade and microclimate buffer to the nest which is at or above the height of the hardwoods. No direct effects are expected to the nest tree or interconnected conifer branching. Douglas-fir needles provide the primary food and building materials for nests, and hardwoods would not contribute to foraging or nest building.

One active and one inactive red tree vole nest was located adjacent to unit 9-8A. The Fire burned and killed midstory and overstory trees within about 50' of both nests and underburned through the stand. One site-potential tree length buffer of suitable habitat around these nests is not available at this site. Nest trees would be buffered with Ten acres of suitable habitat would be attributed to this site. Both nests would be buffered within approximately 70' and included in 10 acres of suitable contiguous habitat. One logging corridor approximately 12' wide may be placed within approximately 70' of the active nest and remove suitable conifer habitat that may contribute to foraging or nest building. Removal of dead trees, or a singular logging corridor would not reduce the viability or persistence of the red tree vole nests or the 10 acre habitat area because no trees with nests, or with connected branching to support adjacent foraging and nest building would be removed. Foraging or nest building may be limited by a canopy break created by a logging corridor (12' wide strip of about 0.04 acres). Red tree voles have been known to cross logging roads, first-order streams, small canopy gaps, suggesting that small gaps (up to 82 feet) may not greatly impair tree vole movement (Federal Register 2011 Vol 76). No measurable microclimate changes are expected to occur to the nest stand. The viability or persistence of the red tree vole nests and adjacent ten acres of habitat would remain high.

One active nest was located near unit 12-5A. No trees would be removed within one site-potential tree length, and 10 acres of suitable habitat would be attributed to the site per RTV Management Recommendations.

One active nest was located adjacent to unit 26-2, approximately 50' from the edge of a stand of severely burned trees. Ten acres of suitable habitat is allocated for the active nest. One site-potential tree length of live trees is not available around the nest. The nest tree and live trees would be retained. Dead trees would be removed. Removal of dead trees would not reduce the viability or persistence of the active red tree vole nest or the 10 acre habitat area because no trees contributing foraging, nest building, or microclimate would be removed.

Three active and three inactive nests were located in adjacent to unit 11-2 in a small patch (approximately 1.6 acres) of suitable habitat, bordered by roads. Adjacent forest has been thinned, burned, or removed as hazard trees, therefore 10 acres of suitable habitat is not available and no suitable buffers can be applied. Actions proposed in Alternatives 2 and 3 would have minimal negative effects to site persistence due to minimal habitat available to sustain the site for long-term persistence, or provide for dispersal or expansion. The nest trees would be protected, but adjacent live trees next to the road may cut and used as cable line support for adjacent salvage recovery.

Red tree voles have multiple nests (Swingle and Forsman 2009) and active nests (and other arboreal mammal nests) are commonly located on the edges of roads or previous BLM or private harvests, and have been located on edges during the Douglas Fire Recovery red tree vole surveys. Red tree vole Management Recommendations (USDA USDI 2001b) recommend retaining a one-tree length habitat buffer around active nest trees to avoid isolating nests or microclimate within the stand. The removal of vegetation for a helicopter landing, temporary road construction, and a logging corridor would not degrade the habitat suitability of the 10 acre RTV habitat areas for the red tree voles. Red tree vole primary habitat (mature and old-growth stands $\geq$ 120 years old) would not be removed, and no red tree vole nests would be removed. The canopy opening from a logging corridor is traversable by voles (Federal Register 2011) and no nests were observed where the corridor would be located, therefore the small amount of suitable conifer habitat that would be removed in buffer areas adjacent to the active nests would not negatively affect persistence of red tree voles. Habitat for 10 acres of suitable habitat for red tree vole management would be retained for the active nest and for expansion of other nest development and colonization. Therefore, some negative effects are expected to occur from the proposed action, but because no nests or interconnected fir trees, or adjacent trees removed which would limit nest building or foraging, the red tree vole sites and 10acre habitat areas are expected to continue to be viable and contribute to species persistence.

The RTV nest Protocol surveys are not intended to detect all nests, but are survey techniques needed to have a reasonable chance of locating the species when it is present on the site (2001 Survey and Manage ROD & S&G's p. 85). The ROD S&G page 5 (concern for persistence), page 6 (relative rarity), and page 10 (species management category "C" Uncommon), provide that not all known sites or populations are likely to be needed for reasonable assurance of persistence based on protocol survey results. The intent of the approved interagency documents (protocols) is to mitigate for the long-term persistence concerns, and the protocol describes survey techniques needed to have a reasonable chance of locating the species when it is on site. Approved interagency S&M Management Recommendations are applied to these results to manage for long-terms persistence. With continued application of Survey Protocols for habitat disturbing projects, and Management Recommendations, no negative cumulative effects are expected for these known.

Bureau Sensitive Species
None affected-

Bats
The three Bureau Sensitive bat species (Townsend's big-eared, pallid, fringed myotis) utilize mines, caves, manmade structures, snags and rock outcroppings for roosting and hibernacula sites. No surveys have been conducted for these species, and very few have been documented in the Project Area. No harvest would occur within 250' of suitable mines or caves known or expected to contain bats. The proposed action is not expected to adversely affect local bat populations or long-term population viability of any bat species in the Project Area. Live trees killed by the fire would be expected to be harvested prior to developing the loose bark or cavity character most utilized by bats for roosting. The net landscape increase in snags from riparian and upland moderate and severe burn areas would provide an increase in snags available as bat

habitat. No negative cumulative effects are expected for this species that would increase the need to list as threatened.

Other Wildlife Species of Concern

USFWS Birds of Conservation Concern and Game Birds Below Desired Condition

Not affected

Some migratory bird individuals other than USFWS species of concern may be disturbed or displaced during project activities. Some nests may be destroyed from timber harvest occurring during active nesting periods. However, there would be no perceptible shift in species composition as a result of the proposed action. Adequate undisturbed areas adjacent to the Project Area would maintain habitat for displaced individuals. Overall, populations in the region would be unaffected due to this small amount of habitat removal, and the increase of available similar habitat within the fire perimeter. Analyzing bird populations at this scale, as appropriate, is supported by both the USDI Fish and Wildlife Service (2008a) and Partners in Flight (Altman and Alexander 2012). Species that prefer open to semi-open forests, stand edges, woodlands, brush, early successional stages to nest and forage may benefit from the effects of the fire. The effects of fire has increased open to semi-open forests, stand edges, and brush fields, and this type of habitat for these species is expected to increase across the fire landscape. Removal of a small percentage of fire-killed trees would still result in a net increase of these types of habitats from untreated areas in riparian reserves, 100 acre owl cores, and spotted owl core nest patch, core, and home range areas. No negative cumulative effects are expected for this species.

Bald and Golden Eagles

Not affected

There are no known golden or bald eagle nest sites in or adjacent to proposed units, however, bald eagles have been sighted perched or foraging along Cow Creek and West Fork Cow Creek. No change to foraging habitat would occur.

Migratory Birds

Not affected

Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds,"

(Federal Register 2001) highlights the need for federal agencies including the USDI Bureau of Land Management (BLM) to conserve migratory birds (those species listed in 50 C.F.R. 17.11) (U.S. Fish and Wildlife Service 2002) protected by the migratory bird conventions (the Migratory Bird Treaty Act [16 U.S.C. 703 – 711], the Bald and Golden Eagle Protection Acts [16 U.S.C. 668 – 668d], the Fish and Wildlife Coordination Act [16 U.S.C. 661 – 666c], and the Endangered Species Act of 1973 [16 U.S.C. 1531 – 1544. This responsibility includes the need to ensure that environmental analysis of federal actions evaluate the effects of those actions on migratory birds, "with emphasis on species of concern" (Federal Register 2001, p.3855).

"To the extent permitted by law and …in harmony with agency missions" (p.3854, Ibid.) such as the O&C Act of 1937, the Medford District Resource Management Plan (USDI 1995) and the Northwest Forest Plan (USDA/USDI 1994a); the proposed actions are consistent with "avoiding

or minimizing, to the extent practicable, adverse impacts on migratory bird resources," (p. 3854, Federal Register 2001) as directed in the Executive Order mentioned above.

Birds of Conservation Concern.
Not affected

Primary Cavity nesting birds
A minimum of two snags per acre ≥16' dbh, of the largest available, representative of the species of the stand, averaged over no larger than 40 acres (RMP p. 40) would be retained in units where sufficient snags are available, to meet 40% population level levels (Neitro et al. 1985; Thomas et al. 1979; Bunnell 2013). Some units would have four snags per acre (Table 4). In addition to snag retention within proposed units, moderate and severe burned mature and older stands with tree diameters > 16" occur adjacent to proposed units in untreated withdrawn/fragile areas from harvest, LSR areas, riparian and upland areas, in patches approximately 1 to 75 acres in size of larger snags adjacent to proposed units. Across the Douglas Fire planning area, approximately 64% (1,500 acres) of moderate and severe burned areas in forest stands that were ≥ 80 years old are excluded from the proposed action and provide abundant snags and down wood. Unsalvaged smaller diameter stands and plantations provide small diameter trees for foraging. The fire also created snags in light burn and mixed-burn severity burn areas with individual trees or small groups of trees of an acre or less throughout the fire area, resulting in both aggregated and dispersed snag retention.

Bunnell (2013) extensively reviewed literature for sustaining cavity using species, and derived implications to forest management, including: retain trees and snags of both hardwoods and favoured, conifer species, sustain a range of decay classes of potential nest trees, retain a range of size and age classes, ensure that some large trees or snags are retained, provide both aggregated and dispersed retention of living and dead trees, do not do the same thing everywhere, and limit salvage logging after tree mortality. With the majority of fire created snags retained in the Douglas Complex Fire outside of proposed units, and 2 to 4 snags per acre of largest available trees in proposed units, the proposed action would meet or exceed 40% population level within proposed units and adjacent area, and result in sustained woodpecker population levels within the planning area.

Regional Strategies
Both the Fish and Wildlife Service (USDI USFWS 2008) and Partners in Flight (Altman and Alexander 2012) consider the state and regional approach a key to the conservation of migratory songbirds. The strategies for the conservation of the olive-sided flycatcher and the rufous hummingbird and other species were proposed in the form of a regional conservation plan for coniferous forests in Oregon and Washington. This strategy, which "represents the collective efforts of multiple agencies and organizations within …Partners in Flight," recognized the Northwest Forest Plan as an effort in the same type of conservation planning process, which approaches management at a regional level. The proposed actions are consistent with the Northwest Forest Plan, which is also designed to provide for the conservation of other forest-related species in the range of the Northern Spotted Owl, such as these songbirds.

Within the Northwest Forest Plan (24,455,300 federal acres), reserved/ withdrawn lands from programmed timber harvest total approximately 78% of the federal land base (USDA/USDI

1994, p. 2-62:65). Not all of the reserves are in or will obtain late-successional forest conditions, but the majority is expected to contribute as suitable habitat towards migratory birds utilizing late successional habitat. In addition, Matrix lands (3,975,300 acres) representing about 16% of the federal land base, contain selected portions of the land managed to retain 15-30% in late-successional forest, which provides additional suitable habitat.

Table 28: Reserved/Withdrawn Timber Harvest Programmed Lands (NWFP ROD 1994 p. 24-29)

Allocation	Approximate Acres	Approximate Percent
Congressionally Withdrawn/Reserved	7,321,000	30
Late Successional Reserves	7,431,000	30
Lands Managed as LSRs	102,000	<1
Riparian Reserves	2,628,000	11
Administratively Withdrawn	1,477,000	6
TOTAL Reserve/Withdrawn from Programmed timber harvest	18,857,000	78

Compliance with the Migratory Bird Treaty Act.
This act implements various treaties and conventions between the U.S. and other countries that share migratory flyways. With this proposed action, and as prohibited in the Act, there would be no deliberate take (USDI BLM IM OR-2009-018), possession, import, export, transport, sale, purchase, barter or offering of these activities, or possessing migratory birds, including nests and eggs.

3.3.4 Alternative 3

No measurable changes in effects are expected to occur to the spotted owl, sensitive species, survey and manage species, migratory birds, or GBBDC. The difference between the reduction of acres of route construction between Alternative 2 and 3 and increase in helicopter landing construction of habitat removal is not a measurable effect to the occupation, viability or persistence these species. Increased helicopter landing locations for Alternative 3 removes vegetation along existing disturbed areas (roads), whereas the increased new temporary or permanent route construction in Alternative 2 would have a slight edge affect/fragmentation effect by creating narrow openings within forest stands.

Cumulative Effects
Private lands surrounding the Project Area are made up of early-, mid-, and late-seral forests, agriculture, urban areas, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on forest rotations. It is expected that any remaining late-seral forests on private timber lands will be converted to early seral forest over the next one or two decades. For those species dependent on early-seral habitat, private forest lands do not always provide quality habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are regularly sprayed to reduce competition with future harvestable trees.

Table 29: Northern Spotted Owl and Critical Habitat - Cumulative Effects

Project Name	Present/ Foreseeable	In CHU SubUnit KLW-1	Cumulative Effects to Spotted Owl Sites
Farout Timber Sale	Implement in 2014	Yes. Not likely to adversely affect CHU due to Prescriptions maintaining NRF and Dispersal habitat. No	No.

		reduction in habitat function to primary constituent elements.	
Fire Resiliency Project	Active stewardship now. Present Action.	No.	Spotted owl habitat would be maintained on approximately 140 acres NRF and 238 acres of dispersal habitat. Occurs within spotted owl home range of 3 owl sites (#4565O, 4623O, 0903O). No adverse cumulative effects from this action.
Wolf Pup Project	Active now. Present action. Within Douglas Complex Project Planning Area.	No.	NRF/dispersal maintain Occurs within spotted owl core/home range of owl sites (0903O, 4607O, 2274O, 2664O, 4577A, 4565O) No adverse cumulative effects from "maintain" habitat actions.
Regor Thin Timber Sale	Implement in 2014. Present or foreseeable action.	Yes. Not likely to adversely affect CHU due to Prescriptions maintaining NRF and Dispersal habitat. No reduction in habitat function to primary constituent elements.	Spotted owl habitat would be maintained on approximately 30 acres NRF and 40 acres of dispersal habitat. Occurs within 2 owl sites (2211O and 2248O). No adverse cumulative effects from this "maintain" action.
Stratton Brimstone CX	Foreseeable action	Yes. Approximately .13 acres of NRF and 2.6 acres dispersal removed, 11 acres capable treated. Not likely to adversely affect primary constituent foraging elements.	No owls cumulatively affected.
Roseburg District Rabbit Mountain LSR	Foreseeable. Planning area is on Roseburg BLM (Rabbit Mountain)	Yes. Removal of PFF habitat may removal foraging primary constituent elements (PCE3) and adversely affect KLW-1).	Approximately 9.5 miles of roadside hazard trees removed (~487 acres) possibly within 1.3 miles of 5 owl sites #0919, 1989,1911, 2298, 2622 not adversely affected by Douglas Salvage Recovery. Cumulative effects from PFF habitat removal may have negative effects, and may adversely affect these owl sites.
Discretionary and Non-discretional road safety actions	Current and Reasonably foreseeable. Along roads within the Douglas Fire Complex perimeter	Yes. Approximately 400 acres (140 acres in CHU) of forest stands at least 70 years old providing post-fire foraging habitat along 42 miles of road could be assessed for hazard tree removal within the fire perimeter as per the *OSHA Field Guide Removal for Danger Tree Identification and Response*. Numbers of hazard trees across the landscape could be up to 3000 trees. These actions may occur in Matrix, Riparian Reserves, 100 acre NSO activity centers, nest patches, etc. Retention of snags and coarse wood could be applied where conditions provide for safety. Some owl sites may be cumulatively effected from downgrading or removal of fire-killed trees (Discretionary/Non-discretionary road safety actions; Douglas Salvage Recovery Project). Owl sites already potentially adversely affected by Douglas EA with potentially increased significant effects may include Nest Patch area PFF removal for #4604, #4605, and #4604. Owl sites affected but not likely to be adversely affected by actions in the EA, but with increased effects from Discretionary/Non-discretionary road safety treatment actions, may be adversely affected from removal of post-fire foraging habitat at Nest Patch, Core, or Home Range areas, and potentially may include sites	

		#4670, 4579, 2080, 4575, 0906, 4534, 0903,4690.
Summary	Cumulative effects of treat and maintain habitat, and removal of PFF habitat, removal of very limited NRF habitat, removal of dispersal habitat, would likely adversely affect CHU subunit KLW-1. Actions are spread out temporally and spatially. Removal of Nesting and foraging habitat is avoided or limited to small route construction or helicopter landing construction. Actions would have some adverse effects of foraging habitat removal, but not adversely modify the intended conservation function of this sub-unit (north-south and east-west connectivity and NSO demographic support.	

Cavity nesting birds

Road safety actions outside of the Douglas Fire Complex Recovery Project –
Approximately 400 acres along potential failure zones of roads may have hazardous trees (up to approximately 3000 trees) felled and removed to alleviate safety concerns. Levels of snags for primary cavity nesting woodpeckers in these areas has been changed by the fire from a live forest with minimal snags, to high density of dead trees with minimal live trees. Removal of hazardous trees would remove snags of all diameters, some of which may provide suitable habitat for primary cavity nesting birds. In addition to the proposed action, this would cumulatively reduce habitat and nesting and foraging habitat along roads, and may not meet RMP (p. 40) 40% mean number of snags of unentered stands for in these areas along roads. Units with two snags per acre and four snags per acre (Table 5) not in hazardous tree removal areas, and approximately 1,500 acres of moderate and severe burned mature and older burned forest areas that is dispersed adjacent to treatment areas, including untreated riparian areas, withdrawn unsuitable/fragile harvest areas, burned 100 acre owl core areas, and light to moderately burned areas untreated but with new fire-killed trees, would provide high levels of snag habitat. Populations of primary cavity nesting birds (woodpeckers) and other benefitting snag users are expected to increase in the planning area and remain stable.

3.4 Soils - Productivity and Compaction

3.4.1 Pre-Fire Condition

The most productive lands occur on deeper soils in the north and east portions of the Douglas Complex. Specifically, the Rabbit Fire and north half of the Dads Creek Fire are considered the most productive lands. Serpentine soils, which are less productive than many other soil types, border portions of Marion, Tuller and Dad's Creeks (USDI 1999b). The southern end of the Douglas Complex, specifically the south half of the Dads Creek Fire encompassing the Hungry Hill and Sugarloaf features is generally considered an area of low site productivity (USDI 1999a).

Soils in the watershed are primarily derived from metasedimentary rock types, with metavolcanic derived soils downstream of Reuben Creek. Soils associated with metasedimentary rocks tend to be deeper and have more nutrients available. Some areas have serpentine-derived soils which are low in calcium and high in magnesium and other minerals which preclude Douglas-fir and many other plant species which are adapted to calcium-based soils (USDI 1999b). Serpentine soils, which are less productive than many other soil types, border portions of Upper Grave and Upper Poorman Creeks and may limit the amount of shade, tree diameter and density of trees on these soils (USDI 1999a).

3.4.2 Existing Condition/Affected Environment

Soil Productivity
Due to the extent and vastness of the Douglas Complex and the management direction of promptly meeting reforestation objectives (RMP, p.184), tree planting is a top priority to maintain productivity. Tappeiner et al. (2007) lists five major ecosystem functions of forest soils that influence forest productivity: 1) water storage, 2) nutrient accumulation, 3) carbon storage, 4) structural support, and 5) habitat for organisms. Forest soil maintenance is a key factor for sustaining productive forests. Fires can cause varying degrees of soil effects depending on temperature of the fire, duration of heating, and soil moisture, lasting from a few years to a few decades (Peterson et al. 2009). When organic matter is removed in intense wildfires, the potential for soil erosion increases since organic matter serves as structural support. In severely burned areas carbon and nitrogen are displaced from the underlying mineral soil layer. Carbon aids in nutrient retention and water infiltration while nitrogen provides compounds for plant growth. Nearly all soil nitrogen is in organic matter. In severe fire areas, nitrogen is lost when organic matter is neutralized. However, in lower fire severity areas, a burst of nitrogen availability occurs that helps regeneration thereby improving forest productivity. In intensely burned areas, soil productivity is reduced through losses of organic matter and nutrients.

Some soils have high erosion hazard under bare mineral soil conditions where slopes are steep and very steep (greater than 35% slope). Post-fire timber harvest activities add to the effects of fire on forest soils, therefore implementing Best Management Practices (BMPs) and minimizing disturbance of fragile areas would minimize losses. These effects are influenced by variables of fire intensity, harvest intensity, down woody retention, and management of post-harvest activity fuels.

The major management limitations and soil characteristics identified by Natural Resources Conservation Service for the soils and soil complexes found within the Activity Area were used in the selection of proper BMPs and Project Design Features (PDFs) that have been incorporated into the Douglas Fire Recovery Project (see Section 2.4).

Soil Compaction
Soil compaction is the packing together of soil particles by physical pressure at the soil surface that results in an increase in soil density and a decrease in pore space. A decrease in soil pore space results in restricted movement of water, nutrients, air, and plant roots, and generally decreases site productivity in most soil types. Section 2.4 describes PDFs to limit soil compaction and effects to soil productivity. Tractor yarding, cable yarding, and helicopter yarding are the harvest methods proposed for use in this project. Tractor yarding causes the most compaction and helicopter yarding, the least. Tractor yarding effects can be mitigated using the PDFs described in Section 2.4.3 causing less than 12% compaction of logged areas. Cable/skyline yarding suspends logs above the ground avoiding most physical abrasion of the forest floor and mineral soil (Peterson et al. 2009). Utilizing PDFs described in Section 2.4.3 for cable yarding would cause no more than 7% compaction of logged areas under the Northwest Forest Plan and Medford District RMP. These percentages are based on research by Adams and Froehlich, 1981, Dryness, 1967, and Clayton, 1981. Helicopter yarding removes logs aerially and greatly reduces soil impacts by minimizing movement of logs along the ground (Peterson et al. 2009).

Timber Production Capacity Classification (TPCC)
The TPCC is a land classification system used to partition all public lands within the Sustained Yield Unit (SYU) boundary of BLM administered lands (BLM 1986a). Portions of the Douglas Complex are classified as having TPCC fragile soils or reforestation limited soils under the TPCC Handbook (BLM 1986a). Information is compiled broadly and is not based on site specific field review. These TPCC classifications were made from the years 1981-1986. As such, these areas can be assessed and updated during site specific field review. The field data collected ultimately determines the specific areas where timber management is suitable. The reforestation TPCC classifications in the Douglas Complex are captured in the following Table:

Table 30: Reforestation TPCC classifications

TPCC Category	Classification	Units Affected
FGR/RMR	Fragile Gradient Restricted / Reforestation Moisture Restricted	11-4, 11-2, 10-1, 15-3A, 09-9, 09-1D, 21-3, 21-6, 12-3A, 09-2, 11-2, 21-6A, 09-1, 09-1, 25-2, 25-6, 09-1A, 15-4, 14-3A, 11-3A, 09-7A, 15-8, 23-9, 11-3A, 09-2A, 09-5A, 09-7A, 13-A1, 13-A3, 15-8, 23-3, 11-2A, 10-1WP, 10-1WP
FGR/RSTR	Fragile Gradient Restricted / Reforestation Surface Temperature Restricted	23-7
FGR/RTR	Fragile Groundwater Restricted / Reforestation Temperature Restricted	19-3, 15-4B, 21-3, 12-2A, 21-2, 25-6, 09-1A, 09-8A, 15-4, 15-2, 23-4, 09-6A, 15-7, 11-3B, 09-5A, 09-7A, 15-7
FNR/RMR	Fragile Nutrients Restricted / Reforestation Moisture Restricted	23-F, 27-2A
FWR/RTR	Fragile Groundwater Restricted / Reforestation Temperature Restricted	03-2A
LSW	Low-Site Productivity Withdrawn	12-1A
NF	Non Forest	29-3, 33-3, 09-1, 23-H
RMR	Reforestation Moisture Restricted	11-2, 11-7, 11-4, 10-1, 23-1A, 23-2A, 23-4A, 23-2B, 25-2A, 15-1A, 15-2A, 15-3A, 15-1B, 25-1A, 15-4A, 15-4C, 23-7, 23-4B, 17-1, 17-3, 09-1D, 03-1, 29-1, 21-3, 17-2, 21-4, 12-5A, 09-2, 03-4, 03-1, 11-2, 09-1D, 09-1, 29-3C, 29-2B, 29-3A, 29-3, 03-5, 03-1, 11-2B, 13-1, 35-5, 35-4, 17-1A, 12-1, 27-3B, 25-2, 27-5, 07-2A, 25-6, 25-5, 15-1, 14-1A, 14-3A, 14-2A, 23-A, 23-F, 23-C, 13-B, 11-3A, 12-3A, 23-B, 27-5A, 27-3A, 27-2A, 07-6A, 12-4B, 27-4, 15-8, 12-4B, 25-7, 11-3B, 12-4, 12-2, 12-3B, 13-1, 13-A1, 13-F, 15-8, 19-1, 27-4A, 27-4, 13-2WP, 11-1WP, 15-2WP

RSMR	Reforestation Surface Rock Moisture Restricted	10-1, 29-1, 17-2, 07-6D, 10-1WP
RSTR	Reforestation Surface Rock Temperature Restricted	13-4, 13-4A, 27-1A, 27-2A, 09-1C
RSW	Reforestation Surface Rock Withdrawn	17-1, 09-3, 09-4, 29-2B, 29-3A, 29-2B, 23-A, 07-6C
RTR	Reforestation Temperature-Restricted	13-4, 11-2, 23-4A, 09-4, 11-7, 13-6, 13-4, 13-2, 14-2, 19-3, 23-6A, 26-2, 23-2A, 23-3A, 23-4A, 15-2A, 23-2B, 13-4A, 23-3B, 23-2C, 23-2C, 23-7, 25-2A, 15-1A, 13-11, 15-3A, 15-1B, 27-B, 15-4B, 11-1, 15-1A, 23-10C, 09-5, 15-6, 23-6B, 23-5, 23-2A, 23-4B, 17-1, 17-3, 09-1D, 03-1, 29-1, 21-3, 21-6, 17-2, 17-2, 12-6A, 12-2A, 21-4, 12-5A, 21-1, 21-2, 03-1, 09-1, 29-3C, 21-6A, 29-2B, 03-5, 03-1, 09-1, 29-2B, 29-1A, 09-2B, 13-1, 35-5, 17-1A, 25-2, 27-5, 07-2A, 25-6, 03-2A, 15-4, 14-1A, 14-3A, 14-2A, 23-A, 23-F, 23-C, 19-2, 23-4, 09-7A, 23-D, 23-B, 23-G, 25-7, 27-2A, 23-9, 27-4, 11-3B, 07-6B, 07-6C, 07-6D, 07-6E, 07-6F, 09-7A, 13-

3.4.3 Alternative 1: No Action

Direct and Indirect Effects

Not treating the fire area would leave 1,669 acres of fire-killed and fire-injured trees. Timber investments would not be recovered when salvage of mortality and anticipated mortality fails to occur. The first two post-fire years are critical in restoring long term site productivity. Fire-killed trees will lose more than 40% of their value after two years. After this time salvage logging is unlikely to occur and site preparation to expedite tree planting would be foregone. Delays in salvage logging would forestall plans for tree planting which would allow undesirable competing vegetation to quickly establish. This is particularly concerning on sites occupied by tanoak as their sprouting becomes an immediate impediment after fire to conifer growth and productivity, hindering the cultivation of commercial conifer species. Atzet and Wheeler (1984, 202-203) caution that it is extremely important to establish crop tree species immediately after harvest to reduce losses in yield, especially in sites where tanoak cover was present before the fire. Tanoak's ability to resprout and occupy widespread areas inhibits the ability to restore long term sustained yield. Delays in salvage logging produce impacts that extend well into the future and effect the future structure and composition of the forest. Maintaining conifer productivity among competing shrubs and hardwoods becomes more difficult and costly with delays in salvage logging and site preparation.

Fire-killed trees would contribute to snags and coarse woody debris amounts. Depending on tree diameter and species, the rate of deterioration of fire-killed trees would vary. Most twigs and branches would be absent after 5 years, with large limbs beginning to fall after 8 to 10 years. Wood borers and bark beetles would be active within the first year of the fire with wood decay evident within two years. Smaller trees would decline more rapidly with breakage occurring

within the first 3 to 4 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 will also fuel the intensity of future fires. While it is recognized that silviculturally, some standing snags can favor the regeneration of some species by reducing wind, temperature and humidity extremes, excessive standing dead and down material however, greatly reduces forest productivity from secondary burning of dry logs on the forest floor several years after a fire (Oliver and Larson 1996, 107).

A no treatment scenario would retain more snags and subsequent windfall of dying trees into the future. Snag fall and fragmentation may destroy emerging regeneration and increase fuel loads. Peterson et al. (2009) suggest that without treatment or removal of post-fire deadwood density, "high fuel loads may complicate the reintroduction of low-severity fire to the recovering forest." Long term risk for secondary burns would be high and such burns would greatly reduce forest productivity.

Cumulative Effects

Cumulative effects to vegetation are considered within the spacial and temporal scale of this analysis as described as the Planning Area. Current or foreseeable projects that have effects to vegetation in the Planning Area are as follows: Fire Resiliency Project, Rueben Hazardous Fuels Reduction Project, ESR Projects, Regon Thin, McKnabe Timber Sale, Young Stand Management Project, Boney Skull, Discretionary and Non-discretional road safety actions and the Wolf Pup Project. A description of these referred to projects is found in Appendix C.

In the projects mentioned above, a reduction in either live overstory and/or live 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) 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 be considered at a later date if stand conditions warrant treatment.

The Roseburg BLM is proposing road safety and restoration activities in the Douglas Complex for the Rabbit Mountain LSR. The Rabbit Mountain LSR project is outside of the Planning Area for this project. Effects to soil compaction would be measureable only to the action area for this project, and not measureable beyond the action area (where units are actually proposed) and furthermore the Planning Area.

Ongoing salvage projects are also being implemented on 17,167 acres of private forest industrial land within the Douglas Complex. In the Planning Area on non-federal lands, compaction may increase as the rate of salvage logging and development on private lands increases. In the next 20 years, compaction levels should remain moderate on BLM lands (<12% of compacted area). New plant growth from the fine roots of early seral vegetation would loosen compacted soil. Needlecast from scorched trees, snag fall, tree fragmentation, and other litter from the vegetation would continue to add organic material to the soil. Severely burned areas have greatly reduced

overhead canopies that generally function as a shelter over frost prone understory floors. On frost prone sites, namely lower valley bottoms and wide flat topographic features, the effects of frost may slow growth and productivity. In undisturbed areas within the fire perimeter, the effects of soil freeze and thaw would continue to reduce compaction. Depending on site conditions, this may take decades instead of years. There would be no increase of compaction in undisturbed areas. However, in areas that would remain roaded and would have regular harvest activity, compaction would not be reduced. Areas where salvage harvesting does not occur would see snagfall, tree fragmentation, and fuel amounts exceeding prefire levels. This huge accumulation of fuels predisposes no action areas to severe intensities of secondary future burns. Soil productivity in untreated areas would be greatly reduced if burned again.

On these lands, harvest activities are generally removing the majority of the trees even in low severity fire areas. These commercially managed stands would follow Oregon State Forest Practices in leaving large snags, large hardwoods, and large coarse woody debris elements. Reduced biological and structural diversity is expected in private industrial forestland which can continue long term if planted with single crop tree species. There are also 320 acres of ODF land that would likely see post-fire recovery treatments applied. State lands typically leave the same required elements detailed in Oregon Forest Practices except in high priority spotted owl sites where an elevated number of snags and all coarse woody debris would likely remain.

3.4.5 Alternative 2: Proposed Action

Direct and Indirect Effects

Mortality salvage is defined the Medford District RMP as the harvest of dead and dying timber (RMP p.108). Mortality of entire stands or of scattered trees that results from disturbance would be harvested in salvage operations; only mortality above the level needed to meet snag retention and other habitat goals and provide desired levels of coarse woody debris would be harvested (RMP p.186). Alternative 2 proposes the harvest and removal of dead and dying trees included but not limited to using a salvage timber sale. Alternative 2 defers from treating 879 acres of riparian reserves, 346 acres within nine KOACs, approximately 1,115 acres to avoid adverse effects to NSO, 93 acres of Nonsuitable woodland, and 681 acres of low sawlog volume areas. In addition, treated units retain snag and coarse woody debris prescribed on a per unit basis. This leaves a substantial amount of untreated area on 3,114 acres of BLM land. Sale contracts would include salvage harvest in units and harvest and removal of roadside hazard trees. The salvage harvest would occur on approximately 1,669 acres consisting of 307 acres of ground based yarding, 1,105 acres of cable/skyline yarding, and 257 acres of helicopter logging would take place Hazard tree removal would occur along approximately 10 miles of road and along one ridge line. Salvage would apply to fire injured or fire killed trees that exhibit at least 75 percent probability of mortality, as determined by crown scorch by species. Yarding of dead unmerchantable hardwood material 8-16 inches DBH may also occur in areas of heavy fire-killed hardwood densities. Salvage harvesting for economic recovery would not occur in the Riparian Reserve, Late Successional Reserves or Northwest Forest Plan 100 acre owl activity centers. However, imminent danger trees across any LUA which pose a safety hazard as identified by the 2008 Field Guide for Danger Trees would be handled on a case by case basis, and not part of this project.

The silviculture prescription includes:

- Snags: Retain minimum of 2 snags per acre, ≥ 16 inches DBH
- Course Woody Debris (CWD): Retain a minimum of 120 linear feet (16" x 16') per acre in decay classes 1 and 2. Where this management direction cannot be met with existing CWD, merchantable material would be used to make up the deficit.

Silviculture prescription specific to Critical Owl Habitat (CHU), high priority owl sites, & occupied Del Norte talus:

- Snags: Retain minimum of 4 snags per acre ≥ 16 inches DBH
- Retain all CWD. Where 120 linear feet of CWD does not exist, merchantable material would be used to make up the deficit.

Removal of trees would be accomplished using conventional and helicopter logging systems. To facilitate operations, 6.59 miles of temporary route and 0.32 miles of permanent road are proposed.

Site preparation to prepare inadequately stocked areas for regeneration are used to provide physical access to planting sites, control fire hazard, provide initial physical control of the site to channel limited resources ion the site into desired vegetation, influence the plant community that redevelops on the site and ensure the retention of site productivity (RMP, p.183). Southern Oregon hardwood and shrub species possess an infamous capability of resprouting. In severe fire areas, an expected shift away from conifer-dominated stands to stands dominated by hardwoods and shrubs would occur in both the short (0-10 years) and long term (11+ years) without management intervention. Slashing on selected units may be necessary to reduce density of hardwood and brush competition as a site preparation prior to tree planting. This would occur only in units with > 40% ground cover competition, leaving live hardwoods over 8" DBH for biological and species diversity (RMP p.75, 188). Post-fire studies have shown that cutting of competing vegetation did not result in the loss of those shrub species from the sites or decrease the diversity of the developing plant communities (USDA/USDI 2014). Following salvage of the fire area, logging slash would be evaluated for treatment (lopping and scattering, or hand piling and burning) to minimize activity fuels. Some areas may add the removal of fire-killed hardwoods less than 16 inches DBH. Reducing deadwood density with the incorporation of project design features detailed in Sec. 2.4 of this EA, would reduce the potential for severe fire in the new forest as well as improve access for tree planting (Tappeiner et al. 2007, 256).

Alternative 2 proposes 1,669 acres of commercial extraction activities, 6.59 miles of temporary route construction and 0.32 miles of permanent road construction. Best Management Practices (BMPs) in the Medford District Resource Management Plan (BLM 1995 p.166) describe the use of designated skid roads within stands to limit horizontal soil compaction to less than 12% of the

harvest area. These activities would result in an estimated 153.98 acres of soil compaction and displacement over new and existing footprints and would reduce soil productivity by an estimated 1.49% in the Activity Area. Total compaction/displacement associated with temporary routes, tractor skid trails, landings and cable yarding corridors would account for approximately 9.2% of the project Activity Area[1]. Each proposed Douglas Complex Project harvest unit would be below 12% compaction and 5% productivity loss as analyzed in the 1994 Medford District FEIS RMP. The specific elements of the Proposed Action that would affect the physical, chemical, or biological properties of soils in proposed harvest units are described below.

Soil Productivity

Salvage harvesting is not proposed in lands classified as Nonsuitable Woodland. Nonsuitable Woodland classifications include all fragile nonsuitable forest land and sites that are not biologically and/or environmentally capable of supporting a sustained yield of forest products (BLM 1986a, p.6). On Fragile Nonsuitable Woodland sites, future production would be reduced even if special harvest and/or restrictive measure are applied due to inherent site factors such as soil, geologic materials, topography, and groundwater tables (BLM 1986a, p.4). All fragile nonsuitable sites are classified as Nonsuitable Woodland (_ _ NW). Nonsuitable woodlands, which include all landslide prone areas and other unstable soils, are identified as not suitable for timber harvest (RMP 1995, p.41).

Timber harvest activities cause forest soil disturbance that have implications for site productivity (Bockheim et al. 1975). The Medford District RMP provides the guidance to apply BMPs during all ground and vegetation-disturbing activities to improve or maintain soil productivity (RMP, p.44). Implementing BMPs and minimizing disturbance of fragile areas will keep losses in soil productivity to a minimum (RMP, p.44). Practices incorporating BMP guidelines are listed in Section 2.4.

Soil Compaction/Displacement

<u>Roads</u>

Temporary routes are not intended to be part of the permanent or designated transportation network system. Temporary route construction on BLM land would occur on 5.33 miles of BLM land and 1.26 miles of private industrial forestland amounting to 6.59 miles and approximately 11.18 total acres. Temporary route construction on federal land would be decommissioned after harvesting and fuels treatments are completed. Road decommissioning for this project would involve blocking roads, sub-soiling the road surface to allow for water filtration, installing waterbars, and applying seed and mulch. Waterbars would filter water runoff and direct drainage off the road surface and away from streams and into vegetation that is adequate to slow surface water, and allow for deposition of detached soil particles. Mulching

[1] Units identified for tractor yarding are calculated at 12% compaction and cable yarded units are calculated at 7% compaction, and helicopter yarded units are calculated at 4% compaction. These compaction percentages are based on research by Adams and Froehlich (1981) and Clayton (1981).

helps minimize surface erosion and seeding helps to establish vegetation re-growth. Sub-soiling road surfaces on all BLM managed temporary routes (5.33 miles) would reduce soil compaction to improve soil productivity on these 9.04 acres of federal BLM land.

A total of 0.32 miles of permanent road construction is anticipated to occur during implementation of the Douglas Complex Project, resulting in 1.56 acres of soil compaction. This ridge road (33-7-21.4 Segment A) would allow harvest operations to occur within Unit 15-3A by connecting two existing roads (BLM road number 33-7-21.0 and a non BLM system road).

Temporary route construction on federal land would be decommissioned after harvesting and fuels treatments are completed. This road decommissioning would be done in the same manner as described above for re-constructed routes. There would be some short-term loss of soil productivity where the temporary route was constructed due to displacement of soil organics. Soil productivity would recover within 1-3 years as disturbed sites become revegetated. Sub-soiling road surfaces would occur to aid in site recovery. Manual revegetation with native species may occur to further accelerate rehabilitation. There would be an increase in soil productivity within the unit along these temporary routes in areas where the organics were deposited (e.g., fill-slopes). Sub-soiling road surfaces of temporary routes would ameliorate compaction.

Landings, Skid trails, and Cable Yarding Corridors

Landings, and other areas of exposed soils resulting from this activity, would be winterized by properly installing and/or using water bars, berms, sediment basins, certified weed-free hay bales, wood straw, small dense woody debris, seeding, and/or mulching, as directed by the Authorized Officer. All new landing areas would be rehabilitated to reduce soil compaction, minimize sedimentation, and improve site productivity. Landings outside of existing road prisms would additionally be planted with conifers following use.

Existing skid trails would be utilized whenever practical. New skid trails would be pre-designated and approved by the Authorized Officer. Skid trails including turning points would be 12 feet width on average. Peterson et al. (2009) notes that “the presence of even a thin litter layer can substantially reduce soil erosion” and that “when soils are bared by wildfire, slash produced during logging can be used to cover the soil surface and reduce erosion.” Many units exhibit a widespread ground cover of surface litter (Figure 14). Tops and limbs of harvest trees would be left on site for nutrient cycling until slash depth exceeds 18 inches. The presence of even a thin layer of surface litter can substantially reduce soil erosion (Peterson et al. 2009).

Figure 10: Soil Burn Severity

Figure 11: Soil Burn Severity Photos - Top row from left to right: Units 15-2, 10-1WP, 13-A; Bottom row left to right 12-4, 13-B, and 27-5

Tractors would be equipped with an integral arch to minimize soils disturbance and equipment would walk over as much ground litter as possible to reduce compaction (Figure 12). Utilized skid trails would be rehabilitated upon completion of harvest. Ground based equipment would be limited to slopes less than 35% and yarding equipment would be limited to designated skids. Use of blades while ground based yarding would not occur to minimize soil disturbance. At a minimum, one-end suspension would be required on all ground based and cable units to minimize soil disturbance. Full suspension would be required if yarding is needed to cross unstable areas or stream draws.

Figure 12: Example of a tractor yarding unit where tops and limbs are left for equipment to walk over and mix into soil for nutrient cycling

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Timber Production Capacity Classification (TPCC)
The Timber Production Capability Classification (TPCC) inventory is designed to identify sites capable of sustaining intensive timber management for a long term flow of timber production. Nonsuitable Woodland TPCC lands include all landslide prone areas and other unstable soils and are identified as not suitable for timber harvest (RMP, p.41). Within the Douglas Complex Fire perimeter 2,271 acres were identified as Nonsuitable Woodland. In the project the following categories were excluded from consideration for treatment for this reason: Fragile Nonsuitable Woodland Soil Moisture (FSNW), Fragile Nonsuitable Nutrient Woodland (FNNW), Fragile Nonsuitable Woodland Slope Gradient (FGNW), and Fragile Nonsuitable Woodland Groundwater (FWNW). There are no treatments proposed on 2,271 acres of Nonsuitable Woodlands which include all landslide prone areas and other unstable soils, and identified as not suitable for timber harvest (RMP, p.41).

Restricted TPCC reforestation classifications (R_R) could have limitations for establishing new trees within 5 years due to temperature, moisture, and surface conditions (i.e., rocky) without further management, rather than have impacts to the physical structure and stability of the soils. The PDFs in Section 2.4 would protect these stands reforestation capability.

On TPCC withdrawn lands unavailable for scheduled forest management, timber harvest could occur to salvage timber killed or substantially damaged by fire, windthrow, insect infestation or other catastrophe to meet the needs of nontimber allocations made on these lands (RMP, p.72). These lands unavailable for planned forest management activities are "withdrawn" from the scheduled timber production base because they lack the physical and biological capability to support and produce a predictable flow of forest products on a sustained yield basis. Timber harvesting from these lands are not included in the Allowable Sale Quantity (ASQ). Salvage would occur to reduce deadwood densities to provide near and long term resilience and resistance of forest to future fire or for road system management. It would also occur to facilitate temporary route construction of roads and provide more logical logging units (RMP, p.72). Fire-killed and fire-injured trees with high probability of mortality would be salvaged on 40.8 acres of lands unavailable for planned forest management (non-fragile suitable woodland TPCC withdrawn categories) consistent with the objectives of the allocation (RMP, 72). Salvage on these lands would reduce deadwood densities that would interfere with future management objectives. These fuels would contribute to the intensity of future fires, impeding suppression efforts. Reducing deadwood densities would help to restore the resiliency of the stand to future wildfire. Treatments are intended to lower risk of future fire intensities at the stand and landscape scale and are applicable to all land use allocations (RMP, p.89). The proposed treatments on the reforestation suitable restricted and withdrawn classification would not have effects to productivity beyond those as described in Section 2.4. These treatments would occur in 13 separate units from 0.5 to 17 acres in size classified as:

- RSW - Reforestation Problem/Surface Rock/Withdrawn (Suitable Woodland)
- LSW – Low Site (forested but will not produce 20 ft3/ac/year)/Withdrawn (Suitable Woodland)
- NF – Nonforest (incapable of 10% tree stocking)

Unit	Unit Acres	Logging System	TPCC Acres	Symbol
17-1	51	Ground Based/Cable	4.5	RSW
09-3	17	Cable	17.1	RSW
09-4	3	Ground Based	2.6	RSW
29-2B	8	Ground Based/Helicopter	0.7	RSW
29-3A	2	Helicopter	0.7	RSW
29-2B	2	Helicopter	1.1	RSW
23-A	9	Ground Based/Cable	1.0	RSW
07-6C	3	Helicopter	0.5	RSW
12-1A	2	Helicopter	2.1	LSW
29-3	4	Helicopter	1.6	NF
33-3	7	Ground Based	7.3	NF
09-1	40	Ground Based/Cable	0.5	NF
23-H	1	Helicopter	1.2	NF

Cumulative Effects

Cumulative effects to vegetation are considered within the spatial and temporal scale of this analysis as described as the Planning Area. Current or foreseeable projects that have effects to vegetation in the Planning Area are as follows: Fire Resiliency Project, Rueben Hazardous Fuels Reduction Project, ESR Projects, Regon Thin, McKnabe Timber Sale, Young Stand Management Project, Boney Skull, Discretionary and Non-discretional road safety actions and the Wolf Pup Project. A description of these activities within these referred to projects is found in Appendix C.

The Stratton/Brimstone salvage project on 130 acres is occurring outside of the Douglas Complex fire perimeter therefore these cumulative vegetation effects of treatments analyzed apply specifically to the footprint within the Douglas Complex Fire. Within the Douglas Complex, tree planting would likely occur following harvest treatments planned under this Project.

Soil compaction from harvesting is limited to the footprint of harvest units within the Douglas Complex Fire Recovery Project. No future or foreseeable activities contributing to further soil compaction are anticipated within the footprint of harvest units in the Douglas Complex Fire Recovery Project. Long term site productivity would improve where tree planting occurs. Within the Douglas Complex, tree planting would likely occur following harvest treatments planned under this Project. Tree planting would accelerate natural regeneration processes of conifer ingrowth and establishment. Tree planting, combined with the incorporation of the BMPs and PDFs described in Section 2.4, would maintain long term site productivity.

Ongoing salvage projects are also being implemented on 17,167 acres of private forest industrial land within the Douglas Complex. On these lands, harvest activities are generally removing the majority of the trees even in low severity fire areas. These commercially managed stands would

follow Oregon State Forest Practices in leaving large snags, large hardwoods, and large coarse woody debris elements. Reduced biological and structural diversity is expected in private industrial forestland which can continue long term if planted with single crop tree species. There are also 320 acres of ODF land that would likely see post-fire recovery treatments applied. State lands typically leave the same required elements detailed in Oregon Forest Practices except in high priority spotted owl sites where an elevated number of snags and all coarse woody debris would likely remain.

3.4.6 Alternative 3:

Direct and Indirect Effects

Alternative 3 is similar to Alternative 2. Public comments identified concerns with watershed resources. Development of this alternative was to accommodate those concerns and provide the decision maker with comparable effects with respect to ground disturbing activities. Silviculture prescriptions are identical between Alternative 2 and Alternative 3. Logging operation proposals are different. Alternative 3 proposes more helicopter harvesting and less road work to accomplish logging activities, while still meeting the Purpose and Need of the project.

The Direct and Indirect Effects of Alternative 3 would be the same as Alternative 2 except that 264 acres of ground based yarding, 924 acres of cable/skyline yarding, and 481 acres of helicopter logging would take place – an increase in 224 acres of helicopter yarding with a corresponding decrease in acres of conventional yarding systems of ground based and cable/skyline. As opposed to conventional yarding systems, the increase in 224 acres of helicopter logging between Alternative 2 and 3 would result in improved site productivity on these corresponding acres of land. However, without roads to facilitate tree planting, associated monitoring for regeneration success, and subsequent plantation maintenance, there may be areas that forego these treatments because of poor access. Areas that forego post-harvest silvicultural regeneration treatments would result in the loss of the ability to control establishment of desirable tree species and meet regenerations targets and timeframes promptly as directed in the Medford District RMP (RMP, p.184).

There are no treatments proposed on nonsuitable woodlands (those TPCC symbols ending in NW) which include all landslide prone areas and other unstable soils, and identified as not suitable for timber harvest (RMP, p.41). Fire-killed and fire-injured trees with a high probability of mortality would be salvaged on 40.8 acres of lands unavailable for ***planned*** forest management (non-fragile suitable woodland TPCC withdrawn categories) consistent with the objectives of the allocation. Harvest from these lands are not included in the ASQ (RMP, p.72). These treatments would occur in 13 separate units from 0.5 to 17 acres in size.

- RSW - Reforestation Problem/Surface Rock/Withdrawn (Suitable Woodland)
- LSW – Low Site (forested but will not produce 20 ft3/ac/year)/Withdrawn (Suitable Woodland)
- NF – Nonforest (Withdrawn)

Table 31: Unit Acres Proposed on Non-Fragile Suitable Woodland TPCC Withdrawn

Unit	Unit Acres	Logging System	TPCC Acres	TPCC Symbol
17-1	51	Ground Based/Cable	4.5	RSW
09-3	17	Cable	17.1	RSW
09-4	3	Ground Based	2.6	RSW
29-2B	8	Ground Based/Helicopter	0.7	RSW
29-3A	2	Helicopter	0.7	RSW
29-2B	2	Helicopter	1.1	RSW
23-A	9	Helicopter	1.0	RSW
07-6C	3	Helicopter	0.5	RSW
12-1A	2	Helicopter	2.1	LSW
29-3	4	Helicopter	1.6	NF
33-3	7	Ground Based	7.3	NF
09-1	40	GB/Cable/Helicopter	0.5	NF
23-H	1	Helicopter	1.2	NF

Alternative 3 proposes 1,669 acres of commercial extraction activities, 3.23 miles of temporary route construction and 0.32 miles of permanent road construction. Best Management Practices (BMPs) in the Medford District Resource Management Plan (RMP, p.166) describe the use of designated skid roads within stands to limit horizontal soil compaction to less than 12% of the harvest area. These activities would result in an estimated 145.41 acres of soil compaction and displacement over new and existing footprints and would reduce soil productivity by an estimated 1.21% in the Activity Area. Total compaction/displacement associated with temporary routes, tractor skid trails, landings and cable yarding corridors would account for approximately 8.7% of the project Activity Area[2]. Each proposed Douglas Complex Project harvest unit would be below 12% compaction and 5% productivity loss as analyzed in the 1994 Medford District FEIS RMP. The specific elements of the Proposed Action that would affect the physical, chemical, or biological properties of soils in proposed harvest units are described below.

Cumulative Effects

Cumulative effects of Alternative 3 would be the same as Alternative 2 except that treatments would be applied to 252 acres of ground based yarding, 936 acres of cable yarding, and 481 acres of helicopter yarding. As opposed to conventional yarding systems, the increase in 224 acres of helicopter logging between Alternative 2 and 3 would result in improved long term site productivity on these corresponding acres of land.

[2] Units identified for tractor yarding are calculated at 12% compaction, cable yarded units are calculated at 7% compaction, and helicopter yarded units are calculated at 4% compaction. These compaction percentages are based on research by Adams and Froehlich (1981) and Clayton (1981).

3.5 Soils – Sedimentation and Erosion

3.5.1 Methodology

The analysis for baseline and cumulative effects for soil erosion includes the primary sources of accelerated erosion, discussed at a planning area (multiple catchment) scale. For direct and indirect effects of this project the analysis area includes all proposed treatment units and the area 25 foot on either side of road maintenance haul roads. These potential impacted areas will be referred to as the "treatment areas." Where this analysis identifies that soil erosion would be transported offsite into streams, or other hydrologically connected conduits, impacts will be analyzed within EA Section 3.6.

3.5.2 Assumptions

For this analysis it is assumed that salvage harvest will occur for the next 1-3 years inside the fire perimeter on non-federal lands. For non-federal lands within this planning area that are outside the fire perimeter, it is assumed that harvest activities will be consistent with past trends, and that actions will be consistent with the Oregon Forest Practices Act and all state, federal, and local laws. It is also assumed that most harvest operations on non-federal lands will have little rehabilitation in terms of road subsoiling and erosion control, that stream side harvest would occur, and that harvesting would continue to occur on a 40-80 year rotation in the foreseeable future.

3.5.3 Affected Environment:

Planning Area Overview

The planning area lies within the Klamath Mountains Geologic Province. The Klamath Mountains were formed from Mesozoic-Jurassic geologic formations which are folded and faulted, and intruded by the collision of the North American and Farallon Plates. This is an area that began uplifting around 14 million years ago, and has been shaped, primarily by water, into a mountainous bowl with a large valley floor.

Due to the large project area and complex geology, there are many different soil properties among the suite of soil types. Proposed treatment areas fall primarily within Beekman-Colestine, Beekman-Vermisa, Josephine-Speaker, Aker-Norling, Aker-Vermisa, and Kanid-Atring complexes, and within the Speaker-Josephine gravelly loam series. Less than 5% of the treatment areas fall within the Vermisa-Rock outcrop, Dubakella-Pearsoil, Dumont-Zing complexes, and within the Josephine, Pollard, and Dumont gravelly loams. Below a varied depth of 0-2" of partially decomposed plant material, soils in the treatment areas generally range from a loam to very gravelly loam in the surface horizon. These soils have a moderate erosion hazard on slopes less than 30%, and a moderate to high hazard of erosion on steeper slopes. Soils are generally colluvium and/or residuum derived from a variety of rock types including metamorphic rock, metasedimentary, metavolcanic, sandstone, mudstone, and siltstone. They are well-drained to somewhat excessively drained, and have a depth to water table that is in excess of 80 inches. The water holding capacity is very low to moderate, and the depth to the restrictive feature varies from 10inches to more than 80inches. These soils are largely suited for growing Douglas-fir, ponderosa pine, and Pacific madrone. Other tree species are present in certain areas, in varying quantities. Within these soil types and complexes areas are also minor contrasting inclusions

with a variety of parent materials and soil characteristics. Soil maps and descriptions of project soil characteristics are available at the USDA Natural Resource Conservation Service (NRCS) web site: http://www.or.nrcs.usda.gov/pnw_soil/or_data.html. The major management limitations and soil characteristics identified by NRCS for the soils and soil complexes found within the Planning Area were used in the selection and development of Best Management Practices (BMPs) and Project Design Features (PDFs) which have been incorporated into the Douglas Fire Complex Recovery Project.

Sensitive and Fragile Soils

Approximately 70% of the treatment areas in this project have soils that are classified as having category 1 sensitive soils as described in the Medford RMP (p. 168). These soils are highly sensitive to burn damage. Another approximately 20% of the treatment areas are classified as category 2 sensitive soils. These soils are moderately sensitive to burn damage. On both of these soil categories, retention of coarse woody material and recruitment of snags is recommended by the Medford RMP (p. 168).

There are also areas of fragile and reforestation limited soils under the Timber Production Capability Classification (TPCC) Handbook (BLM 1986a). TPCC fragile classifications within treatment areas in this planning area include Fragile-Slope Gradient-Suitable, Fragile-Groundwater-Suitable, and Fragile-Nutrient-Suitable. These sites have a higher degree of sensitivity for various reasons, but are all considered to be suitable for all actions required to perform commercial harvest as long as additional PDFs are applied.

Sites classified as fragile due to slope gradient (FGR) have higher instances of debris type landslides and unacceptable levels of surface erosion if implemented without site specific PDFs. Sites classified as fragile due to groundwater (FWR) contain water at or near the surface for sufficient durations to negatively affect conifer growth and survival. Without the application of specific protection measures such as seasonal or soil moisture restrictions, these sites can be prone to soil displacement, compaction, and where hydrologically connected, stream sedimentation. Sites classified as being fragile as a result of nutrient content (FNR) have soils that are inherently low in nutrients or have a nutrient imbalance that inhibits tree growth. Timber harvest on these sites can be performed without reducing productivity below the threshold of commercial timber land. Table 32 below identifies where TPCC fragile soils exist with in proposed salvage units. In most units only a portion of the unit overlaps TPCC fragile soil classifications. Units in bold have at least a 90% overlap with TPCC fragile restricted soils.

Table 32: Timber Productivity Capacity Classification (TPCC) in the Douglas Complex Recovery Planning Area

TPCC Classification	Unit #
FGR	**11-3A**, 11-3B, **11-2A**, 7-6A, **9-1A**, 9-1C, **9-2A**, 9-7A, **9-8A**, **9-5A**, **9-6A**, **15-7**, 15-4, 15-8, **15-3**, **15-2**, 14-3A, 13-A1, 13-A2, **13-A3**, 23-3, 25-6, 12-6A, 12-2A, 12-3A, 9-1, 9-2, 9-1D, 9-4, 9-5, **9-9**, 10-1WP, 10-1, 11-2, 11-4, 15-3A, 15-4A, 15-4B, 13-4, 21-3, 21-2, 21-6A, 21-6, 23-A, 23-4, 23-7, 23-10C, 19-3, 27-B, 25-1A
FWR	3-2A
FNR	23-F, 27-2A
TPCC Classification	**Unit #**
FGR	11-3A, 11-3B, 11-2A, 7-6A, 9-1A, 9-1C, 9-2A, 9-7A, 9-8A, 9-5A, 9-6A, 15-7, 15-4, 15-8, 15-3,

	15-2, 14-3A, 13-A1, 13-A2, 13-A3, 23-3, 25-6, 25-7, 12-6A, 12-2A, 12-3A, 9-1, 9-2, 9-1D, 9-4, 9-5, 9-9, 10-1WP, 10-1, 11-2, 11-4, 15-3A, 15-4A, 15-4B, 13-4, 21-3, 21-2, 21-6A, 21-6, 23-A, 23-4, 23-7, 23-10C, 19-3, 27-B, 25-1A
FWR	3-2A
FNR	23-F, 27-2A

Additional TPCC classifications that overlap units in this Planning Area are specific to reforestation difficulties rather than impacts to the physical structure and stability of the soils. Section 3.4 Soil Productivity and Compaction, identifies and describes the specific limiting factors for each of these classifications.

Map 8 of the Grave Creek Watershed Analysis (WA) and Map 16 of the West Fork Cow Creek WA identify general areas within this Planning Area that may have unstable soils. This information is compiled broadly and is not based on site specific field review. As such, these areas were cautiously assessed during multiple site-specific field reviews. The field data collected ultimately determines the specific areas where timber management is suitable.

Erosion

Introduction

Erosion is an inclusive term for the detachment and removal of soil and rock. On hillslopes in southern Oregon the dominant natural processes of erosion are, action by raindrops, running surface water, subsurface water, and mass wasting. The amount of erosion that occurs is a function of the eroding power of the action and the erodibility of the soil. The natural physical and chemical characteristics of the soil combined with the past land use management alterations are determining factors in soil erodibility.

Ground cover by forest litter, duff, and organic material is the most import component of the forest environment for protecting the mineral soil from erosion (Elliot et al. 1996). Vegetation type and density also plays a key role in how erodible a soil is. Vegetation influences soil erodibility through the action of its roots, intake of water and nutrients, and by providing organic matter and cover to protect the soil surface. Vegetative cover reduces the particle detachment rate, and through the binding capacity of root masses, the sediment transport rate. Therefore surface erosion, from disturbed soils that are not compacted, is normally greatly diminished within 1-3 years, following the regrowth of vegetation. Soils protected by litter are also less prone to erosion (SOLO, 2006; Rothacher and Lopushinsky 1974).

Soil compaction is the packing together of soil particles by physical pressure at the soil surface that results in an increase in soil density and a decrease in pore space. A decrease in soil pore space results in restricted movement of water, nutrients, air, and plant roots, and as such generally decreases site productivity and vegetative growth in most soil types. Reduced pore space also reduces water infiltration, causing an increase in surface runoff and accelerated erosion. Road decommissioning that includes proper subsoiling greatly reduces the recovery period and type of long-term impacts to soils that have been compacted. In cases where compacted soils have not been subsoiled during rehabilitation, chronic erosion and other soil impacts can persist for 40- 80 years, or more (Wert and Thomas, 1981).

Sources of Accelerated Erosion

In this planning area, alterations to the soil profile from past and current management actions that apply force to, or alter the vegetative cover, are extensive. Past management on non-federal and federal lands alike, have increased the erodibility of soils through road construction, maintenance and use, timber management, and fire.

All roads contribute to accelerated erosion at different levels depending on the surface type, type of use, location, maintenance frequency, and moisture levels of the road surface during use. Roads modify hydrology both through interception of precipitation on the road surface, and through interception of subsurface flow. Poorly located roads that channelize flow on hillslopes are recurrent sources of accelerated surface erosion, and in some cases mass wasting (Wemple and Jones, 2003). Unsurfaced or poorly surfaced roads open to public use and management during wet conditions, in addition to poorly located roads that have failed or are failing, are one of the largest chronic sources of accelerated erosion in the planning area.

Timber harvest on federal and non-federal lands within this planning area has been occurring for decades. Based on field surveys and 2013 LiDAR imagery, the planning area currently has widespread compaction from skid trails and roads. Many of these skid trails and primitive roads are partially revegetated with grasses, brush, and other vegetation. Since the erodibility of the soil on these revegetating sites is trending towards improvement, these sites will generally continue to contribute less surface erosion each year; unless reopened for access or future management.

Watersheds with large areas that are in an unnaturally open condition can also increase erosion by reducing protective cover, root mass, and decreasing vegetative uptake of water. Additionally, wildfire increases the erodibility of the soil by altering the organic surface layer and chemical composition. Heat resulting from large scale and intense fires can also damage soil biology such as mycorrhizae, nitrifying bacteria, and other soil organisms in proportion to burn intensity, adversely affecting soils for up to 10 years (Barnett 1989).

<u>Pre-Fire Conditions</u>

Pre-Fire Road Erosion

Within the planning area, there are approximately 431 miles of system roads that are currently used and maintained as funding allows. Most of these roads are open to the public and are periodically used and maintained as haul routes for forest management operations. Existing roads proposed for haul and maintenance as part of this project are either paved (BST), rocked, or native surface.

Based on GIS data, approximately 10% of roads in this planning area are Bituminous Surface Treatment (BST) surfaced. Rocked roads account for approximately 42% of the roads, and when used for wet condition haul, are generally upgraded where needed to provide adequate surfacing to prevent excessive erosion and road damage. Unless upgraded, rocked and natural surface roads on hydrologically connected BLM lands are only used for log hauling during dry conditions (as described in the PDFs (Section 2.4.5, Hauling and Road Maintenance). Approximately 16% of the roads within this planning area are unsurfaced. These roads are generally the largest sources of erosion, especially if they are open to year round public motor vehicle use. The remaining 32% of roads within this planning area are unclassified surface

types. Nearly all of these roads occur on private lands. The percentage of these roads that are paved, rocked, or natural surface is unknown.

Due to limited funding for maintenance, and multiple ownerships, some of the roads in this planning area were not regularly maintained prior to the Douglas Complex fires, and as such showed evidence of surface erosion, inadequate drainage, inadequate stream crossings, and/or unstable cut-banks and fill slopes. Generally roads in this planning area were not maintained with adequate rock surfacing to allow for wet season haul to occur without impacts to the road surface and water quality. Many natural surface roads that were open to the public during the wet season had obvious drainage and surface integrity issues that were present prior to the Douglas Complex fires in the form of large ruts and small road failures.

Prior to the Douglas Complex, existing BLM collector and arterial roads had received regularly scheduled and emergency maintenance as necessary to protect the road from failure and/or impacts to public resources. Additionally, BLM roads that were utilized for federal and non-federal project actions received pre and post-project maintenance to restore or improve drainage patterns and reduce the risk of accelerated erosion. Some historic roads on both public and private lands within this planning area were constructed in poor locations in regards to slope stability and hydrologic impacts, and have been contributing since their construction to excessive chronic erosion and instances of mass wasting; primarily slumping and road cut failures. On public lands these poorly located roads are regularly managed to reduce erosion and risk of mass wasting, closed, or when appropriate and financially possible, decommissioned.

During assessments for the Douglas Complex fire rehabilitation, it was noted that cross drain culverts on road systems in this planning area were generally spaced farther apart than recommended under the Oregon Administrative Rules for forest roads (OAR 629-625-0330). However, past engineering assessments on publicly maintained roads have shown that cross drain spacing prior to the Douglas Complex fire was generally adequate to provide proper drainage, except during rare high flow events.

Pre-Fire Timber Harvest (skid trails, yarding corridors, and landings)
The construction and use of landings, skid trails, and yarding corridors during past timber management operations has resulted in the compaction and displacement some of the soils within the planning area. It is estimated based on 2013 LiDAR and Ortho-Imagery data that roughly 3.5% of the soils in the planning area were in an altered condition prior to the Douglas Complex. With the regrowth of vegetation the magnitude of these impacts on the erodibility of the soil decreased over time. It is estimated based on the type of impact, stand type, aspect, and time since the impact occurred, that approximately 75% of these impacted acres have enough vegetative cover to keep erosion onsite.

Within previously harvested units in this Planning Area, evidence of past compaction is still present along tractor skid trails. Based on field surveys, erosion from past timber management within the treatment units has generally subsided or stabilized. Evidence of past actions is essentially only visible within units where skid trails or landings were not rehabilitated following use, or where irrigation channels have failed causing slope failure or deep gullying. This area is estimated to account for roughly 15 acres within the proposed treatment units. Areas with excessive erosion would be buffered out of the treatment area.

Pre-Fire Open Conditions and Fire
Based on 2012 satellite imagery, approximately 6% of the planning area has large areas that are un-vegetated or sparsely vegetated with young trees and brush. These un-vegetated areas exist primarily as a result of past timber harvest actions. Not all of these areas have bare soil conditions that would result in an increase in erosion. Many areas have timber slash, down woody debris, and other cover that has the ability to keep offsite soil erosion to a minimum. The highest risk of increased erosion is in areas where timber units were broadcast burned. Since this practice has not occurred on BLM lands in this area within the past 15 years, these instances would be associated with non-federal lands. As such, the number of acres associated with this action is unknown. Increased erosion associated with open conditions on harvest sites would be expected to decrease exponentially each year following harvest, and with the re-growth of vegetation, would be expected to be negligible within 5 years.

There are approximately 5,175 acres of hazardous fuel reduction treatments that occurred in the past five years within the planning area. These treatments were designed to limit the extent and magnitude of onsite erosion, which would be retained within the vegetation of each unit and would not be transported offsite, or to streams. These treatments help to reduce the probability and magnitude of intense, large scale wildfires by reducing fuel loading and horizontal continuity within the stand. Based on field reconnaissance, there is no evidence within treatment units of any persisting accelerated erosion as a result of these hazardous fuel reduction treatments.

GIS data indicates that, prior to the Douglas Complex fires, no wildfires have occurred within the last 10 years in this planning area.

<u>Post Fire Conditions</u>
Douglas Complex fires
On BLM lands in the GPRA soil burn severity within the Douglas Complex fire perimeter was mixed with 9% burning at high severity, 17% at moderate severity, 20% at low severity, and 53% that remained unburned. Within treatment units 29% of the soil burned at high severity, 45% at moderate severity, 19% at low severity, and 7% were unburned.

Post-Fire Road Erosion
During the Douglas Complex fires nearly all system and non-system roads that had become grown over by brush were reopened for escape routes, fire control lines, and general access. These roads remained open to year round traffic following the fire unless they had officially been closed to public access prior to the fire. Though this action did not change the road density in these watersheds, there are now more roads available for use. These road miles are included in the pre-fire road mileage discussed above.

Additionally, during and following the fire, road use in this planning area increased exponentially due to fire suppression, rehabilitation, emergency stabilization, non-federal timber salvage, replanting, and other land management actions. Natural surface roads and some rocked roads with old weathered surfacing tend to have weak soil bases that become vulnerable to excessive erosion when wet. These roads were utilized during the winter months and in numerous areas are exhibiting rutting and other surface irregularities. This increased use, combined with more accessible miles of road, has resulted in an increase in surface erosion from roads in the planning area.

Conversely, the Douglas Complex fires also resulted in road maintenance that helped to correct some of the pre-fire maintenance issues. The bulk of this maintenance was implemented on rocked roads. During and following fire suppression actions, most of the mainline and some collector rocked roads were reshaped and graded. Additional cross drains were installed, and numerous culverts were repaired. Vegetation was cut from ditchlines, and culvert inlets were cleaned. With these drainage improvements, these roads would be expected to have low levels of erosion unless utilized for hauling under wet conditions.

Post-Fire Timber Harvest (skid trails, yarding corridors, and landings)
At the time of this analysis, timber salvage has occurred and is ongoing on non-federal lands. The extent of this salvage is unknown. During fire suppression actions dozerlines, handlines, heli-spots, and safety zones were created that have impacts consistent with the soil impacts that result from timber harvest activities. As with skid trails and yarding corridors, dozerlines and handlines result in soil compaction and displacement that can cause varied degrees of erosion. Unlike skid trails, dozerlines are typically 20-80 feet wide, which can result in additional open canopy impacts. These acres are included in the open condition assessment below. Where adequate drainage and cover exists, erosion on dozerlines and handlines usually decreases over time. However, where these control lines are constructed on steep terrain and are not rehabilitated to provide for adequate drainage, these sites can often result in chronic erosion that can persist for decades. Heli-spots and safety zones are equivalent to large timber harvest landings. They create, or are placed on, large compacted open areas on relatively flat ground. Because these sites are created on relatively flat ground, erosion associated with these sites generally decreases over time, and is usually negligible within five years, unless utilized for other purposes.

During fire suppression actions, 49 miles of dozerline was constructed as fire control lines on federal and non-federal lands within the planning area. Of these, 18 miles were located on BLM lands within this planning area. Dozerlines constructed on non-federal lands were waterbarred as necessary to prevent failure, but were not otherwise rehabilitated. These areas are expected to be highly susceptible to erosion for several years to decades until enough vegetation or other ground litter is present to provide a protective cover. On BLM lands, all dozerlines were waterbarred and covered with root wads, downed trees, and slash. Additionally all berms were pulled back onto the cleared area to allow for drainage. In areas where dozerline intersected or were in close proximity to streams, weed-free straw mulch and native seed was additionally applied to reduce erosion. As such, dozerlines 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.

In addition to dozerlines there was also 13 miles of handline that was constructed during fire suppression actions in this planning area. Of these, 3.8 miles were located on BLM lands within this planning area. Since handlines are typically only 2-4 feet wide they generally do not require rehabilitation to prevent chronic erosion. Typically, these sites are waterbarred as necessary to prevent gullying in steep terrain but are otherwise not rehabilitated. Since these sites are so narrow, adjacent vegetation and ground litter typically covers the site within the first 1-2 years, preventing further erosion.

Post-Fire Open Conditions and Fire
Based on 2013 post-fire satellite imagery, approximately 20% of the planning area has areas which are un-vegetated or sparsely vegetated as a result of past harvest and the Douglas Complex fires. Not all of these areas have bare soil conditions that would result in an increase in erosion. Some areas have timber slash, down woody debris, and other cover that has the ability to keep soil erosion to a minimum. Where bare soils are present and adjacent to streams, an increase in stream sedimentation would be expected.

Due to impacts associated with the Douglas Complex fires, the highest risk of increased erosion and stream sedimentation would be associated with steep high intensity burn areas prone to surface erosion and gullying, and in areas where the potential for mass wasting on hillslopes has been increased due to fire impacts. Where a minimum of 19-29% of the overstory canopy within a subwatershed exist, depending on the hydroregion, the risk of peak flow enhancement, which can increase the risk of mass wasting events, is increased (Grant et al., 2008). Where wildfire consumed the ground cover vegetation, the risk would be even greater.

High density road networks that artificially route surface and subsurface flows also increase mass wasting potential, especially in areas where water yield is above normal due to a high percentage of open condition in the subwatershed. Based on the 2013 satellite imagery, the Dads Creek and Riffle Creek HUC 12 subwatersheds are at risk for increased peak flows as a result of the amount of open canopy largely due to the Douglas Complex fires. This does not imply that these are the only areas at risk, or that any slopes in these areas will actually fail. The satellite imagery only provides indicators of increased mass wasting potential. There are many other determining factors that must be analyzed when it comes to slope stability following a large fire event.

On BLM lands, emergency stabilization actions were implemented on some of the areas that were determined to be at the highest risk for mass wasting, and that have the most critical resources at risk in the event of slope failure. However, if slope failure does occur in close proximity to a stream, it is likely that a large mass of sediment will enter the stream network. This sedimentation would result in numerous large pulses of sediment and debris being carried downstream as streamflows rise and fall. Despite being a natural process that these areas have evolved to over geologic time, it would be expected that a substantial impact to aquatic resources would result in the more immediate timeframe.

The highest risk of increased erosion outside the burned areas is in areas where steep timber units were broadcast burned. Since this practice has not occurred on BLM lands in this area within the past 15 years, these instances would be associated with non-federal lands. As such, the number of acres associated with this action is unknown.

3.5.4 Alternative 1 – No Action
Direct and Indirect Effects
Under Alternative 1, this project would not have any adverse impacts to soil resources as a result of road or route construction, road use, yarding corridors, skid trails, landings, or burning of activity fuels as prescribed by the BLM. Areas that do not currently have adequate cover would be subject to surface erosion in the short term, but in a majority of the units would likely dissipate to pre-fire conditions within a few years as vegetation reestablishes on the site. Peak

flows in the Dads and Riffle Creek HUC12 subwatersheds would still be subject to enhancement which could result in larger floods and increased risk of mass wasting.

Cumulative Effects

Erosion from land management actions across all ownerships within this planning area would be expected to remain consistent with current levels over the long term, but generally vary from year to year. Within this planning area, there are a total of 31,296 acres of non-federal land. Based on past harvest trends, on average 250 acres are typically harvested each year on non-federal lands within this planning area. Given the addition of 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 abovewhat would typically occurr in this planning area based on past trend acreages. It would be expected that fire salvage would be the primary target for timber extraction and reforestation within the fire perimeter on non-federal lands.

There are approximately 17,780 acres of non-federal land within this fire perimeter and planning area. Of these, roughly 4,900 acres burned at high enough severity to result in open canopy conditions. These acres were accounted for in the calculations used in the peak flow analysis. It could be expected that most of the commercial timber would be removed from these acres. Additionally, it could be expected that an unknown amount of adjacent green trees may also be removed where it is operationally advantageous. Harvesting of green trees adjacent to severely burned stands would further increase open conditions within the planning area. Many harvested areas may also be treated by prescribed fire in association with site preparation for planting.

New roads could be constructed for timber salvage operations and green tree harvest in the planning area on private property. All actions implemented to facilitate timber harvest and future stand development on non-federal lands would be required to be consistent with the Oregon Forest Practices Act, as well as state and federal water quality laws. The increased erosion associated with open conditions on these sites would be expected to decrease each year following the fire, and with the re-growth of vegetation, would be expected to be negligible within five years.

Where compacted acres from past road construction and timber extraction are not associated with actively maintained road systems, soils would continue to improve slowly over time as tree roots and other natural processes break apart soil particles, eventually resulting in a reduction in compaction on these acres. During this period, some areas could experience an increase in erosion due to gullies and rills that form on compacted and unmaintained skid trails. These acres would likely reestablish full hydrologic and soil functions within 40-80 years, depending on soil type, condition at the time of harvest, and future land management (Wert and Thomas, 1981).

Broadcast burning, pile burning, and other activity fuels treatments would be expected to continue on non-federal lands under the No Action Alternative. The magnitude and extent of the erosion associated with these actions is unknown. All operations are required to be implemented consistent with the Oregon Forest Practices Act, as well as state and federal water quality laws.

Discretionary and Non-discretionary Road Safety Actions are current and foreseeable within the Douglas Complex Fire perimeter. Where these actions occur within the Riparian Reserve on

BLM lands, felled trees would be left onsite, or if necessary for safety, would be removed. This action would be expected to result in open space where moderate to high soil burn severity impacted the root systems or structural integrity of trees within 2 ½ tree lengths (500ft) above road systems and 1 ½ tree lengths (300ft) below road systems within the fire perimeter. Since the actual locations, extent, and magnitude of this action is not known, the impacts associated with this action cannot be assessed.

Additionally, on federal lands, previously analyzed and approved projects would still take place within this planning area. Projects include the Fire Resiliency Project, Wolf Pup Timber Sale, Regor Thin Timber Sale, McKnabe Timber Sale, Young Stand Management Project, Major Federal Highway projects, Medford Road Maintenance Categorical Exclusion, and ongoing Emergency Stabilization and Rehabilitation (ESR) projects. Appendix C provides a description of these projects.

All of the projects listed above would be implemented using standard Project Design Features which would greatly reduce the amount of compaction, surface disturbance, and the amount of exposed soil that would occur from upslope timber management and fuels reduction activities. This would minimize the impacts of these actions on soils, would eliminate offsite transport mechanisms, and keep erosion from yarding, skid trails, and landings onsite and out of streams.

All projects except the Young Stand Management and Pump Chance Maintenance Categorical Exclusions would additionally require road work and maintenance actions that would result in some offsite erosion consistent with the road use and maintenance actions analyzed for Alternative 2 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 of these projects, and any resulting stream sedimentation from these actions would be regulated using BMPs to protect water quality (EA Section 3.6 Hydrology). Road maintenance activities would be expected to maintain or reduce current erosion levels from roads in the future.

Soil impacts resulting in erosion as a result of all federal projects discussed above are consistent with the impact analysis and conclusions provided in the 199 Medford RMP EIS.

3.5.5 Alternative 2

Direct and Indirect Effects

Treatment areas proposed under this project comprise approximately 3% of the total acres within this planning area. Field surveys were used to identify and defer all areas that have the potential to result in chronic erosion, excessive soil displacement, or landslides as a result of this project. BMPs and PDFs were then identified and incorporated into the Douglas Fire Complex Recovery Project's Proposed Action to address the remaining general management concerns identified for each soil type.

The only project action that could result in offsite erosion would be hauling and maintenance activities on roads that are hydrologically connected via ditchlines or stream crossings. Instances of offsite erosion and stream sedimentation from hauling and road maintenance would remain within state water quality standards and would not be of a magnitude to result in a negative impact to aquatic organisms or fish habitat. Offsite erosion and stream sedimentation from hydrologically connected road maintenance and haul is discussed in EA Section 3.6 Hydrology.

All other road use, temporary route construction and reconstruction (including associated decommissioning), skid trail construction and decommissioning, landing construction and rehabilitation, yarding operations, and activity fuels, proposed under Alternative 2, would result in only localized increases in accelerated onsite erosion that would persist for 1-3 years. Below is the description of all activities that would result in accelerated onsite erosion.

Road Haul Activities and Road Maintenance
There are 180.2 miles of existing road, 0.32 miles of proposed permanent new construction and 6.6 miles of new and reconstructed temporary routes proposed for haul and maintenance. Of the existing roads proposed for haul and maintenance, approximately 39.5 miles of bituminous (paved), 103.2 miles of aggregate (rocked), and 20.2 miles of natural surface roads, and 17.3 miles have an unknown surface type.

Under Alternative 2, unpaved haul roads would receive road surface, ditchline, and culvert maintenance as necessary to protect the integrity and drainage of the road during use. Newly constructed or reconstructed temporary routes would be utilized and decommissioned, and would require little or no maintenance activities. The proposed haul and road maintenance on unpaved roads would contribute to accelerated erosion at different levels depending on the moisture levels of the road surface during haul, and the type of maintenance applied. Because all harvest units would require the use of a hydrologically connected rocked or natural surface road to haul extracted materials, hauling would be restricted to dry road conditions to minimize the amount of surface erosion and the transport of eroded material to streams. Other PDFs would help to limit the transport of eroded material to streams. PDFs related to water quality are discussed in EA Section 3.6 Hydrology. All roads would be maintained as necessary to prevent road damage and excessive erosion.

Approximately 23.7 miles of existing haul routes are located on TPCC fragile soils. These roads would be used for haul during dry conditions, and would receive road maintenance consistent with standard PDFs, but would additionally be required to follow these supplementary PDFs to minimize erosion.

On approximately 0.3 miles, road maintenance actions could be performed on FNR lands where needed. Road maintenance activities such as road and ditchline shaping, blading, brushing, and spot-rocking, in areas where subgrades, surfacing, or ditchlines are in poor condition, would result in episodic instances of accelerated erosion within the first season, but would result in an overall improvement of existing drainage and reduce chronic erosion. PDFs would be utilized to minimize the amount of erosion from hauling and road maintenance activities on FNR soils.

On approximately 13.9 miles, road maintenance actions could be performed on FGR lands where needed. Another 6.0 miles of road maintenance could be implemented on FGNW soils if necessary. Road maintenance activities such as road and ditchline shaping, blading, brushing, and spot-rocking, in areas where subgrades, surfacing, or ditchlines are in poor condition, would result in episodic instances of accelerated erosion within the first season, but would result in an overall improvement of existing drainage and reduce chronic erosion. The PDFs incorporated in this project would minimize the amount of erosion from hauling and road maintenance activities on FGR and FGNW soils (EA Section 2.4)

Another 0.5 miles of road maintenance could be implemented on FNGR soils if necessary. Since these roads are designated as fragile due to both gradient and nutrients, maintenance on these roads would require use of both sets of PDFs discussed above.

Where hydrologically connected, 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. These effects will be discussed further in Section 3.6 Hydrology.

Temporary Route Construction, Reconstruction, and Decommissioning
There is a total of 6.59 miles of temporary route construction/reconstruction, and subsequent decommissioning proposed for access to units for timber extraction. The table below identifies units accessed, approximate temporary route length, location on the slope, sideslope adjacent to proposed route, soil type/TPCC fragile classification, and type of construction.

Table 33: Road Construction in Relation to TPCC Classification

Unit Accessed	Temporary Route Length (miles)	Location on Slope	Soil Type/TPCC fragile classification	Type of Construction
7-6A	0.09	Ridge and Upper Slope ~100 feet below ridge	19G, 120G / FGR	Construction
7-6A	0.33	On Ridge	19G	Construction
9-1	0.28	Ridge and Upper Slope ~150 feet below ridge	5F, 19G, 117F	Construction
9-1	0.06	Upper Slope ~150 feet below ridge	5F	Construction
9-1D	0.07	Upper Slope ~200 feet below ridge	5F, 117F	Construction
9-6A	0.03	Ridge and Upper Slope ~50 feet below ridge	5F / FGR	Construction
10-1	0.08	Upper Slope ~75 feet below ridge	120G / FGR	Construction
10-1	0.02	Upper Slope ~50 feet below ridge	120G	Construction
10-1	0.02	Upper Slope ~75 feet below ridge	120G / FGR	Construction
10-1	0.12	Upper Slope ~200 feet below ridge	117F	Construction
10-1WP	0.07	Upper Slope ~100 feet below ridge	117F	Construction
10-1WP	0.15	Upper Slope ~75 feet below ridge	117F	Construction
11-7	0.06	Upper Slope ~150 feet below ridge	5F	Construction
11-7	0.01	Ridge and Upper Slope ~50 feet below ridge	5F	Construction
11-7	0.02	Ridge and Upper Slope ~75 feet below ridge	5F	Construction

Unit Accessed	Temporary Route Length (miles)	Location on Slope	Soil Type/TPCC fragile classification	Type of Construction
11-7	0.04	Ridge and Upper Slope ~150 feet below ridge	5F	Construction
11-7	0.04	Ridge and Upper Slope ~150 feet below ridge	5F, 117F	Construction
13-4	0.05	Ridge and Upper Slope ~100 feet below ridge	72F	Construction
13-A2 & 13-A3	0.24	Ridge and Upper Slope ~100 feet below ridge	13G, 69E, 120G / FGR (50ft)	Construction
14-1A	0.26	On Ridge	6F, 120G	Reconstruction
14-1A	0.02	On Ridge	6F	Construction
14-1A	0.12	Upper Slope ~300 feet below ridge	6F	Reconstruction
14-3A	0.04	Ridge and Upper Slope ~100 feet below ridge	120G	Construction
15-1A	0.54	Ridge and Upper Slope ~25 feet below ridge	6F	Construction
15-1A	0.17	Ridge and Upper Slope ~25 feet below ridge	6F, 72F	Construction
15-2A	0.03	Ridge and Upper Slope ~75 feet below ridge	72F	Construction
15-2WP	0.08	Ridge and Upper Slope ~100 feet below ridge	72F	Construction
15-3A	0.11	Mid Slope ~650 feet below ridge	94G	Construction
15-3A	0.10	Mid Slope ~650 feet below ridge	94G	Construction
15-3A	0.05	Ridge and Upper Slope ~25 feet below ridge	7F	Construction
15-3A	0.04	Ridge and Upper Slope ~25 feet below ridge	7F	Construction
17-1	0.12	Ridge and Upper Slope ~25 feet below ridge	7F	Reconstruction
17-1	0.26	Upper Slope ~125 feet below ridge	7F	Construction
17-1	0.08	Upper Slope ~200 feet below ridge	94G	Construction
17-2	0.15	Upper Slope ~200 feet below ridge	94G	Construction
17-2	0.06	Upper Slope ~100 feet below ridge	94G	Construction
21-2	0.04	Upper Slope ~350 feet below ridge	7F / FGR	Construction
21-3	0.12	Ridge and Upper Slope ~50 feet below ridge	7F	Construction
21-3	0.08	Upper Slope ~350 feet below ridge	7F	Construction
21-4	0.04	Upper Slope ~100 feet below ridge	48F	Construction
21-4	0.04	Upper Slope ~100 feet below ridge	48F	Construction

Unit Accessed	Temporary Route Length (miles)	Location on Slope	Soil Type/TPCC fragile classification	Type of Construction
23-4	0.03	Upper Slope ~50 feet below ridge	6F	Construction
23-4	0.02	Upper Slope ~50 feet below ridge	6F, 72F	Construction
23-4	0.02	Upper Slope ~50 feet below ridge	72F	Construction
23-4	0.02	Upper Slope ~75 feet below ridge	72F	Construction
23-4	0.09	Ridge and Upper Slope ~200 feet below ridge	72F	Construction
23-4	0.05	Upper Slope ~125 feet below ridge	72F	Construction
Sec23 landing	0.2	Ridge and Upper Slope ~200 feet below ridge	120G	Construction
Sec23 landing	0.07	Ridge and Upper Slope ~200 feet below ridge	120G	Construction
25-6	0.08	Ridge and Upper Slope ~25 feet below ridge	19G, 120G	Reconstruction
27-2A	0.43	Ridge, Upper, & Mid Slope ~1250 feet below ridge	120G	Construction
27-2A	0.17	Upper Slope ~475 feet below ridge	120G	Construction
27-2A	0.06	Ridge	120G	Construction
27-5	0.54	Ridge and Upper Slope ~50 feet below ridge	13G, 69E, 120G	Reconstruction
27-5	0.15	Ridge and Upper Slope ~100 feet below ridge	6F, 120G	Construction
29-1	0.15	Upper Slope ~450 feet below ridge	6F	Construction
29-1	0.06	Upper Slope ~125 feet below ridge	6F, 7F	Construction
35-5	0.38	Ridge and Upper Slope ~100 feet below ridge	6F, 120G	Reconstruction

All 6.59 miles of proposed temporary routes are located outside of Riparian Reserves and TPCC fragile withdrawn areas. They would be hydrologically disconnected from streams and wet areas. Temporary routes that are located on or near the ridge with 50% or less side slope would require no fill or minor cut and fill construction techniques. For the eight temporary routes located on slopes greater than 50%, typical cut and fill construction techniques would be utilized. Fill from all cut and fill construction would be pulled back over the temporary roadbed area following subsoiling to help stabilize soils. This would greatly reduce the hydrologic impact of constructing this road because it would stabilize fill material and allow for ground water flow patterns to be reestablished.

Nearly all the proposed temporary routes are located on ridges on upper slopes. These temporary routes would have little if any interception of shallow subsurface flow. Approximately 0.71 miles of temporary route needed to access Units 15-3A and 27-2A would be located mid-slope.

Additionally, there are eight temporary routes that cross over the TPCC fragile gradient restricted (FGR) land classification. Combined these routes cross over approximately 0.22 miles of construction on FGR. FGR lands are classified as fragile as a result of steep gradients. The proposed routes, though technically crossing lands classified as being fragile due to extremely steep slopes, have been walked and field verified. None of the proposed routes on FGR cross over any areas where the slope exceeds 55%.

All temporary routes would be constructed and utilized within the same dry season to the greatest extent possible. Subsoiling the compacted road surface will allow for unimpeded infiltration and ground water percolation processes to continue during the rainy season. If circumstances occur that require a road to be winterized and utilized the following dry season, the route would have properly sized drainage installed and would be fully winterized. These routes would be decommissioned the next year following use. With the implementation of the prescribed PDFs, including subsoiling the road surface, pulling back of fill material, installation of waterbars, and blocking of the decommissioned area to motorized vehicles, there would be no change to watershed hydrology or water quality following the decommissioning of any of the proposed temporary routes.

Through implementation of the PDFs, temporary route construction, reconstruction, and decommissioning impacts to soils would be minimized. There would be a short term impact to soil function on approximately 26.8 acres of roadbed, for 1-2 years until the road is decommissioned, as well as an increase in onsite erosion for 1-3 years until ground vegetation recovers. On 1.5 miles of reconstructed road, there would be a long-term gain in soil function on 1.8 acres as a result of decommissioning actions that include subsoiling of currently compacted roadbeds.

Permanent Road Construction

There is a total of 0.32 miles of new permanent road construction proposed to connect two road systems together and thereby avoid hauling and road improvement actions from occurring in valley bottom of Poorman Creek. Poorman Creek is a non-federal road that is directly connected to the stream in many locations. When used, erosion from this road is directly enters the stream in numerous locations. Currently it is only partially drivable, and as such, is very low use. Opening up this road to haul standards would increase the amount of chronic sediment that would enter the stream from this road.

This proposed road would be located partially on the ridge and partially on the upper slopes within 100 feet of the ridge. It would not cross through any TPCC fragile restricted or withdrawn soils, or any Riparian Reserves. The maximum side slope adjacent to this proposed road is 50%, and the maximum clearing width would be 60 feet. The road would be constructed using cut and fill construction methods and will have both inslope to inside ditch with relief pipes and outsloped road surface with rolling drain dips and waterbars for road surface drainage. Ridge top road segments will intercept little to no subsurface flow mainly due to their location. Outsloping the road surface and installing drain dips will uniformly distribute any minimal road surface runoff and intercepted shallow subsurface flow across the road surface onto the fillslope and re-infiltrating into the downslope residual soil mantle. As such there would be no measurable change to watershed hydrology at the drainage area scale as a result of the construction of this road.

There would be a long term impact to soil function and erosion on approximately 0.8 acres of the permanent road running surface. There would also be a short term impact to soil function on approximately 2.3 acres of cut and fillslope, along the course of the new road and an increase in onsite erosion for 1-3 years until ground vegetation recovers. This road would not be closed, and would be open to public and land management use in the future. However, due to the upper slope location and the road construction and design techniques there would be no change to water quality.

Timber Harvest (skid trails, yarding corridors, and landings)
There are a total of 1,669 acres proposed on matrix lands for timber salvage and future hazard tree removal under this project. Due to the sensitivity of the landscape in large fire burned areas additional protection measures were designed and incorporated into this project to ensure erosion resulting from timber extraction actions remains onsite. With no salvage harvest in Riparian Reserves, and some additional PDFs, all streams, streambanks, and adjacent hillslopes will not be impacted. Supplemental PDFs to keep erosion from this project onsite and to a minimum are discussed below.

To facilitate harvesting of these acres, the construction, use, and rehabilitation of skid trails, landings, and cable yarding corridors would result in up to 125 acres of compaction and accelerated on-site erosion within treatment units. An additional 16 acres would be subject to soil disturbance and areas of compaction outside the treatment units where helicopter landings are constructed. Compaction on utilized landings and skid trails that are not currently part of the permanent road system would be subsoiled following harvest activities. All utilized landings, skid trails, and yarding corridors would be rehabilitated consistent with the PDFs described in Section 2.4.

As discussed in the Affected Environment, 60 units partially overlap TPCC fragile restricted classifications. A total of 123 acres within treatment units would occur on FGR soils. There are also two acres located on FNR soils, and two acres located on FWR soils. These TPCC restricted areas have been surveyed in the field to ensure site stability, and were found to be suitable for timber extraction and activity fuels reduction treatments. To protect these sites and minimize potential erosion consistent with the Medford RMP and Standard Operating Procedures for soils PDFs would be implemented to limit the magnitude and extent of soil erosion (EA Section 2.4).

Implementation of Project Design Features will greatly reduce the amount of soil compaction, surface disturbance, and the amount of exposed soil following treatments that would occur as a result of Alternative 2. These PDFs would also eliminate offsite transport mechanisms and keep erosion from yarding, skid trails, and landings onsite and out of the stream network.

Open Conditions and Fire
Since this project would only be targeting trees that are fire injured and fire killed with at least a 75% chance of mortality, timber extraction units would largely overlap un-vegetated or sparsely vegetated areas. Where timber extraction is implemented, PDFs would ensure the amount of slash and coarse wood available on site to provide ground cover and erosion control is maintained or increased within treatment areas. This would reduce fire caused surface erosion impacts within proposed treatment units that currently do not have adequate ground cover onsite.

Besides surface erosion, the Dads Creek and Riffle Creek HUC 12 subwatersheds were identified as being currently at risk for peak flow enhancement as a result of open canopy created primarily by the Douglas Complex fires. An opening is considered to be present in where canopy closure is less than 30%. Adding canopy openings to any catchment generally increases the risk of peak flow enhancement, which can lead to increased upslope and instream erosion. However, if a catchment still remains below established thresholds, the likelihood of such an event is both unlikely and undetectable. Adding canopy openings to the Dads Creek and Riffle Creek HUC 12 subwatersheds, which are already at risk for peak flow enhancement, would exacerbate an already high-risk situation. Timber salvage would not add any additional canopy openings, since the canopy was already opened in the fire within units that are proposed for treatment. Wherever roads and landings are proposed, individual or small groups of trees may be removed, but these areas would not be continuous, and within these already sensitive subwatersheds each green tree removal area would be less than ¼ acre in size to ensure that open space is not increased.

Activity fuels treatments would occur as necessary to maintain or reduce the fire hazard where slash exceeds 18 inches in depth. Hand pile burning could have a localized impact to soils that would be reduced through regulation of the burn intensity and moisture conditions outlined in the burn plan. All activity fuels treatments would include any combination of lop-and-scatter, hand-piling or hand pile burning in accordance with PDFs as needed to ensure erosion is minimized and remains onsite. No mechanical piling of slash would occur. Lop-and-scatter would not adversely impact soils, and would provide additional erosion protection. Hand pile burning and underburning would have a localized impact to soils that would be reduced through regulation of the burn intensity and moisture conditions outlined in the burn plan.

To ensure that erosion remains onsite during activity and fuels reduction treatments and that soil damage and erosion are minimized and consistent with those impacts analyzed in the 1994 Medford RMP EIS, all burning activities on sensitive and fragile soils would be implemented under a burn plan utilizing the Project Design Features (EA Section 2.4).

Summary of Effects for Soil Erosion
The following actions proposed in Alternative 2 would result in onsite soil erosion that would be minimized through the use of PDFs.

- Hauling and road maintenance on 180.2 miles of existing road
- 6.59 miles of temporary route construction and subsequent decommissioning
- 0.32 miles of permanent road construction
- Approximately 141 acres associated with yarding corridors, skid trails, and landings needed to harvest 1,669 acres of salvage timber

There would be no instances of chronic erosion or excessive soil displacement that would occur as a result of this project. In addition to localized erosion resulting from the above listed activities, on a total of approximately 179 acres there would be a short term impact to soil function as a result of road, route, skid trail, landing, and yarding corridor construction actions

associated with this alternative. There would additionally be a long term impact to soil function and erosion on approximately 0.8 acres of the permanent road running surface.

The only instance of offsite erosion that would occur as a result of Alternative 2 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. These impacts are addressed in Section 3.6 Hydrology.

The magnitude and extent of soil erosion from all activities associated with Alternative 2 of this project would be consistent with the impact analysis and conclusions provided in the199 Medford RMP EIS.

Cumulative Effects

Activities associated with this project including temporary route, permanent road, and landing construction and use; timber extraction, yarding corridors and skid trails; and handpile burning would all result in low levels of onsite erosion that would be minimized through implementation of PDFs. Erosion from project actions would be short term and would not persist for more than three years. When the effects to soils from Alternative 2 are added cumulatively with all other actions that are occurring in this planning area, the magnitude of the impacts to soil function and extent of soil erosion would remain consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS. Impacts from offsite erosion to beneficial uses including water quality in support of aquatic life are discussed in Section 3.6 Hydrology.

3.5.6 Alternative 3

Direct and Indirect Effects

As with Alternative 2 management actions proposed under Alternative 3 would result in soil displacement and erosion within the treatment areas and along roads. Between the two Action Alternatives (2&3) the treatment unit boundaries and acres remain the same. Under Alternative 3 there would be 3.36 miles less of temporary route construction, and approximately 4 less acres of soil disturbance from yarding corridors, skid trails, and landings than what is proposed under Alternative 2. As with Alternative 2, field surveys were used to identify and defer all areas that have the potential to result in chronic erosion, excessive soil displacement, or landslides as a result of this project. BMPs and PDFs were then identified and incorporated into the Douglas Fire Complex Recovery Project to address the remaining general management concerns identified for each soil type.

Following incorporation of these BMPs and PDFs, actions that would result in offsite erosion from this project would be limited to, hauling and maintenance activities on roads that are hydrologically connected via ditchlines or stream crossings. All other road use, temporary route construction and reconstruction (including associated decommissioning), skid trail construction and decommissioning, landing construction and rehabilitation, yarding operations, and activity fuels, proposed under Alternative 3, would result in localized increases in accelerated onsite erosion that would persist for 1-3 years. Below is the description of all activities that would result in accelerated onsite erosion. Offsite erosion and stream sedimentation from hydrologically connected road maintenance and haul is discussed in Section 3.6 Hydrology.

Road Erosion
Hauling and road maintenance on existing roads would be unchanged from that which was anlayzed in Alternative 2.

Because all harvest units would require the use of a hydrologically connected rocked or natural surface road to haul timber, these actions would be restricted to dry conditions to minimize the amount of surface erosion and the transport of eroded material to streams.

Where hydrologically connected, 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. These effects will be discussed further in Section 3.6 Hydrology.

Temporary Route Construction, Reconstruction, and Decommissioning
There is a total of 3.23 miles of temporary route construction/reconstruction, and subsequent decommissioning proposed for access to units for timber extraction. The table below identifies units accessed, approximate temporary route length, location on the slope, sideslope adjacent to proposed route, soil type/TPCC fragile classification, and type of construction.

Table 34: Proposed Road Construction with Soil Classifications

Unit Accessed	Temporary Route Length (miles)	Location on Slope	Soil Type/TPCC fragile classification	Type of Construction
7-6A	0.09	Ridge and Upper Slope ~100 feet below ridge	19G, 120G / FGR	Construction
7-6A	0.33	On Ridge	19G	Construction
9-1	0.28	Ridge and Upper Slope ~150 feet below ridge	5F, 19G, 117F	Construction
9-1	0.06	Upper Slope ~150 feet below ridge	5F	Construction
9-1D	0.07	Upper Slope ~200 feet below ridge	5F, 117F	Construction
9-6A	0.03	Ridge and Upper Slope ~50 feet below ridge	5F / FGR	Construction
10-1	0.08	Upper Slope ~75 feet below ridge	120G / FGR	Construction
10-1	0.02	Upper Slope ~50 feet below ridge	120G	Construction
10-1	0.02	Upper Slope ~75 feet below ridge	120G / FGR	Construction
10-1	0.12	Upper Slope ~200 feet below ridge	117F	Construction
10-1WP	0.07	Upper Slope ~100 feet below ridge	117F	Construction
13-4	0.05	Ridge and Upper Slope ~100 feet below ridge	72F	Construction
14-1A	0.26	On Ridge	6F, 120G	Reconstruction

Unit Accessed	Temporary Route Length (miles)	Location on Slope	Soil Type/TPCC fragile classification	Type of Construction
14-1A	0.02	On Ridge	6F	Construction
14-1A	0.12	Upper Slope ~300 feet below ridge	6F	Reconstruction
14-3A	0.04	Ridge and Upper Slope ~100 feet below ridge	120G	Construction
15-1A	0.17	Ridge and Upper Slope ~25 feet below ridge	6F, 72F	Construction
17-1	0.26	Upper Slope ~125 feet below ridge	7F	Construction
17-1	0.08	Upper Slope ~200 feet below ridge	94G	Construction
17-2	0.15	Upper Slope ~200 feet below ridge	94G	Construction
17-2	0.06	Upper Slope ~100 feet below ridge	94G	Construction
21-2	0.04	Upper Slope ~350 feet below ridge	7F / FGR	Construction
21-3	0.12	Ridge and Upper Slope ~50 feet below ridge	7F	Construction
21-3	0.08	Upper Slope ~350 feet below ridge	7F	Construction
21-4	0.04	Upper Slope ~100 feet below ridge	48F	Construction
21-4	0.04	Upper Slope ~100 feet below ridge	48F	Construction
23-4	0.03	Upper Slope ~50 feet below ridge	6F	Construction
23-4	0.02	Upper Slope ~50 feet below ridge	6F, 72F	Construction
23-4	0.02	Upper Slope ~50 feet below ridge	72F	Construction
23-4	0.02	Upper Slope ~75 feet below ridge	72F	Construction
23-4	0.09	Ridge and Upper Slope ~200 feet below ridge	72F	Construction
23-4	0.05	Upper Slope ~125 feet below ridge	72F	Construction
Sec23 landing	0.2	Ridge and Upper Slope ~200 feet below ridge	120G	Construction
Sec23 landing	0.07	Ridge and Upper Slope ~200 feet below ridge	120G	Construction
25-6	0.08	Ridge and Upper Slope ~25 feet below ridge	19G, 120G	Reconstruction
29-1	0.15	Upper Slope ~450 feet below ridge	6F	Construction
29-1	0.06	Upper Slope ~125 feet below ridge	6F, 7F	Construction

All 3.23 miles of proposed temporary routes are located outside of Riparian Reserves and TPCC fragile withdrawn areas. They would be hydrologically disconnected from streams and wet areas. The width of temporary routes would be limited and constructed routes would be located primarily through already burned stands where removal of green canopy is minimized. Temporary routes that are located on or near the ridge with 50% or less side slope would require no fill or minor cut and fill construction techniques. For the seven temporary routes located on slopes greater than 50%, typical cut and fill construction techniques would be utilized. Fill from all cut and fill construction would be pulled back over the temporary roadbed area following subsoiling to help stabilize soils. This would greatly reduce the hydrologic impact of constructing these routes because it would stabilize fill material and allow for ground water flow patterns to be reestablished.

Under Alternative 3, all the proposed roads are located on the upper slope or ridge. These temporary routes would have little if any interception of shallow subsurface flow. There are seven temporary routes that cross over the TPCC fragile gradient restricted (FGR) land classification. Combined, these routes cross over approximately 0.19 miles of construction on FGR. FGR lands are classified as fragile as a result of steep gradients. The proposed routes, though technically crossing lands classified as being fragile due to extremely steep slopes, have been walked and field verified. None of the proposed routes on FGR cross over any areas where the slope exceeds 55%.

All temporary routes would be constructed and utilized within the same dry season to the greatest extent possible. Subsoiling the compacted road surface will allow for unimpeded infiltration and ground water percolation processes to continue during the rainy season. If circumstances occur that require a road to be winterized and utilized the following dry season, the route would have a properly sized drainage installed and would be fully winterized. These routes would be decommissioned the next year following use. With the implementation of the prescribed PDFs, including subsoiling the road surface, pulling back of fill material, installation of waterbars, and blocking of the decommissioned area to motorized vehicles, there would be no change to watershed hydrology or water quality following the decommissioning of any of the proposed temporary routes.

Through implementation of the PDFs, temporary route construction, reconstruction, and decommissioning impacts to soils would be minimized. There would be a short term impact to soil function on approximately 13.9 acres of temporary roadbed for 1-2 years prior to road decommissioning, as well as an increase in onsite erosion for 1-3 years until ground vegetation recovers. On 0.5 miles of reconstructed road, there would be a long-term gain in soil function on 1.8 acres as a result of decommissioning actions that include subsoiling of currently compacted roadbeds.

Permanent Road Construction

A total of 0.32 miles of new permanent road construction that is proposed to connect two road systems together and thereby avoid hauling up the valley bottom of Poorman Creek in Alternative 2 is also proposed in Alternative 3. As described under Alternative 2, there would be no measurable change to watershed hydrology at the drainage area scale as a result of the construction of this road. Long term and short term impacts of this road on soil function and erosion would be the same as in Alternative 2.

Timber Harvest (skid trails, yarding corridors, and landings)
There are a total of 1,669 acres proposed on matrix lands for timber salvage and future hazard tree removal under this project. Between the two Action Alternatives (2&3) the treatment unit boundaries and acres remain the same. Under Alternative 3, soil disturbance from yarding corridors, skid trails, and landings would be less than what is proposed under Alternative 2 because the number of acres of proposed ground based and cable yarding has been reduced, and the number of acres proposed for helicopter extraction has been increased. Actions associated with Alternative 3 harvest activities would result in approximately 138 acres of compaction and accelerated on-site erosion within treatment units.

All other actions affecting soils and soil erosion are the same as discussed within Alternative 2 and would be the same. Implementation of Project Design Features would greatly reduce the amount of compaction, surface disturbance, and the amount of exposed soil following treatments that would occur as a result of Alternative 3. This would minimize the impacts of this action on soils, and would eliminate offsite transport mechanisms and keep erosion from yarding, skid trails, and landings onsite and out of streams.

Open Conditions and Fire
There would be no change in the impacts to canopy openings or activity fuels treatments between Alternative 3 and Alternative 2.

Summary of Effects for Soil Erosion
The following actions proposed in Alternative 3 would result in onsite soil erosion that would be minimized through the use of PDF's.

- Hauling and road maintenance on 180.2 miles of existing road
- 3.23 miles of temporary route construction and decommissioning
- 0.32 miles of permanent road construction
- Approximately 138 acres associated with yarding corridors, skid trails, and landings needed to harvest 1,669 acres of salvage timber

There would be no instances of chronic erosion or excessive soil displacement that would occur as a result of this project under Alternative 3. In addition to erosion resulting from the above listed activities, on approximately 14 acres there would be a short term impact to soil function as a result of the construction actions associated with this alternative. There would additionally be a long term impact to soil function and erosion on approximately 0.8 acres of the permanent road running surface.

The only instance of offsite erosion that would occur as a result of Alternative 3 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.

The magnitude and extent of soil erosion from all activities associated with Alternative 3of this project would be consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS.

Cumulative Effects

Activities associated with this project including temporary route, permanent road, and landing construction and use; timber extraction, yarding corridors and skid trails; and handpile burning would all result in low levels of onsite erosion that would be minimized through implementation of PDFs. Erosion from project actions would be short term and would not persist for more than three years.

When the effects to soils from Alternative 3 are added cumulatively with all other actions that are occurring in this planning area, the magnitude of the impacts to soil function and extent of soil erosion would remain consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS. Impacts from offsite erosion to beneficial uses including water quality in support of aquatic life are discussed in EA Section 3.6 Hydrology.

3.6 Hydrology

3.6.1 Methodology

For this project, the scale of analysis consists of all drainages within the six impacted HydrologicUnit Code (HUC) 12 subwatersheds. This scale is broader than HUC14 drainages, but finer than complete HUC12 subwatersheds. This smaller analysis area was selected to better detect potential effects of the project from the proposed actions. The rationale is that adverse (or beneficial) effects to water resources are easier to detect in smaller catchments (Bosch and Hewlett 1982) and as one nears the scale of the treatment site. This extent of this analysis area will be subsequently referred to as the planning area.

3.6.2 Assumptions

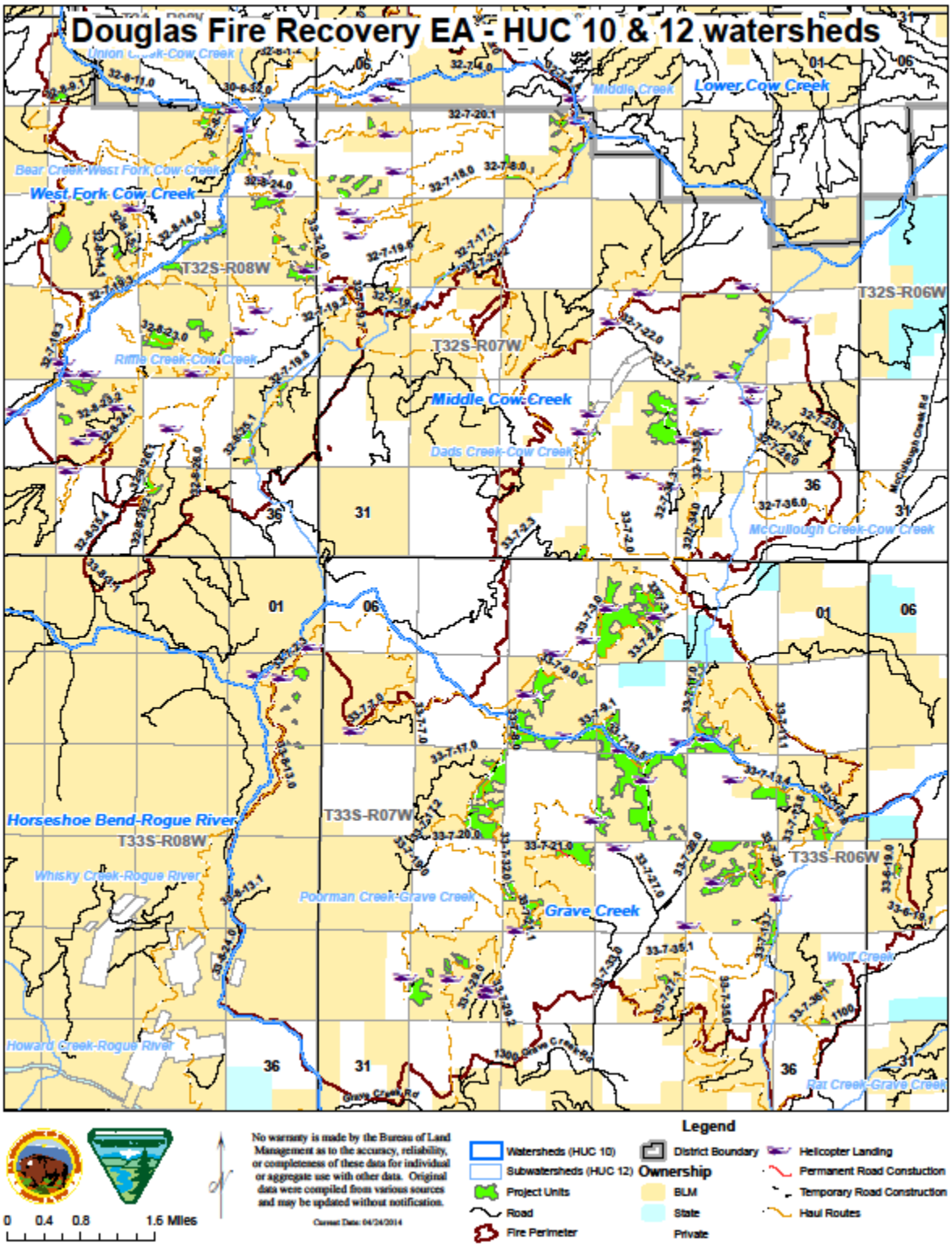
For this analysis it is assumed that salvage harvest will occur for the next 1-3 years inside the fire perimeter on non-federal lands. For non-federal lands within this planning area that are outside the fire perimeter, it is assumed that harvest activities will be with past trends, and that actions will be consistent with the Oregon Forest Practices Act and all state, federal, and local laws. It is also assumed that most harvest operations on non-federal lands will have little rehabilitation in terms of subsoiling and erosion control, that stream side harvest would occur, and that harvesting would continue to occur on a 40-80 year rotation in the foreseeable future. It is assumed that actions associated with non-federal harvest and timber hauling would occur year round and that water quality standards would be met.

3.6.3 Affected Environment:

Planning Area Overview

The planning area for this project incorporates portions of two HUC 8 subbasins; the Lower Rogue and South Umpqua. Within these HUC 8 subbasins, there are portions of three HUC 10 watersheds that would be affected, the Grave Creek, Middle Cow Creek, and West Fork Cow Creek watersheds. These watersheds are approximately 104,529 acres, 113,210 acres, and 55,933 acres, in size, respectively. Within these watersheds there are portions of six HUC 12 subwatersheds. These subwatersheds vary in size from about 13,600 to 23,800 acres.

Figure 13: Hydrologic Unit Code 10 and 12 Watersheds in the Planning Area



The table below displays each of these individual subwatersheds and the actions proposed within each. The upper extent of drainages within the subwatersheds comprises the boundary for the hydrologic analysis of this project.

Table 35: Planning Area Watershed Information

Watershed (HUC 10)	Sub watershed (HUC 12)	HUC 12 Area (Acres)	HUC 12 Area (mi2)	Salvage Harvest Units (Acres)	Temporary Route Construction and Reconstruction (Miles/Acres)	Temporary Route Construction and Reconstruction (Miles/Acres)	Permanent Road Construction (Miles/Acres)	Percent of HUC 12 Sub-watershed in Planning Area
Grave Creek	Wolf Creek	28,358	44.3	18.5	0	0	0	9.9
	Poorman Creek - Grave Creek	23,843	37.3	781.8	2.76	1.61	0.32	68.5
Middle Creek	McCullough Creek - Cow Creek	13,933	31.8	33.9	0	0	0	43.9
	Dads Creek – Cow Creek	15,760	24.6	454.6	1.81	0.91	0	100
	Riffle Creek – Cow Creek	13,651	21.3	276.1	1.40	0.47	0	100
West Fork Cow Creek	Bear Creek – West Fork Cow Creek	13,880	21.7	91.2	0.59	0.20	0	63.8

The planning area is located in the Inland Siskyous of the Klamath Mountains Ecoregion. This area has a Mediterranean type of climate characterized by cool, wet winters and warm, dry summers. Temperatures range from 0 degrees (F) on King Mountain in January to 110 degrees in the interior valleys in August. Extended summer drought is common. Precipitation varies from 36 inches per year in the south eastern interior valleys of these watersheds, to 64 inches per year on Dutchman Butte. Approximately 90 percent of the yearly total falls in the months October to May. Half of the subwatersheds in this planning area are dominated by the rain hydroregion and half are dominated by the rain-on-snow hydroregion. There is an insignificant amount of the snow-dominated hydroregion found throughout the planning area subwatersheds (approximately 43 acres spread out across 63,515 acres).

The volume of stream flow closely parallels the precipitation pattern: peak stream flows occur from November to March and low stream flows occur from July to October. Small headwater streams are often intermittent and have no surface flow during the dry season in most years. Conversely, perennial streams generally flow some volume of water throughout all but the driest years. Intermittent and perennial streams are located within close proximity to a majority of the proposed treatment units. Intermittent and perennial streams are located within close proximity to a majority of the proposed treatment units.

There are approximately 59 miles of streams that are not meeting Oregon Department of Environmental Quality standards for temperature within this planning area. These streams

include Bear Creek, Bonnie Creek, Cow Creek, Dads Creek, Grave Creek, Panther Creek, Poorman Creek, Rattlesnake Creek, Rueben Creek, Riffle Creek, Rock Creek, Skull Creek, West Fork Cow Creek, and Wolf Creek. All of these streams flow through mixed ownership. In many streams this is because naturally low summer flows and shade removal have resulted in stream temperatures that exceed thresholds for various anadromous fish life stages.

Shade on these streams has been impacted by past timber harvest actions and more recently wildfires that have removed overstory canopy within the shade zone. The Douglas Complex fires further impacted portions of many of these water quality limited streams both as a result of, the removal of vegetation due to moderate to high severity burning and, removal of vegetation along streams during fire suppression actions. However, since this project does not propose any actions within the Riparian Reserves, or any actions that would remove stream shade, this water quality analysis focuses on sedimentation.

Based on the three Watershed Analyses that cover this area (WA), designated beneficial uses for the watersheds within this planning area include; public and private domestic water supply; industrial water supply; irrigation; livestock watering; anadromous fish passage, rearing, and spawning; resident fish and aquatic life; wildlife and hunting; fishing; boating; aesthetic quality; water contact recreation; hydropower; and commercial navigation and transportation.

The West Fork Cow Creek is a Tier 1 Key Watershed in the Medford RMP and is therefore an integral part of the Aquatic Conservation Strategy (ACS) (see Appendix A for the ACS Consistency Analysis). Key Watersheds are crucial for maintaining and recovering habitat for at risk stocks of anadromous salmonids and resident fish species. Harvest activities are permitted in Tier 1 Key Watersheds as long as Riparian Reserve management direction is applied and there is no net gain in the amount of roads (Medford RMP). More information about Key watersheds can be found within the West Fork Cow Creek Watershed Analysis (WA).

Additional information on this planning area can be found in the following documents. The Grave Creek WA and Grave Creek Water Quality Restoration Plan (WQRP) cover information within the Grave Creek HUC 10 watershed. The Middle Cow Creek WA and Middle Cow Creek WQRP cover the Middle Cow Creek HUC 10 watershed, and the West Fork Cow Creek WA and West Fork Cow Creek WQRP cover the West Fork Cow Creek watershed. These documents can be reviewed on the Medford District BLM website at http://www.blm.gov/or/districts/medford/plans/inventas.php and http://www.blm.gov/or/districts/medford/plans/activityplans.php, respectively.

Introduction

The term peak flow refers to the maximum instantaneous discharge of a stream or river. In this region, natural fluctuations in stream discharge are controlled by seasonal precipitation and snowmelt patterns (Grant, 2008). Peak stream flows typically occur during or immediately following intense precipitation, and/or rain-on-snow events. Changes in peak flows and low flows can occur as a result of land management actions that result in large openings and large scale wildfire events.

Water yield is defined as the total volume of surface runoff that leaves a drainage area (Church and Eaton, 2001). In a review of 94 catchment experiments worldwide it was shown that

deforestation causes increases in annual water yields. Increases in the average total runoff within a watershed are generally found to be in proportion with the amount of forest cover removed (Church and Eaton, 2001). Harr (1983) found that 80% of the increased water yields in the Pacific Northwest (PNW) occurred during the wet season, between October and March (Church and Eaton, 2001). Increased water yield is primarily a result of reduced evapotranspiration and interception within the watershed. As forests regenerate, water yields generally decrease to pretreatment levels within two to three decades (Hicks et al. 1991).

The Oregon Department of Environmental Quality (ODEQ) is responsible for establishing water quality standards to protect beneficial uses and aquatic life in Oregon streams. Currently ODEQ does not have established criteria for measuring sediment. The current water quality standards instead address turbidity, a measure of water clarity. This standard does not necessarily correlate with the amount of sediment entering the stream.

In addition to turbidity standards, the health of aquatic macroinvertebrate communities has been used as an indicator of sedimentation effects and overall water quality conditions in aquatic systems. The GPRA monitored aquatic macroinvertebrates within these HUC 10 watersheds between 1991 and 2002. The results of those surveys indicate sediment and lack of habitat complexity may be limiting aquatic productivity in some locations. Water samples collected in Perkins Creek and an unnamed tributary to West Fork Cow Creek indicate that stream turbidity during winter months becomes elevated in response to precipitation events. To date, results of this monitoring indicate that post-fire turbidity levels are within the normal range expected for streams of similar size in southwestern Oregon (J. Parker pers. comm., 2014). Parker goes on to say that as would be expected following a landscape disturbance, much of the sediment which was mobilized post-fire was larger (e.g. sand and gravel). Although suspended sediment levels are likely elevated above pre-fire levels, these levels are not outside the range of natural variability and are limited to the duration of a precipitation event (2014).

In all the watersheds in this planning area stream bed quality has been negatively impacted by high road densities, roads in close proximity to streams, un-maintained or poorly maintained roads, native surface roads used for winter haul, roads open to year round for public motor vehicle use, and non-federal and pre-Northwest Forest Plan timber harvest that included streamside harvest.

Stream surveys completed for past projects within the planning area watersheds indicate that though variable, water quality, channel stability, and stream bed quality for aquatics within, and adjacent to proposed project units is generally in fair to good condition. In the small percentage of streams where one or more of these was indicators was rated as poor, historic skid trails and roads that are crossing or adjacent to streams were reported to be the primary cause. Tributary streams within this planning area are generally steep, narrow, and confined, with low or no flow by late summer. During the winter months flows within these streams typically becomes fast moving and scouring. Channel roughness in the upper reaches of all streams within these watersheds is generally high.

The major streams in the planning area are Cow Creek, Bear Creek, Berglund Gulch, Bonnie Creek, Cook Creek, Cow Creek, Dads Creek, Dry Creek, Goat Trail Creek, Grave Creek, Hughes Gulch, Jacob Creek, Knupp Creek, Marion Creek, Panther Creek, Perkins Creek,

Poorman Creek, Rattail Creek, Rattlesnake Creek, Rueben Creek, Riffle Creek, Rock Creek, Skull Creek, Sled Creek, Stevens Creek, Susan Creek, Totten Creek, Tuller Creek, Water Tank Gulch, West Fork Cow Creek, and Wolf Creek. These are 3rd order to 6th order stream channels, and generally contain some fish habitat in the lower reaches. Streams that are 3rd order and above account for approximately 146 of the 754 miles of stream channels within this planning area. Substrate within larger stream channels is primarily bedrock and boulder dominated with high to moderate levels of active streamside erosion. Approximately 81% of the stream miles in this planning area are 1st and 2nd order tributary streams. Tributary streams are generally steep, narrow, and confined, with low or no flow by late summer. During the winter months flows within these streams typically become fast moving and scouring.

Sources of Peak Stream Flow Enhancement

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 burnt areas during rain-on-snow events, and roads capturing and/or diverting rerouting water within their ditches.

Based on a compilation of watershed studies in the Pacific Northwest (Grant et al., 2008), 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). The same report showed that in a rain-on-snow dominated hydroregion, the detection limit is when 19% of the catchment area is in ECA.

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 wildfire has 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 is dependent upon site-specific conditions.

Compaction from roads reduces infiltration capacity, increases subsurface water interception, and increases the rate of delivery of water and sediment to stream channels via ditchlines. Additionally, timber harvest and fire removes vegetation, thereby reducing evapotranspiration and interception of precipitation, increasing the total water yield and potentially adding to flow enhancements (Harr 1986, Jones 2000).

Roads can modify peak flows by reducing infiltration on compacted surfaces, allowing for more rapid surface runoff, or by intercepting subsurface and surface runoff, and channeling it more directly into streams (Ziemer, 1981). The amount of roaded area at which changes in peak stream flow become measure varies considerably based on research. Based on a study of several small basins, significant increases in peak flows were documented when roads occupy more than 12% of the watershed. This study also found that where roads occupy less than 5% of a watershed, increases in peak stream flows were “small, inconsistent, and statistically

nonsignificant." A more recent study found that measurable changes in peak flows can be seen when percent roaded area occupies between 3-4% of a basin (WPN, 1999). The Oregon Watershed Assessment Manual assigns a low potential of hydrologic impacts in association with roads when the roads occupy less than 4% of a subwatershed. A moderate potential is assigned to areas where roads occupy between 4-8% of the subwatershed, and a high potential is assigned to those areas that are above 8% roaded area (WPN, 1999).

A wide array of components factor into changes in hydrologic behavior; some of the watershed interactions that control these changes are scientifically well understood, some are not (Grant et al, 2008). This analysis will focus on changes in stream flow as a result of open watershed condition and roads.

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. Episodic landslides and slumps usually associated with intense winter storms, hillslope erosion, stream bank erosion and roads are primary sediment sources in the planning area. Instream sediment from the stream channel bed and banks is to some extent part of the natural geomorphic process of a stream.

In this planning area past management actions on non-federal and federal lands alike, have increased the erodibility of soils through road construction, maintenance, and use, timber management, and fire. Where these actions are hydrologically connected directly to the stream network, stream sedimentation can occur.

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. Unsurfaced or poorly surface roads which are open to public use and land management during wet conditions, and poorly located roads which have failed or are failing, are the largest chronic sediment sources in the planning area. Proper cross drain spacing and vegetated ditchlines can greatly reduce the amount of sediment that enters streams as a result of roads.

Timber harvest on federal and non-federal lands within this planning area has been occurring for many decades. Based on LiDAR imagery (2013), this planning area currently has widespread areas of compaction from skid trails and roads. In areas where skid trails and roads were constructed through or in close proximity to stream channels and were not rehabilitated following use, areas of surface erosion has resulted in chronic sources of sedimentation to streams.Where timber harvest yarding and skidding has occurred within the riparian area of a stream, evidence of stream sedimentation is often present for years as stands revegetate.

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).

Pre-Fire Conditions

Pre-Fire Road Network

Within the planning area, there are approximately 431 miles of system roads that are currently used and maintained as funding allows. Most of these roads are open to the public and are periodically used and maintained as haul routes for forest management operations. Approximately 90% of the roads in this planning area are not paved. Due to limited funding for maintenance, and multiple ownerships, some of the roads in this planning area were not regularly maintained prior to the Douglas Complex fires, and as such showed evidence of surface erosion, inadequate drainage, an insufficient number of cross drains, inadequate stream crossings, and/or unstable cut-banks and fill slopes. Generally roads in this planning area were not maintained with adequate rock surfacing to allow for wet season haul to occur without impacts to the road surface and water quality. Many natural surface roads that were open to the public during the wet season prior to the Douglas Complex fires had obvious drainage and surface integrity issues that presented prior to the Douglas Complex fires in the form of large ruts and small road failures. Where hydrologically connected, these roads provided a source of fine sediment to adjacent streams.

Since research indicates that roads are one of the most critical impacts to a watershed in regards to hydrology and peak flow changes, an assessment was done to evaluate the risk of hydrologic changes resulting from roads individually. Within the planning area, there are approximately 431 miles of system roads. Based on an average compacted width of 15ft for low use natural surface local and resource roads, 20ft for all rocked and unknown roads, and 30 feet for paved arterial mainline roads in this planning area, this mileage equates to 1.7% roaded area. The table below breaks out the amount of roaded area by subwatershed.

Table 36: Road Acres by Subwatershed in the Planning Area

Subwatershed	Watershed Acres		Roaded Area	
	Total HUC12 Acres	Acres of HUC12 in Planning Area	Acres	Percent
McCullough Creek – Cow Creek	13,933	6,116	114.1	1.9
Poorman Creek – Grave Creek	23,843	16,343	269.5	1.6
Wolf Creek	28,357	2,810	56.7	2.0
Bear Creek – West Fork Cow Creek	13,880	8,857	143.8	1.6
Dads Creek – Cow Creek	15,760	15,748	236.7	1.5
Riffle Creek – Cow Creek	13,651	13,641	231.6	1.7

Based on research by Harr et al. and Bowling and Lettenmaier (WPN, 1999), roaded area is not currently extensive enough to be causing to peak flow enhancement at the drainage or planning area scale.

Pre-Fire Timber Harvest (skid trails, yarding corridors, and landings)
Of the 3,931 acres that were in an open canopy condition prior to the Douglas Complex fires, approximately 2,141 acres (54%) were within 200 feet of a stream. Where these acres occur on non-federal land, or on federal lands harvested prior to the implementation of the Northwest Forest Plan (NWFP), skid trails and landings in close proximity to or intersecting streams can still be seen (LiDAR, 2012). Many of these skid trails and landings have revegetated to some degree. However, the erodibility of the soil on these sites generally continues to trend downward due to poor drainage and captured water resources. These sites will continue to contribute sediment to streams in the planning area. Since the implementation of the Northwest Forest Plan, harvest operations on federal lands have required rehabilitation of utilized landings and skid trails within Riparian Reserves.

Pre-Fire Open Conditions
Based on 2012 imagery, prior to the Douglas Complex fires, approximately 6% of the planning area had large areas that were un-vegetated or sparsely vegetated with young trees and brush. These areas existed primarily as a result of past timber harvest. However, because the amount of open space in each of the subwatersheds in the planning area was below the peak flow enhancement threshold, excessive sedimentation would have been unlikely.

The below table displays the distribution of open conditions within the HUC12 subwatersheds in this planning area.

Table 37: Pre-Fire Open Conditions - Includes Pre-Fire Natural and Disturbed Area Openings

Subwatershed	Number of drainages contained within	Equivalent Clearcut Area		Hydroregion
		Acres	Percent	
McCullough Creek – Cow Creek	3	438.9	7.2	Rain[1]
Poorman Creek – Grave Creek	7	865.6	5.3	Rain
Wolf Creek	4	253.8	9.0	Rain
Bear Creek – West Fork Cow Creek	5	345.4	3.9	Rain-on-Snow[2]
Dads Creek – Cow Creek	7	1045.3	6.6	Rain-on-Snow
Riffle Creek – Cow Creek	8	982.2	7.2	Rain-on-Snow

[1]rain-dominated hydroregion: peak flow detected when ECA reaches at least 29% of catchment
[2]rain-on-snow dominated hydroregion: peak flow detected when ECA reaches at least 19% of catchment

Based on the compilation of watershed studies in the Pacific Northwest (Grant et al., 2008), the amount of ECA prior to the Douglas Complex fires was not extensive enough to be contributing to peak flow enhancement or accelerated stream sedimentation at the drainage or planning area scale.

Post Fire Conditions
The Douglas Complex fires burned a total of 48,671 acres on Bureau of Land Management, Josephine County, timber industry, and private lands. In the GPRA, the fires burned approximately 36,791 acres within the West Fork Cow Creek, Middle Fork Cow Creek, and Grave Creek HUC 10 watersheds. Because the project area boundary includes all area to the upper extent of the affected watersheds, the project boundary includes 63,515 total watershed

acres. All treatment areas fall within the fire perimeter. The Douglas Complex fires burned through this area in a mosaic pattern with areas high, moderate, and low severity, and areas that remained completely unburned.

Within the Douglas Complex fire perimeter soil burn severity was mixed with 9%, burning at high severity, 17% at moderate severity, 20% at low severity, and 53% that remained unburned. Within treatment units 29% of the soil burned at high severity, 45% at moderate severity, 19% at low severity, and 7% were unburned.

Post-Fire Road Network
No known changes were made to the mileage of the road network during or following the Douglas Complex fires. Within the planning area, there are approximately 431 miles of system roads. This mileage equates to 1.7% roaded area. Most of these roads are hydrologically connected to streams. During the Douglas Complex fires many system and non-system roads that had been grown over by brush, were reopened for escape routes, fire control lines, and general access. These roads currently remain open to year round trafficAdditionally, during and following the fire, road use in this planning area has increased due to fire suppression, rehabilitation, emergency stabilization, non-federal salvage, replanting, and other land management actions. Natural surface and some low-use rocked roads with old weathered surfacing tend to have weak soil bases that become vulnerable to excessive erosion when wet. Where hydrologically connected, increased road use combined with increased access, has increased the amount of sediment mobilization.

Conversely, the Douglas Complex fire rehabilitation and emergency stabilization treatments resulted in approximately 60 miles of road maintenance that helped to alleviate some of the erosion and sedimentation issues within the fire area. During and following fire suppression actions, many mainline and some collector roads were reshaped and graded to facilitate drainage and reduce erosion. More than 40 culverts were cleaned, more than 10 culverts were replaced, more than 10 road cut banks were stabilized, and more than 30 road fill slopes were stabilized. With these drainage improvements, many roads are expected to have lower erosion rates and thus would be expected to contribute less sediment now than levels prior to the fires.

Field inspections of the proposed haul route showed multiple locations with the potential for accelerated sediment delivery. Access to all proposed haul roads is hydrologically connected to streams. There are a total of 402 intermittent stream and 90 perennial stream crossings along the proposed haul routes.

Post-Fire Timber Harvest (skid trails, yarding corridors, and landings)
At the time of this analysis, timber salvage has occurred and is ongoing on non-federal lands. Additionally, during fire suppression, dozerlines and handlines were created that have impacts consistent with the impacts that result from timber harvest activities. As with skid trails and yarding corridors, dozerlines and handlines result in soil compaction and displacement that can cause varied degrees of erosion, and where hydrologically connected stream sedimentation.

During fire suppression actions dozerlines were constructed on both federal and non-federal lands that crossed through perennial and intermittent stream channels. Dozerlines constructed on non-federal lands were waterbarred as necessary to prevent failure, but were not otherwise

rehabilitated. These areas would be expected to be highly susceptible to erosion for several years to decades until enough vegetation or other ground litter is present to provide a protective cover. On BLM lands, all dozerlines were waterbarred and covered with vegetative root wads, downed trees, and slash. Additionally all berms were pulled to allow for drainage. In areas where dozerline intersected or was in close proximity to streams, weed-free straw mulch and native seed was additionally applied to reduce erosion. Handlines, because they are so narrow and not as heavily compacted, generally do not require a lot of rehabilitation to prevent chronic erosion. Typically, these sites were only waterbarred as necessary to prevent gullying in steep terrain, and were seeded and mulched wherever they enter stream channels. Since these sites are so narrow, adjacent vegetation and ground litter typically covers the site within the first 1-2 years, preventing any further erosion or chronic sedimentation. 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.

Post-Fire Open Conditions

Following the Douglas Complex fires the open stand conditions within this planning area as a result of past timber harvest and wildfire is now at 20%. Adding canopy openings of any size generally increases risk of peak flow enhancement. However, if remaining below the previously referenced ECA threshold, the likelihood of such an event is both unlikely and undetectable. Adding canopy openings to a catchment which is already at risk for peak flow enhancement, however only exacerbates a high-risk situation. The extent of the green tree removal 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. Wherever roads and landings are proposed, a small amount of acreage may be added to the ECA if such actions are in areas where the canopy is green and is currently above 30% cover. These areas will be discussed during this analysis.

Following the Douglas Complex fires, the Dad's Creek and Riffle Creek subwatersheds were determined to be at risk for peak flow enhancement as a result of open space conditions.The below table displays the distribution of the open conditions within the HUC12 subwatersheds that comprise this planning area.

Table 38: Post-Fire Open Conditions (Includes Natural and Disturbed Area Openings)

Subwatershed	Number of drainages contained within	Equivalent Clearcut Area		Hydroregion
		Acres	*Percent	
McCullough Creek – Cow Creek	3	829	13.6	Rain[1]
Poorman Creek – Grave Creek	7	4,061	24.8	Rain
Wolf Creek	4	614	21.9	Rain
Bear Creek – West Fork Cow Creek	5	1,027	11.6	Rain-on-Snow[2]
Dads Creek – Cow Creek	7	3,426	21.8*	Rain-on-Snow
Riffle Creek – Cow Creek	8	2,824	22.3*	Rain-on-Snow

[1]rain-dominated hydroregion: peak flow detected when ECA reaches at least 29% of catchment
[2]rain-on-snow dominated hydroregion: peak flow detected when ECA reaches at least 19% of catchment

Increases in peak flows within smaller drainages in these HUC12 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. Larger tributary and mainstem streams in this planning area are generally high gradient, constrained bedrock channels, with large boulders and woody material providing a majority of the channel structure. These channels are generally resistant to major morphological changes as a result of low to moderate flow increases. Smaller headwater channels would be expected to be the least resistant to increased flows due to the fine silt and clay substrate that generally dominates these streams. Stream surveys indicate that many of the streams in this planning are deficient of large woody debris, with the exception of in some moderate to high intensity burn areas where the root or soil structure was compromised causing fire killed trees to fall within and near streams. 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, and in areas with high potential for mass wasting on hillslopes within the fire perimeter. In this planning area the highest risk for mass wasting as a result of the Douglas Complex fires would be where flows concentrate on steep midslope to lower slope areas, and where high severity burns killed all or most of the overstory canopy. Where the fire consumed the protective ground litter and low-growing brush in areas with naturally sensitive soils, the risk would be even greater.

High density road networks that route surface and subsurface flows also increase mass wasting potential, especially in areas where water yield is above normal due to a high percentage of open canopy. This does not imply that these are the only areas at risk, or that any slopes in these areas will actually fail. The post-fire aerial photography only provides indicators of enhanced peak flows, increased mass wasting potential, and the percentage of open space and roaded area.

On BLM lands, emergency stabilization actions were implemented on some of the areas that were determined to be at the highest risk for mass wasting, and that have the most critical resources at risk in the event of slope failure. However, if slope failure does occur in close proximity to a stream, it is likely that a large mass of sediment will enter the channel. This sedimentation would result in numerous large pulses of sediment being carried downstream as streamflows rise and fall. Despite being a natural process that these areas have evolved with over geologic time, it would be expected that substantial impacts to aquatic resources would result in the more immediate timeframe.

3.6.4 Alternative 1 – No Action

Direct and Indirect Effects

Under Alternative 1, this project would not have any adverse impacts to water quantity or water quality as a result of road or route construction, road use, yarding corridors, skid trails, landings, or burning of activity fuels. 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. In a majority of the units, sedimentation would likely dissipate to pre-fire conditions within a few years as vegetation reestablishes on the site.

Cumulative Effects

Sedimentation from routine harvest actions across all ownerships within these subwatersheds would be expected to remain consistent with current levels over the long term, but would vary from year to year. Within this planning area there are a total of 31,296 acres of non-federal land. There are approximately 17,780 acres of non-federal land within this fire perimeter of this planning area. Of these, roughly 5,000 acres burned at high enough severity during the Douglas Complex fires to result in open space conditions. These acres are counted in current open space calculations as more than 30 percent of the canopy was removed by fire in these areas. It would be expected that most of the commercial timber and some non-commercial material would be removed from these acres 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 tree adjacent to severely burned stands would further increase open conditions within this planning area. Many harvested areas may also be treated by prescribed fire in association with site preparation for planting. 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 based on past trend acreages. 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, the Clean Water Act and the Endangered Species Act.

There are currently 431 miles of roads in this planning area. An unknown amount of new roads will likely be constructed for non-federal timber operations in the planning area. Though some new roads would be constructed as a result of currently proposed federal actions and non-federal actions, sedimentation from roads is likely to remain near current levels, or may even decrease since current road design and construction practices afford greater consideration for water quality than the practices implemented when many of these roads were originally constructed. Sedimentation is not expected to increase also due to the amount of road maintenance which has occurred in the planning area.

Discretionary and non-discretional road safety actions that occur within the Riparian Reserve on BLM lands, felled trees would be left onsite, or if necessary for safety. This action would be expected to result in open space where moderate to high soil burn severity impacted the root systems or structural integrity of trees within 2 ½ tree heights (500ft) above road systems and 1 ½ tree heights (300ft) below road systems within the fire perimeter. Because these actions would only be implemented as needed to comply with State and Federal safety laws, there is no requirement for these actions to be consistent with ACS objectives, the Clean Water Act, or the Endangered Species Act. Since the actual locations, extent, and magnitude of this action is not known, the impacts associated with this action cannot be assessed.

In addition to actions on non-federal lands, there are multiple previously analyzed and approved projects on federal lands that would have an impact on water resources within this planning area

independent of the Douglas Fire Complex Recovery Project. These projects include the Fire Resiliency Project, Wolf Pup Timber Sale, Regor Thin Timber Sale, McKnabe Timber Sale, Major Federal Highway projects, and ongoing Emergency Stabilization and Rehabilitation (ESR) projects. Appendix XX provides a description of the activities that are occurring within this planning area under these projects.

All of the projects listed above would be implemented using standard Project Design Features which would greatly reduce the amount of compaction, surface disturbance, and the amount of exposed soil that would occur from upslope 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. Impacts to subsurface hydrology would be localized and short-term due to decommissioning and rehabilitation actions that require compacted roads and landings to be subsoiled.

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

All projects except the Young Stand Management and the Pump Chance Maintenance Categorical Exclusions would require hauling and/or road maintenance actions that would result in some offsite erosion consistent with the road use and maintenance actions analyzed for Alternative 2 of this project (EA Section 3.5). 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.

Cumulative effects of past land management practices on federal and non-federal lands have contributed to the current reductions in water quality and aquatic habitat within the analysis area. Water quality impacts that will result from all federal projects discussed above are consistent with the Clean Water Act and the impact analysis and conclusions provided in the1994 Medford RMP EIS. Sedimentation from harvest actions and road construction on non-federal lands within this planning area would be consistent with the Oregon Forest Practices Act, the Clean Water Act and the Endangered Species Act. These acts provide a threshold for water quality and aquatic impact that would suggest that actions affecting water quality and aquatic habitat on non-federal lands would maintain current conditions.

3.6.5 Alternative 2

Direct and Indirect Effects

Management actions proposed under Alternative 2 would result in a short term, localized impact to water quality and subsurface hydrology. Temporary routes, new and expanded landings, and new skid trails would all compact soils and impact subsurface hydrology in the short-term. All areas of compacted soils associated with construction and use of these sites would be subsoiled following use. There would be one permanent road that would result in a long term impact to soil function within this planning area. However due to the road's location outside of Riparian Reserves and along a ridge, it would not measurably impact water quality or water quantity. As

such, there would be no impact to peak flows, low flows, or water yield as a result of these actions.

No proposed actions would occur within the Riparian Reserve or within the primary shade zone of any streams or perennial waterbodies within this planning area. As such there would be no impact to water temperature as a result of these actions.

Following incorporation of these BMPs and PDFs, actions that would result in offsite erosion from this project would be limited to timber hauling and maintenance activities on roads that are hydrologically connected via ditchlines or stream crossings. All other road use, temporary route construction and reconstruction (including associated decommissioning), skid trail construction and decommissioning, landing construction and rehabilitation, and yarding operations proposed under Alternative 2, would result in localized increases of erosion that could persist for 1-3 years. Below is the description of activities that could have a short term or long term impact on localized subsurface water flows, or could result in offsite erosion and stream sedimentation.

Road Haul Activities and Road Maintenance
There are 180.2 miles of existing road maintenance, 0.32 miles of proposed permanent new construction and approximately 6.6 miles of new and reconstructed temporary routes proposed for haul and maintenance. Of the existing roads, there are approximately 39.5 miles of bituminous (paved), 103.2 miles of aggregate (rocked), and 20.2 miles of natural surface roads and 17.3 miles unknown surface type roads that would be used for haul, and maintained as necessary.

Of the existing roads, eleven of these unpaved roads proposed for hauling would be located outside the planning area. The planning area and would be subjected to the same BMPs and PDFs. Therefore, despite being located outside of the planning area, impacts to water quantity and quality would remain unchanged.

Table 39: Proposed Haul Routes Outside of the Planning Area per Subwatershed

Subwatershed	Haul routes to be used, but not located within the planning area (miles)
Wolf Creek	0.92
Union Creek – Cow Creek	0.55
Whisky Creek – Rogue River	7.5
Middle Creek	13.7
Poorman Creek – Grave Creek	1.4
McCullough Creek	0.35

Under Alternative 2, 180.2 miles of haul roads would receive road surface, ditchline, and culvert maintenance as necessary to protect the integrity and drainage of the road during use. Newly constructed or reconstructed temporary roads would be utilized and decommissioned, and would require little or no maintenance activities. The proposed haul and road maintenance on unpaved roads would contribute to accelerated erosion at different levels depending on the moisture levels of the road surface during haul, and the type of maintenance applied. All roads would be maintained as necessary to prevent road damage and excessive erosion, and exceeding State

turbidity standards for water quality. Because all harvest units would require the use of a hydrologically connected rocked or natural surface road to haul extracted materials, hauling on unpaved roads would be restricted to the dry conditions to minimize the amount of surface erosion and the transport of eroded material to streams.

Where hydrologically connected, maintenance and hauling activities on rocked and natural surface roads could result in localized instances of erosion and/or sedimentation at stream crossings where roads are adjacent to, or in close proximity to streams. These instances may result in elevated stream turbidity which would likely return to baseline conditions within 20 minutes (Toman and Skaugset, 2011). Road maintenance completed prior to and after haul would reduce the amount of offsite sediment movement during and after haul. Additionally, PDFs that limit hauling to dry road conditions, and restrict all but emergency maintenance actions to the dry season when soil moisture is at its lowest, would considerably reduce the amount of erosion that occurs during hauling and maintenance. Additionally, in locations where the roads cross, or are near critical habitat for Oregon Coast (OC) or Southern Oregon Northern California Coast coho (SONC), sediment barriers would be installed as necessary to ensure that no sediment reaches the stream.

Well vegetated ditchlines would reduce the amount of sediment reaching stream channels. During the dry condition haul there would be no water flowing on the road surface or in ditchlines, so sediment delivery to streams would be minimal. Sediment derived from hauling would be primarily directed to ditch lines and then out of ditchlines via ditch relief culverts to the forest floor. Sediment directed to hillsides by ditch-relief culverts would filter into the soil before reaching stream channels. However, some sediment directed to ditchlines during hauling could move off-site during winter rains. Sediment control devices would be installed in some instances where ditchline vegetation or design would not adequate to trap and store enough sediment to ensure compliance with water quality standards.

The use of the roads is expected to be short term and limited by weather conditions as specified in the site specific Project Design Features. The amount of fine sediment introduced to streams during haul activities on hydrologically connected portions of the existing roads would be indiscernible beyond natural erosion processes occurring during winter rains and would have negligible impacts to downstream resources. Deposition of fine sediments could result at capture points within 25ft, downstream of stream crossings within smaller tributaries. The extent of these deposits would not be of a magnitude to alter macroinvertebrate populations and would be indiscernible following the first few rains. Changes in embeddedness, interstitial spaces, and pool depth would not occur. Effects to water quality from hauling and road maintenance would not be discernible from background levels within the larger tributary or mainstem streams within this planning area. An overall reduction in chronic sediment entering streams would occur on some sections of haul road following road maintenance because these road activities would improve currently impaired road drainage.

As such, these actions would not exceed water quality standards for turbidity and would not result in any measurable effects on aquatic habitat.

Temporary Route Construction, Reconstruction, and Decommissioning
There is a total of approximately 6.59 miles of temporary route construction/reconstruction, and subsequent decommissioning proposed for access to units for timber extraction. All proposed temporary routes are located outside of Riparian Reserves and would be hydrologically disconnected from streams and wet areas. Nearly all the proposed roads are located on the upper slope. These temporary routes would have little if any interception of shallow subsurface flow.

Approximately 0.75 miles of temporary route needed to access Units 15-3A and 27-2A would be located mid-slope. Based on the location of these proposed routes, subsurface flow may be intercepted when it is present. However, all temporary routes would be constructed and utilized within the same dry season to the greatest extent possible. Subsoiling the compacted road surface would allow for unimpeded infiltration and ground water percolation processes to continue during the rainy season. If circumstances occur that require a road to be winterized and utilized the following dry season, the route would be have properly sized drainage installed and would be fully winterized. These routes would be decommissioned the next year following use. Additionally, all temporary routes located on slopes greater than 50%, would utilize typical cut-and-fill construction techniques would be utilized. Material from all cut-and-fill construction would be pulled back over the temporary roadbed area following subsoiling to help stabilize soils. This would greatly reduce the hydrologic impact of constructing this road because it would stabilize fill material and allow for ground water flow patterns to be reestablished.

With the implementation of the prescribed PDFs, including subsoiling the road surface, pulling back fill material, installation of waterbars, and blocking decommissioned areas to motorized vehicles, there would be no change to watershed hydrology or water quality following the decommissioning of any of the proposed temporary routes.

There would be a short term impact to subsurface hydrology on approximately 26.8 acres. On 1.5 miles of reconstructed road, there would be a long-term gain in subsurface flows on 1.8 acres as a result of decommissioning actions that include subsoiling of currently compacted roadbeds.

Permanent Road Construction
There is a total of 0.32 miles of new permanent road construction proposed to connect two road systems together and thereby avoid hauling up the valley bottom of Poorman Creek. This road would be constructed within the Poorman Creek-Grave Creek HUC12 subwatershed. It would be located partially on the ridge and partially on the upper slopes within 100 feet of the ridge. It would not cross through any Riparian Reserves and would be hydrologically disconnected from all streams and wet areas. The maximum side slope adjacent to this proposed road is 50%, and the maximum clearing width would be 60 feet. Approximately, 0.16 miles of the road would be constructed using cut and fill construction methods and would have both, inslope to inside ditch with relief pipes, and outsloped road surface with rolling drain dips and waterbars, for road surface drainage. Construction of the ridge top road segment would intercept little to no subsurface flow mainly due to its location. Outsloping the road surface and installing drain dips would uniformly distribute any minimal road surface runoff and intercepted shallow subsurface flow across the road surface onto the fillslope and re-infiltrating into the downslope residual soil mantle. Proper placement of any necessary drainage structures would also ensure that historic flow patterns are maintained where flow is intercepted. As such there would be no measurable

change to watershed hydrology at the drainage area scale as a result of the construction of this road.

This road would not be closed, and would be open to public and land management use in the future. However, due to the upper slope location and the road construction design techniques there would be no change to water quality.

Timber Harvest (skid trails, yarding corridors, and landings)
There are a total of 1,669 acres proposed on matrix lands for timber salvage and future hazard tree removal under this project. Due to the sensitivity of the landscape in large fire burned areas additional protection measures were designed into this project to ensure erosion resulting from timber extraction actions remains onsite. One of these protection measures was to increase the distance between project actions and streams by eliminating salvage harvest from the Riparian Reserves. In addition to no Riparian Reserve entry, coarse woody debris would be placed or felled on contour along Riparian Reserve or FGNW soils interface within timber units so as to ensure no transport of sediment from the timber unit to the Riparian Reserve and aquatic resources. Additionally, coarse woody debris or straw waddles would be placed above roads which are hydrologically connected via ditchline to the stream network.

Where inadequate ground cover exists within treatment units as a result of moderate to high severity burning during the Douglas Complex fires, implementation of these PDFs would additionally help protect from surface erosion, and where hydrologically connected, stream sedimentation.

To facilitate harvesting of these acres, the construction, use, and rehabilitation of skid trails, landings, and cable yarding corridors would result in up to 141 acres of compaction and accelerated on-site erosion within treatment units. Compaction on utilized landings and skid trails that are not currently part of the permanent road system would be subsoiled following harvest activities. With the implementation of the prescribed PDFs, including subsoiling, installing waterbars, and spreading of slash/mulch for surface protection there would be no change to watershed hydrology or water quality from these sites.

Open Conditions and Fire
Timber salvage would not add any additional canopy openings, since the canopy was already opened in the fire within units that are proposed for treatment. Wherever roads and landings are proposed individual or small groups of trees may be removed, but these areas would not be continuous and within all except the Dads Creek and Riffle Creek subwatersheds would not result in enough total open space to exceed established thresholds. As such, the likelihood of any increase in flows as a result of the removal of these individual or small groups of green trees is both unlikely and undetectable. Within the already sensitive Dads Creek and Riffle Creek subwatersheds, PDF's limit the green tree removal area to less than ¼ acre in size to ensure that ECA is not increased.

Where timber extraction is implemented, PDF's would ensure the amount of slash and coarse wood available on site to provide ground cover and erosion control is maintained or increased within treatment areas. At the boundary of Riparian Reserves without adequate ground cover to filter upslope erosion PDF's additionally require contour falling of trees over 8" to further ensure

that erosion from upslope timber harvest remains onsite. Furthermore, implementation of these PDFs would also reduce fire caused surface erosion impacts within proposed treatment units that currently do not have adequate ground cover onsite.

Activity fuels treatments would occur as necessary to maintain or reduce the fire hazard where slash exceeds 18” in depth. Hand pile burning would have a localized impact to soils that would be reduced through regulation of the burn intensity and moisture conditions outlined in the burn plan. All activity fuels treatments would include any combination of lop-and-scatter, hand-piling or hand pile burning in accordance with PDF’s needed to ensure erosion is minimized and remains onsite. Lop-and-scatter would not adversely impact soils, and would provide additional erosion protection. Hand pile burning would have a localized impact to soils that would be reduced through regulation of the burn intensity and moisture conditions outlined in the burn plan.

Summary of Effects to Water Resources
The following actions proposed in Alternative 2 would result in localized impacts to subsurface hydrology and water quality that would be minimize through the use of PDF’s.

- Hauling and road maintenance on 180.2 miles of existing road
- 6.59 miles of temporary route construction and decommissioning
- 0.32 miles of permanent road construction
- Approximately 141 acres associated with yarding corridors, skid trails, and landings needed to harvest 1,669 acres of salvage timber

There would be no impact to peak flows, low flows, water yield, or temperature as a result of this project. The only instance of sedimentation that would occur as a result of Alternative 2 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.

There would additionally be a long term impact to localized subsurface flows on approximately 0.8 acres of the permanent road running surface. There would be no measurable change to watershed hydrology at the drainage area scale.

The magnitude and extent to water resources from all activities associated with the Alternative 2 of this project would be consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS.

<u>Cumulative Effects</u>
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 will ensure that any potential impacts are isolated and will 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, the Clean Water Act, and is within the scope of anticipated effects to aquatic resources analyzed in the Medford District PRMP EIS (USDI 1994). Additional BMP requirements for federal timber hauling and road decommissioning actions would in some locations, result in a net reduction in sediment entering streams.

Temporary routes, landings, yarding corridors, and skid trails proposed in Alternative 2 would result in localized impacts to subsurface hydrology. These impacts would be localized, and because all routes would be subsoiled following use, would be alleviated within two years of the project. Permanent road construction would also result in a localized impact to subsurface hydrology. This impact would be long term but due to the length, location, and use of natural drainage patterns for drainage of any intercepted flow, the proposed road would not measurably alter flows at any catchment scale. Therefore these impacts would not cumulatively add to the impacts to peak flows, low flows, or water yield discussed under the no action alternative.

Alternative 2 would not result in any additional sediment entering streams from harvest actions. All actions including; temporary route, permanent road, and landing construction and use; timber extraction yarding corridors and skid trails; and hand pile burning would be hydrologically disconnected from streams and remain onsite. As such this action would not cumulatively add to any impacts discussed under the cumulative impacts under the no action alternative.

When the effects to water resources from Alternative 2 are added cumulatively with all other actions that are occurring in this planning area, the magnitude of the impacts to beneficial uses as a result of all impacts to water quantity and water quality would remain consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS.

3.6.6 Alternative 3

Direct and Indirect Effects

As with Alternative 2, management actions proposed under Alternative 3 would result in a short term, localized impact to water quality and subsurface hydrology. Between the two Action Alternatives (2&3) the treatment unit boundaries and acres remain the same. Under Alternative 3 there would be 3.36 miles less temporary route construction, and 4 less acres of soil disturbance and compaction from yarding corridors, skid trails, and landings than what is proposed under Alternative 2.

Stream sedimentation from hydrologically connected road maintenance and haul are the same as those discussed for Alternative 2.

Temporary Route Construction, Reconstruction, and Decommissioning

There is a total of 3.23 miles of temporary route construction/reconstruction, and subsequent decommissioning proposed for access to units for timber extraction. All proposed temporary routes are located outside of Riparian Reserves and would be hydrologically disconnected from streams and wet areas. All the proposed roads are located on the upper slope under Alternative 3. These temporary routes would have little if any interception of shallow subsurface flow.

Construction techniques and their impacts to aquatic resources would be the same as described in Alternative 2.

Through implementation of the PDFs, temporary route construction, reconstruction, and decommissioning impacts to soils would be minimized. There would be a short term impact to localized subsurface flows on approximately 13.9 acres. On 0.5 miles of reconstructed road, there would be a long-term gain subsurface hydrology on 1.8 acres as a result of decommissioning actions that include subsoiling of currently compacted roadbeds.

Permanent Road Construction
Permanent road construction techniques and location would be the same as described in Alternative 2.

There would be a long term impact to localized subsurface flows on approximately 0.8 acres of the permanent road running surface. There would be no measurable change to watershed hydrology at the drainage area scale.

This road would not be closed, and would be open to public and land management use in the future. However, due to the upper slope location and the road construction design techniques there would be no change to water quality.

Timber Harvest (skid trails, yarding corridors, and landings)
There are a total of 1,659 acres proposed on matrix lands for timber salvage and future hazard tree removal under this project. Between the two Action Alternatives (2&3) the treatment unit boundaries and acres remain the same. Under Alternative 3, soil disturbance and compaction from yarding corridors, skid trails, and landings would be less than what is proposed under Alternative 2 because the number of acres of proposed ground based and cable yarding has been reduced, and the number of acres proposed for helicopter extraction has been increased. Actions associated with Alternative 3 would result in a total of approximately 138 acres of compaction and accelerated on-site erosion within treatment units.

All other actions affecting soils and soil erosion are the same as discussed within Alternative 2 would be the same. Implementation of Project Design Features would greatly reduce the amount of compaction, surface disturbance, and the amount of exposed soil following treatments that would occur as a result of Alternative 3. This would minimize the impacts of this action on soils, and would eliminate offsite transport mechanisms and keep erosion from yarding, skid trails, and landings onsite and out of streams.

Open Conditions and Fire
There would be no change in the impacts to open space or activity fuels treatments between Alternative 3 and Alternative 2.

Summary of Effects for Water Resources
The following actions proposed in Alternative 3 would result in localized impacts to subsurface hydrology and water quality that would be minimize through the use of PDFs.

- Hauling and road maintenance on 180.2 miles of existing road
- 2.74 miles of temporary route construction and decommissioning
- 0.49 miles of temporary road reconstruction and decommissioning

- 0.32 miles of permanent road construction
- Approximately 138 acres associated with yarding corridors, skid trails, and landings needed to harvest 1,669 acres of salvage timber

As with Alternative 2, there would be no impact to peak flows, low flows, water yield, or temperature as a result of this project. There would be a localized loss of subsurface hydraulic connectivity associated with the permanent road construction. However, on 0.5 miles of reconstructed road, there would be an improvement in hydraulic connectivity resulting from decommissioning actions that include subsoiling of currently compacted roadbeds.

Sedimentation from haul and maintenance activities on existing roads would be the same as summarized in Alternative 2.

The magnitude and extent to water resources from all activities associated with the Alternative 3 of this project would be consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS.

Cumulative Effects

Ongoing actions on non-federal lands would likely require hauling on some of the proposed haul routes. At times when hauling occurs concurrently with haul for this project, the standard would remain the same for the amount of allowable turbidity within streams. Having multiple projects within this planning area would not cumulatively change the magnitude of impacts, or the extent of the impacts that was analyzed for the direct and indirect effects of the Douglas Fire Complex Recovery Project for the following reasons; Federal and state laws limit the magnitude of potential stream sedimentation; PDFs will ensure that any potential impacts are isolated and will not impact water quality; and each of the projects that are occurring within the same watershed during the same time period are in dispersed locations. Logically it can be concluded that negligible increases in sediment from these activities would contribute to the overall amount of sediment entering streams from past, present, and future impacts within these subwatersheds, but sediment from these actions would be within ODEQ water quality standards, the Clean Water Act, and is within the scope of anticipated effects to aquatic resources analyzed in the Medford District PRMP EIS (USDI 1994). Additional BMP requirements for federal hauling actions would, in some locations, result in an overall reduction in sediment entering streams from non-federal haul during concurrent hauling activities.

Temporary routes, landings, yarding corridors, and skid trails proposed in Alternative 3 would result in localized impacts to subsurface hydrology. These impacts would be localized and would be alleviated within two years of the project due to subsoiling. Permanent road construction would also result in a localized impact to subsurface hydrology. This impact would be long term but due to the length and location of the proposed road, would not measurable alter flows at any catchment scale. Therefore these impacts would not cumulatively add to peak flow, low flow, or water yield baseline impacts discussed under the no action alternative.

Alternative 3 would not result in any additional sediment entering streams from harvest actions. All actions including; temporary route, permanent road, and landing construction and use; timber extraction yarding corridors and skid trails; and handpile burning would be hydrologically

disconnected from streams and remain onsite. As such this action would not cumulative add to the baseline impacts discussed under the no action alternative.

When the effects to water resources from Alternative 3 are added cumulatively with all other actions that are occurring in this planning area, the magnitude the impacts to beneficial uses as a result of all impacts to water quantity and water quality would remain consistent with the impact analysis and conclusions provided in the1994 Medford RMP EIS.

3.7 Fish

3.7.1 Methodology

The spatial scale of the analysis for the Planning Area totals 63,515 acres (~99 square miles) and includes the watersheds listed in Table 35.

3.7.2 Affected Environment

Pre-fire Condition

Fish Species

This Planning Area provides habitat for special status species, including Oregon Coast (OC) and Southern Oregon/Northern California Coast (SONCC) Coho Salmon (*Oncorhynchus kisutch*); OC and Klamath Mountains Province (KMP) Steelhead (*Onchorychus mykiss*); SONCC Chinook (*O. tshawytscha*), and Umpqua Chub (*Oregonichthys kalawatseti*). Current fish distribution is based on sources of information that include historical surveys, Oregon Department of Fish and Wildlife (ODFW) Aquatic Inventory observations, Streamnet, Watershed Analyses for Middle Cow Creek (USDI, BLM 1999), Watershed Analyses for Grave Creek (USDI, BLM 1999), and Watershed Analyses for West Fork Cow Creek (USDI, BLM 1997). For a complete list a fish species found within the three HUC 10 watersheds refer to the Watershed Assessments listed above.

Table 40: Fish Bearing Streams Located in Proximity to Proposed Harvest Units

HUC 10	Stream name	Fish Species
Grave Creek	Poorman Creek	SONCC Coho, KMP Steelhead
	Rock Creek	KMP Steelhead
Middle Cow Creek	Cow Creek	OC Coho, OC Steelhead, Umpqua Chub
	Marion Creek	OC Coho, OC Steelhead
	Riffle Creek	OC Coho, OC Steelhead
West Fork Cow Creek	Bear Creek	OC Coho, OC Steelhead
	West Fork Cow Creek	OC Coho, OC Steelhead, Umpqua Chub

Federally-Threatened Species

Salmon are listed under the Endangered Species Act (ESA) by evolutionarily significant units (ESU). An ESU is a stock of Pacific salmon that is 1) substantially reproductively isolated from other specific populations units; and 2) represents an important component in the evolutionary legacy of the species. The southern most extent of the federally listed threatened OC Coho Salmon is the Umpqua Basin. The northern most extent of the federally listed threatened

SONCC Coho Salmon is the Rogue Basin. See Table 41 for units and their proximity to fishbearing and coho critical habitat (CCH).

Oregon Coast Coho
On June 20, 2011, the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service published a final determination to retain OC Coho Salmon as a threatened species under ESA (Federal Register Vol. 76, No. 118). Designation of Critical Habitat became effective on February 11, 2008, (Federal Register Vol. 73, No. 28). OC Coho Salmon are present in Middle Cow and West Fork Cow Creek HUC 10 watersheds downstream from proposed units and haul routes.

Southern Oregon/Northern California Coast Coho
On June 28, 2005, the NOAA Fisheries Service published a final determination to list SONCC Coho Salmon as a threatened species under the ESA (Federal Register Vol. 70, No. 123). Designation of Critical Habitat became effective on May 5, 1999 (Federal Register Vol. 64, No. 86). SONCC Coho salmon are present in Grave Creek HUC 10 watershed downstream from proposed units and haul routes.

Table 41: Distance from Proposed Harvest Units to Fish Bearing Streams and CCH

Nearest Fish Bearing Stream	Units in proximity	Range to Fish Bearing Stream	Range to Coho Critical Habitat
Bear Creek	15-1, 15-2, 15-3, 15-3B, 15-4, 15-7, & 15-8	410 feet - 0.8 miles	410 feet - 0.8 mile
Bonnie Creek	25-6, 25-7, 35-4, & 35-5	0.4 miles - 0.5 miles	0.6 miles - 1.6 miles
Cow Creek	03-3, 03-4, 12-1, 12-2, 12-4, 07-6A, 07-6B, 07-6C, 07-6F, 12-3A, 12-3B, 13-1, 13-A, 13-A1, 13-A2, 13-A3, 13-B, 13-E, 13-F, 17-1A, 19-1, 19-2, 27-4A, & 27-5A	390 feet - 0.7 miles	390 feet - 0.7 miles
Dads Creek	09-1A, 09-1C, 09-2A, 09-5A, 09-6A, 09-7A, 09-8A, & 23-F	0.6 miles - 1.5 miles	3.6 miles - 4.7 miles
Marion Creek	09-1 & 33-3	1,097 feet - 1.0 mile	1,097 feet - 1.0 mile
Panther Creek	23-A, 23-G, 23-H, 27-1A, & 27-2A	0.5 miles - 0.8 miles	1.7 miles - 2.4 miles
Perkins Creek	03-1, 03-5, 09-2, 09-9, 10-1, 09-2B, & 10-1WP	737 feet - 1.4 miles	0.5 miles - 1.8 miles
Poorman Creek	09-4, 09-5, 11-1, 13-11, 13-2, 13-2WP, 13-4, 13-4A, 13-4B, 13-6, 14-2, 15-1A, 15-1B, 15-2A, 15-2WP, 15-3A, 15-4A, 15-4B, 15-4C, 15-6, 21-4, 23-10C, 23-1A, 23-2A, 23-2B, 23-2C, 23-3A, 23-3B, 23-4A, 23-4B, 23-5, 23-6A, 23-6B, 26-2, & 27-B	433 feet - 1.8 miles	0.4 miles -2.4 miles
Rattlesnake Creek	11-2, 11-4, 11-7, 11-1WP, & 11-2B	0.4 miles - 0.6 miles	0.4 miles - 0.6 miles
Riffle Creek	14-2A, 23-1, 23-3, 23-4, 23-9, 27-3A, 27-3B, 27-4, & 27-5	857 feet - 1.1 miles	857 feet - 1.1 miles
Rock Creek	17-1, 17-2, 21-1, 21-2, 21-3, 21-6, 21-6A, 29-1, 29-1A, 29-2B, 29-3, 29-3A, & 29-3C	895 feet - 1.5 miles	1.3 miles - 3.3 miles
Rueben Creek	09-3, 12-1A, 12-1B, 12-2A, 12-5A, 12-6A, & 17-3	0.4 miles - 1.8 miles	2.4 miles - 3.8 miles

Skull Creek	25-2 & 25-5	0.4 miles - 0.5 miles	0.4 miles - 0.5 miles
Susan Creek	07-2A, 07-6D, & 07-6E	0.3 miles - 0.4 miles	0.3 miles - 0.4 miles
Totten Creek	23-B, 23-C, & 23-D	0.5 miles - 0.6 miles	2.5 miles - 3.0 miles
Tuller Creek	09-1D	1.4 miles	1.4 miles
West Fork Cow Creek	03-2A, 11-2A, 11-3A, 11-3B, 12-4B, 14-1A, & 14-3A	410 feet - 0.8 miles	410 feet - 0.8 miles
Wolf Creek	19-3, 23-7, 25-1A, &25-2A	773 feet - 0.8 miles	773 feet - 1.2 miles

Bureau Sensitive Species

KMP Steelhead is a bureau sensitive species and also listed as a sensitive species by the state of Oregon. KMP Steelhead are found throughout the Grave Creek HUC 10 watershed portion of the Planning Area. Grave Creek, Poorman Creek, Reuben Creek, Rock Creek, and Wolf Creek support KMP steelhead and their habitat is contained within Coho Critical Habitat. Upstream access for anadromous fish on Rock Creek end at waterfall barriers.

OC Steelhead is a bureau sensitive species and also listed as a sensitive species by the state of Oregon. OC steelhead trout are located throughout the Umpqua Basin (Middle Cow Creek and West Fork Cow Creek HUC 10) with habitat preferences similar to those of other salmonids. OC steelhead trout tend to occupy streams with higher gradients than do OC Coho salmon, and their distribution is similar to resident cutthroat trout, where access is not blocked by manmade or natural barriers. Upstream access for anadromous fish on Bonnie Creek, Dads Creek, Perkins Creek, Riffle Creek, Skull Creek end at waterfall barriers.

SONCC Chinook is a bureau sensitive species and also listed as a sensitive species by the state of Oregon. SONCC Chinook are found in the Grave Creek HUC 10 watershed portion of the Planning Area.

The Umpqua chub is a bureau sensitive species found in the mainstems of the North and South Umpqua Rivers and several larger tributaries (Simon 2008). According to research, Umpqua Chub are found in the mainstem, lower reaches of West Fork Cow Creek and Cow Creek within the Planning Area.

Aquatic Habitat, Coho Critical Habitat, & Essential Fish Habitat

Spawning substrate

The availability of spawning substrate is an important factor in fish productivity. The quality of spawning habitat varies according to the amount and quality of the spawning substrate. Gravel and small cobble substrate that is relatively free from embedded fine sediment provides ideal spawning substrate for resident and anadromous salmonids (Bell 1986). During incubation of eggs and alevins, survival and emergence rates can be reduced when sediment exceeds 15 percent of the area (Bjornn and Reiser 1991).

According to ODFW Aquatic Habitat Inventory Surveys, sand and fine organics made up a substantial portion of riffle units, as illustrated in Table 42. There was an average of 14.1 percent of riffles comprised of sand and fines with a range from 2.0 to 45.0 percent. The percentage of spawning gravel was moderate. Gravel substrate made up an average of 37 percent of riffle units, ranging from 15 to 64 percent.

Table 42: Selected Habitat Index Values for Streams in the Proposed Units

HUC 10	Stream Name	Percent Sand and Organics	Percent Gravel	Percent Pool Habitat	Volume of LWD (m3/100)	Average Key Pieces (per 100m)
Grave Creek	Poorman Creek Reach 1	15.0	64.0	33.0	3.1	7.1
	Poorman Creek Reach 2	15.0	60.0	12.3	17.7	54.8
	Rock Creek Reach 1	15.0	40.0	8.8	10.0	21.9
	Rueben Creek Reach 4	NA	NA	12.0	68.2	51.9
	Rueben Creek Reach 5	NA	NA	7.0	19.3	33.3
	Reuben Creek Tributary A	45.0	39.0	17.0	46.0	154.5
	Wolf Creek Reach 1	11.0	20.0	42.0	2.9	1.8
	Wolf Creek Reach 2	16.0	23.0	32.0	7.5	5.0
	Grave Creek Subtotals	19.5	41.0	20.5	21.8	41.3
Middle Cow Creek	Battle Creek	NA	NA	0.5	16.4	20.3
	Cow Creek Reach 1	7.0	34.0	54.0	1.1	0.5
	Cow Creek Reach 2	10.0	40.0	64.0	2.0	0.7
	Cow Creek Reach 3	8.0	39.0	72.8	4.1	2.3
	Cow Creek Reach 6	14.0	30.0	67.1	0.4	0.4
	Cow Creek Reach 7	15.0	38.0	76.4	11.6	4.3
	Cow Creek Reach 9	16.0	32.0	69.3	0.8	0.8
	Cow Creek Reach 10	9.0	36.0	67.1	1.4	1.6
	Perkins Creek Reach 1	15.0	15.0	8.6	4.2	3.0
	Perkins Creek Reach 2	NA	NA	0.8	11.0	9.6
	Rattlesnake Creek Reach 2	10.0	55.0	12.4	9.1	16.3
	Riffle Creek Reach 1	2.0	27.0	16.5	4.3	10.3
	Riffle Creek Reach 2	3.0	30.0	16.5	14.5	26.8
	Susan Creek Reach 1	10.0	31.0	14.2	10.1	21.5
	Susan Creek Reach 2	15.0	32.0	1.6	10.1	7.4
	Middle Cow Creek Subtotals	10.3	33.8	36.1	6.7	8.4
West Fork Cow Creek	Bear Creek Reach 1	11.0	39.0	22.8	1.3	3.8
	West Fork Cow Creek Reach 1	14.0	33.0	38.6	0.6	0.6
	West Fork Cow Creek Subtotals	12.5	36.0	30.7	1.0	2.2
Average for project area		14.1	36.9	29.1	9.8	4.5

Pool quality

Pools are important habitat features for juvenile rearing during summer months, when lower water levels and higher stream temperatures add to stress, and during high flow events when off-channel habitat provides refuge. Salmonids are typically of larger in size and found in greater numbers in deeper pool habitats (Rosenfeld et al. 2000). Surveyed stream reaches (see Table 42 had an average of 9.8 percent pool habitat by area, and an average 4.5 key pieces per 100 meters of stream.

Large Woody Debris
Large woody debris is important in the formation of deep scour pools and off-channel habitat, and retention of gravel substrate (Bilby and Ward 1989). The pools and off-channel habitat provide refuge for salmonids during high flow events and reserves of cool water during low flow months when water temperatures may become elevated.

Stream channels in the project area have low levels of large woody debris. On average, there are 9.8 key pieces and 4.5 m3 of large woody debris per 100 meters of stream. Foster et al. (2001) describe key pieces as those greater than 33 feet in length and 24 inches in diameter.

Habitat access
Bonnie Creek, Dads Creek, Perkins Creek, Riffle Creek, and Skull Creek have a series of falls that inhibit access.

There are no known fish passage barriers within the project area and Grave Creek and West Fork Cow Creek HUC 10 watersheds. Within the project area and Middle Cow Creek, there is one known fish passage barrier on BLM roads. Stevens Creek #1 culvert along 33-7-2.1 road is a partial barrier to coho salmon; adults would be capable of passing the culvert during certain flows. The culvert is in section 2, has on outlet jump of 2 feet, and is approximately 0.75 mile from the Cow Creek, Rattlesnake confluence.

Coho Critical Habitat
As previously discussed, CCH for OC and SONCC Coho salmon was designated in the final Federal Register listing which also designated OC and SONC coho salmon as threatened (Federal Register 2008b and 1999). CCH is found adjacent to 10 units (03-3, 07-6B, 11-2A, 11-3A, 13-A3, 15-4, 15-7, 23-3A, 23-4B, 23-5) at an average 421 feet from CCH in Cow Creek, West Fork Cow Creek, Bear Creek, and Poorman Creek. All other units are found further away from the full riparian buffers. See Table 41 Distance From Proposed Salvage Units to Fish Bearing Streams and CCH.

Essential Fish Habitat
Streams and habitat currently or historically accessible to Chinook and coho salmon are considered Essential Fish Habitat (EFH), designated for fish species of commercial importance by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 50 CFR, Part 600, Subsection J, EFH.

Streams within the Planning Area designated as EFH include Grave Creek, Poorman Creek, Rock Creek, Rueben Creek, Wolf Creek, Rattlesnake Creek, Stevens Creek, Marion Creek, Tuller Creek, Cow Creek, Skull Creek, Riffle Creek, Susan Creek, West Fork Cow Creek, Bear Creek, and other streams accessible to coho salmon.

<u>Existing Condition</u>
Fish Species
The Douglas Fire Complex did not change the fish species found within the analysis area. See the Pre-Fire Affected Environment for a detailed discussion on fish species found in the analysis area.

Aquatic Habitat, Coho Critical Habitat, and Essential Fish Habitat

Spawning Substrate
Stream substrate is likely to be similar to the description within the Pre-Fire Affected Environment due to the overall low severity of burns within the Riparian Reserve. Few areas within the Douglas Complex exhibited moderate-high burn severity within the Riparian Reserves. Poorman Creek, Perkins Creek, Battle Creek, Swanson Creek, Cow Creek, Riffle Creek, Susan Creek, and West Fork Cow Creek experienced moderate-high burn severity in their upper reaches along intermittent streams. Riparian Reserves adjacent to CCH have minor acres of moderate-high burn severity and only occurred near Swanson Creek, Susan Creek, and Cow Creek.

Pool quality
Pool habitat availability would remain unaffected by the post-fire conditions. As described above in Spawning Substrate, few acres of Riparian Reserves experienced moderate-high burn severity, and even fewer acres of Riparian Reserves adjacent to CCH experienced moderate-high burn severity.

Large Woody Debris
Large woody debris is likely to be similar to Pre-Fire Affected Environment due to low Riparian Reserve acres reaching moderate-high burn severity. Low numbers and volumes (9.8 m3/100 and 4.5 key pieces per 100m) indicated during pre-fire ODFW surveys should be experienced during any post-fire surveys.

Habitat access
The Douglas Fire Complex did not change the habitat access found within the analysis area. See the Pre-Fire Affected Environment for a detailed discussion on habitat access status in the analysis area.

Coho Critical Habitat
The Douglas Fire Complex did not change the CCH found within the analysis area. See the Pre-Fire Affected Environment for a detailed discussion on critical habitat in the analysis area.

Essential Fish Habitat
The Douglas Fire Complex did not change the critical habitat found within the analysis area. See the Pre-Fire Affected Environment for a detailed discussion on EFH in the analysis area.

3.7.3 Alternative 1 – No Action

Direct/Indirect Effects
Under this alternative, there would be no salvage of timber or associated activities within the planning area. There would be no hauling of timber, road renovation or road construction associated with the salvage harvest.

Fish and fish habitat downstream of the project area would continue to be indirectly and cumulatively affected by the fire. Slopes where vegetation was removed by fire are at an increased risk of slumping and contributing sediment to stream channels. This sediment could reach adjacent stream channels via the road network and have an adverse effect on fish and aquatic habitat.

Absent the harvest of dead or dying trees, there would be no effects to large woody debris recruitment in streams downstream of the units. A small increase in sediment delivery to fish bearing reaches would occur via intermittent stream channels in the drainage. Stream channels downstream would likely encounter increased rates of sedimentation as a result of the removal of vegetation by fire and the increased risk of debris slides.

Cumulative Effects

The following activities have been previously analyzed and approved projects that would still occur within the project area in the near future; the Fire Resiliency Project, Wolf Pup Timber Sale, Regor Thin Timber Sale, McKnabe Timber Sale, Young Stand Management Project, Cow Creek Federal Highway project, Road safety actions, Medford Road Maintenance Categorical Exclusion and ongoing Emergency Stabilization and Rehabilitation (ESR) projects. Appendix C provides a description of the activities that are occurring within this planning area that are considered in this cumulative effects analysis.

Road safety actions may result in open space where moderate to high soil burn severity impacted the root systems or structural integrity of trees within 2 ½ tree lengths (500ft) above road systems and 1 ½ tree lengths (300ft) below road systems within the fire perimeter. Because these actions would only be implemented as needed to comply with State and Federal safety laws, there is no requirement for these actions to be consistent with BMPs and PDFs which reduce the probability of impacts to CCH and EFH. Since the actual locations, extent, and magnitude of this action is not known, the impacts associated with this action cannot be assessed.

Due to the limited size and spatial scattering of treatment areas on private lands, road drainage improvements in the watershed, and Oregon Forest Practices Act regulations on size of harvest units, incremental impacts created by private land practices would be inconsequential.

3.7.4 Alternative 2

Direct/Indirect Effects

Federally-Threatened Species

Stand treatments, yarding, landing construction and rehabilitation, temporary route construction and reconstruction (including route decommissioning), road maintenance, hauling, and activity fuel treatments would have no effect on OC and SONCC Coho Salmon (ESA-Threatened) and CCH. For the Douglas Project Planning Area, the closest CCH (Cow Creek, West Fork Cow Creek, Bear Creek, and Poorman Creek) is approximately 405 feet from the closest treatment units (03-3, 07-6B, 11-2A, 11-3A, 13-A3, 15-4, 15-7, 23-3A, 23-4B, and 23-5). These treatment units will have full Riparian Reserves averaging 400 feet. The Douglas Project Planning Area haul road segments and road related activities intersect 4 streams at 6 locations containing CCH. These 6 road segments represent 2 bridges (Bear Creek and West Fork Cow Creek), and 4 culverts (Rattlesnake Creek and Riffle Creek) on CCH streams. Sediment would not be expected to enter CCH as a result of haul or maintenance of haul roads, with dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed, to prevent sediment delivery into CCH. Project activities would follow all provisions of the Clean Water Act (40 CFR Subchapter D) and Department of Environmental Quality's (DEQ's) provisions for maintenance of water quality standards.

Bureau Sensitive Species

OC Steelhead and Umpqua Chub are within Middle Cow Creek and West Fork Cow Creek HUC 10 Watershed. KMP Steelhead and SONCC Chinook are within Grave Creek HUC 10 Watershed. OC Steelhead, KMP Steelhead, and SONCC Chinook habitats are contained within the CCH analyzed for OC and SONCC coho salmon. SSS in the Douglas Area is approximately 405 feet from the closest treatment units (03-3, 07-6B, 11-2A, 11-3A, 13-A3, 15-4, 15-7, 23-3A, 23-4B, and 23-5). These treatment units will have full Riparian Reserves averaging 400 feet. The Douglas Project Planning Area haul road segments and road related activities intersect 4 streams at 6 locations containing SSS. These 6 road segments represent 2 bridges (Bear Creek and West Fork Cow Creek), and 4 culverts (Rattlesnake Creek and Riffle Creek) on SSS streams.

Umpqua chub are found in mainstem Cow Creek and West Fork Cow Creek. No changes to Umpqua chub would occur because no measurable effects (sediment) would reach Cow Creek and West Fork Cow Creek. The nearest project activity (road haul) would be over two bridges (Bear Creek and West Fork Cow Creek) and hauling and maintenance activities on the 32-8-10.2, 32-8-11.0, 32-7-19.7, and 33-7-2.3 road averaging over 400 feet away from Cow Creek and West Fork Cow Creek.

Treatment units, yarding, landing construction and rehabilitation, permanent route construction, temporary route construction and reconstruction (including route decommissioning), road maintenance, hauling, and activity fuel treatments would have no effect on OC Steelhead, Umpqua Chub, KMP steelhead, and SONCC Chinook. Sediment would not be expected to enter SSS habitat as a result of haul or maintenance of haul roads, with dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed, to prevent sediment delivery into SSS streams. Project activities would follow all provisions of the Clean Water Act (40 CFR Subchapter D) and Department of Environmental Quality's (DEQ's) provisions for maintenance of water quality standards. Fish species are listed as special status species by ESUs. See the "T/E (Threatened or Endangered) Fish Species or Habitat" section above for the definition of ESUs.

Aquatic Habitat, Coho Critical Habitat, and Essential Fish Habitat

Spawning substrate

Stream substrate is likely to be similar to the description within the Pre-Fire and Post-Fire Affected Environment due to the proposed activities would occur outside Riparian Reserves and BMPs and PDFs in upslope areas and along haul routes would greatly reduce the likelihood of harvest related sediment entering spawning substrate.

Pool quality

Pool quality would not be effected by proposed harvest and road related activities. Activities would occur outside Riparian Reserves and BMPs and PDFS in upslope areas and along haul routes would greatly reduce the likelihood of harvest related sediment affecting pool quality.

Large Woody Debris

Full Riparian Reserves would be 200 feet on either side of non-fish bearing perennial and intermittent streams, and perennial springs, or 400 feet total. Fish bearing streams would receive a 400 foot buffer on either side of the stream, or 800 feet total. Full Riparian Reserves would be sufficient to keep large wood at current levels. As a result, there would be no probability of an effect to Large Woody material as a result of proposed harvest and road related activities.

Habitat access
Habitat access would remain unaltered under Alternative 2. Fish passage culverts or bridges are not proposed to be replaced or upgraded under this project.

Critical Habitat
See Federally-Threatened Species above for discussion on CCH.

Essential Fish Habitat
Treatment units, yarding, landing construction and rehabilitation, temporary route construction and reconstruction (including route decommissioning), road maintenance, hauling, and activity fuel treatments would not adversely affect coho and Chinook salmon EFH. EFH in the Douglas Area is approximately 405 feet from the closest treatment units (03-3, 07-6B, 11-2A, 11-3A, 13-A3, 15-4, 15-7, 23-3A, 23-4B, and 23-5). These treatment units will have full Riparian Reserve buffers averaging 400 feet. The Douglas Project Planning Area haul road segments and road related activities intersect 4 streams at 6 locations containing EFH. These 6 road segments represent 2 bridges (Bear Creek and West Fork Cow Creek), and 4 culverts (Rattlesnake Creek and Riffle Creek) on EFH streams. Sediment would not be expected to enter EFH as a result of haul or maintenance of haul roads, with dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed, to prevent sediment delivery into EFH. Project activities would follow all provisions of the Clean Water Act (40 CFR Subchapter D) and Department of Environmental Quality's (DEQ's) provisions for maintenance of water quality standards.

Cumulative Effects
Since there are no direct or indirect effects resulting from this Alternative 2 there would be no additional incremental effects added to the Planning Area's cumulative effects.

3.7.5 Alternative 3
Direct/Indirect Effects
Alternative 3 has less road building and less impactful logging systems. With the implementation of the PDFs there would be no direct or indirect effects from Alternative 3. The Alternative 3 would be even less impactful the analysis of Alternative 2.

Cumulative Effects
Since there are no direct or indirect effects resulting from this Alternative 3 there would be no additional incremental effects added to the Planning Area's cumulative effects.

3.7.6 Aquatic Conservation Strategy Assessment
The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. (Final EIS for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, page B-6) February 1994.

A site/project scale and fifth field assessment was performed for the Douglas Fire Complex Recovery Project. Proposed activities in Alternatives 2 and 3 would meet ACS goals and objectives at the site and watershed scales. Therefore, this action is consistent with the ACS goals and its objectives at both the site and watershed scales. The detailed ACS assessment to support this determination is found in Appendix A.

3.8 Cultural and Paleontological Resources

3.8.1 Background Information

Cultural resources are defined as any definite location or object of past human activity, occupation, or use identifiable through inventory, historical documentation, or oral evidence. Cultural resources can be divided into archaeological, building and structural, and traditional resources. Traditional Cultural Properties are defined as properties of traditional religious and cultural importance – places important to modern-day living communities for sustaining a shared cultural legacy.

Traditional Cultural Resources Interest in our heritage and concern over the destruction of cultural resources has prompted passage of legislation on the national, state, and local levels to protect and promote significant examples of our nation's history and traditional legacy. BLM Manual 8100 also provides direction in the identification, management, and protection of cultural resources. The goal is to avoid, minimize, or mitigate impacts to significant cultural resources referred to as Historic Properties or Traditional Cultural Properties in the legislation.

Paleontological resources are any fossilized remains, traces, imprints or organisms that are of paleontological interest and provide information about the history of life on earth. The Paleontological Resources Protection Act (PRPA) directs federal agencies to coordinate the management and protection of paleontological resources on federal lands using scientific principles and expertise. It also directs agencies to develop programs to increase public awareness of the value of paleontological resources. Additional BLM regulations (43 CFR 3809) address the collection of invertebrate fossils, fossil plants, petrified wood, and the protection and management of paleontological resources.

The analysis area boundary is the fire perimeter and includes all proposed salvage units, road work locations, landing locations, and other areas where ground disturbance is proposed or where there could be potential effects to cultural or paleontological resources.

3.8.2 Methodology

Activities associated with the proposed action may directly or indirectly affect cultural resources that are significant and eligible to the National Register of Historic Places (NRHP).

Activities associated with the proposed action may directly or indirectly affect cultural resource sites that are eligible for inclusion in NRHP

Activities associated with the proposed action may directly or indirectly affect Native American culturally significant sites and traditional use areas located on lands administered by the BLM

Activities associated with the proposed action may directly or indirectly affect paleontological resources

3.8.3 Desired Condition

The short and long-term future desired condition of archaeological sites is the preservation of elements and data that make each site eligible for the NRHP. The short and long-term future desired condition for cultural resource sites, including traditional gathering and spiritual areas, is to manage them in a manner that is consistent with and sustains tribal use and needs. For paleontological resources, the short and long-term future desired condition is to manage in accordance with the PRPA and agency directives and regulations.

3.8.4 Affected Environment

For the purpose of analysis, cultural resources are divided into two categories: prehistoric and historic archaeological sites and culturally significant resources, which are further defined below. While this division does not necessarily alter the way in which the BLM manages a given tract of land, it does provide a better understanding of those properties that require protection.

Prehistoric

According to ethnographic information, southwestern Oregon is located within the homelands of several modern day cultural groups, the Cow Creek Band of Umpqua Tribe of Indians, the Confederated Tribes of the Siletz Indians, and the Confederated Tribes of the Grand Ronde Community of Oregon. Ethnographic divisions have been based on linguistic data and, although the tribal groups spoke different languages, they shared many cultural traits and similar lifestyles.

Occupation of southwestern Oregon dates back to at least 10,000 years based on archaeological evidence. The majority of prehistoric sites recorded in southwestern Oregon date to the late Holocene (Late Archaic) period (from 1,500 years ago to European contact). The few archaeological excavations conducted near the study area have been at lower elevations, along major stream terraces, and tend to date to the late Holocene (Late Archaic) period.

The archaeological record is supported by ethnographic evidence; the native Takelma shared information about specific village and place names in Sunny Valley and along Grave Creek (Gray 1987, Stepp 2001). Settlements likely occurred along other major drainages such as Cow Creek and Wolf Creek. Permanent village dwellings were constructed of wood planks, bark, and brush-covered features. People wintered in permanent villages along lower-elevation river and stream terraces, and then dispersed into smaller bands during the spring, summer, and fall to utilize resources in the high country. Seasonal trips into the surrounding uplands provided other resources not available in the lowlands. The smaller, more mobile groups occupying the uplands constructed less substantial, temporary structures for expediency. Ethnographic accounts describe that the native populations used fire to propagate and manage various resources including nut, seed, root, and berry crops, for hunting and wildlife, and basketry materials (Pullen 1996, Tveskov 2006: 20-22).

Important seasonal animal resources included birds, deer, bear, elk, rabbits, and other mammals that were hunted with snares, spears, nets and clubs, or bows before European contact. Salmon, eels, mussels, and other fish were caught with hooks and lines, weirs, baskets, traps, and dip nets. Eggs and grasshoppers also made up a portion of the diet (Gray 1987). The main food staples were plant resources – roots, seeds, nuts, and berries like wappato, camas, tarweed, acorns, and manzanita. The primary staple was acorns, particularly from the California black oak. Tobacco

was the only domesticated plant raised by the Takelma, and only used by the adult men and woman shamens. (Tveskov 2006: 18) Plant processing materials included hand stones and grinding slabs, digging sticks, stone pestles and mortars, hopper mortars, and boiling stones (Gray 1987, Pullen 1996, Tveskov 2006). Baskets and woven tools were made with various grasses and ferns (Beckham 1978).

For the native populations of southwestern Oregon, hunting and social interactions were based on spiritual and ritual practices. Hunting required ritual preparation, such as attending sweat lodges the night before. There were also special proscriptions for handling animal carcasses or transporting big game back to camp. The First Salmon Ceremony, that usually involved the ritual preparation and consumption of the first salmon of the season, ensured the ongoing viability of the fish supply (Tveskov 2006:14-20).

Today modern day Tribes take an active role in the management of their native lands and the BLM works with individual tribal governments to further identify and address Native American concerns and traditional uses of BLM administered land.

Historic

The first Europeans into the area were on exploration and trapping expeditions during the 1820s through 1840s. The Rogue Valley was first visited in the historic period by Hudson Bay Company trappers in 1827, led by Peter Skene Ogden. In Odgen's journal, he noted numerous Native Americans in the area as he headed north approximately along the route of Interstate 5 (LaLande 1990). The Hudson Bay Company built its first regional headquarters, Fort Vancouver, on the Columbia River in 1824. The route from Fort Vancouver, through the Rogue Valley, to the Sacramento Valley in California became known as the Siskiyou Trail and an established travel route by 1830 (Mackie 1997:28).

Jesse and Lindsay Applegate established the Applegate Trail in 1846 as more people were traveling through the area or deciding to settle in the area permanently. The Applegate Trail brought settlers into southwestern Oregon using existing segments of the Siskiyou Trail. Traffic on the Applegate/Siskiyou trail system increased with James Marshall's discovery of gold at Sutter Mill in 1848 and in the Rogue and Illinois River basins (Ericson 2014). The area had only been sparsely settled when gold was discovered at several locations in Josephine and Jackson counties between 1851 and 1853.

The Grave Creek Ranch, which began as a land claim and cabin at the ford where the Applegate/Siskiyou Trail crossed Grave Creek, became one of the first permanent settlements near the study area. The small community of Leland sprang up around the ranch established its own post office in 1855 (McLane 1995). By 1855, the Six-Bit House became another stopping location along the trail. People likely settled along Cow Creek about the same time period, although little information is available. One historic account mentions that only 3 houses were left standing in the area in the fall of 1855 following raids by Native Americans (Robbins, 1933:349).

The influx of foreigners devastated local native communities by the introduction of disease, loss of subsistence areas, and later on, full scale conflict. Encounters between the native people and incoming residents started as small scale raids and skirmishes on both sides, but as western

migration into the area increased, the violence escalated into warfare. The Rogue River Wars of 1855 to 1856 ended with the forceful removal of the native people to the reservations in northwestern Oregon, far away from their homeland.

One noteworthy battle that occurred between the settlers and Native Americans during the Rogue River Wars took place within the mountains between Cow Creek and Grave Creek. The Battle of Grave Creek Hill was one of the key skirmishes of the Rogue River Wars and skirmishes of the battle occurred at least at three different geographic locations. The battles took place between October 25 and November 1, 1855, between approximately 300 enlisted U.S. Dragoons, Territorial volunteers, and southern Oregon militia and upwards of 200 Native American armed forces who were traveling with woman and children. Ethnographic accounts of the war mentioned the Native Americans hid out in the mountains between Cow Creek and Grave Creek or continued on to winter and seek refuge in the Rogue River Canyon.

Despite conflicts between the incoming settlers and native populations, mining continued to expand into southwestern Oregon. When gold was discovered in Jackson and Josephine counties, a full-blown gold rush occurred. The news spread like wildfire compared to the earlier discoveries. The earliest mining techniques required little more than a mining pan or sluice boxes, and miners could tackle this work alone. This early "bust" of placer mining lasted from the 1860s through the 1980s. The first gold seekers panned along the rivers and creeks, picking up the "easy" gold and then moving on. By the 1890s most of the easily accessed gold-bearing deposits along the streams had been depleted.

It was during this time period that many Chinese moved into the area to rework abandoned placer mines or the mines sold to them by other miners who had moved on. Many took on other labor intensive jobs of constructing ditches or working on the railroad.

Another boom period of mining occurred during the early 20th century with the introduction of hydraulic mining. Hydraulic placer mining technology was developed in California and was quickly adopted in southwestern Oregon where there was a plentiful seasonal water supply, steep ground for channeling water, and rich river-bank deposits (Kramer 1999). Hydraulic mining techniques increased the availability of water that allowed miners to work large-scale areas with less effort, however, the cost of equipment and labor usually required some capital investment and more organization on behalf of the miners. Hydraulic mining continued in the area until around 1920 (Seipp 2012).

Grave Creek had a more extensive mining history than Cow or Wolf Creeks and at one time was considered one of the most important placer mining streams in Oregon (Diller 1907). Most of the study area lies within the Mt. Reuben Mining District, the area north of the Rogue River and Grave Creek, between Reuben Creek on the east and Whiskey Gulch on the west. Although placer mining occurred in the study area, lode mining played a more prominent role, especially during the years 1890-1910. For a brief five-year period, from 1895 to 1900, the Mt. Reuben Mining District was considered by many to be the principal lode mining district of Southern Oregon. The majority of the district's quartz mines started during this time period (Christian 2014). Lode mining required even more capital and labor than hydraulic mining and generally proved less promising results.

Many mines reopened during the 1920s and 1930s due to improved gold recovery techniques and the rise in gold prices in 1934-1935. Mining was a lucrative employment opportunity when jobs were scarce during the Great Depression. Work resumed at the Benton Mine in 1935, employing the largest labor force in all of southern Oregon at the time. When E. R. Wheeler and his associates purchased the California Mine in the early 1920s, they started an extensive development campaign and built the longest mining tunnel in Southern Oregon (almost 8,000 feet in length). (Youngberg cited in Christian 2014) With World War II, gold mining was ordered to stop by order L-208 issued by the War Production Board to provide more labor and equipment to mine metals needed for the war. Even though the order was repealed after the war in mid-1945, operations resumed at only a handful of mines in the Mt. Reuben Mining District. Since then, a few small-scale operations have continued to be active.

The early mining, along with other economic activities (such as ranching and farming) gave rise to substantial settlements in the area. By the 1860's, settlers populated all the bottomlands along Cow Creek, Grave Creek, and Wolf Creek. Settlers used the Donation Land Act of 1850 to acquire blocks of land. The town of Glendale was established in 1883. Solomon Abraham and W.R. Willis platted the city to service the railroad being built along Cow Creek. By the 1880s, communities in the Glendale area were thriving.

The early mining boom quickly expanded the transportation infrastructure across the project area. The road system in the Cow Creek corridor has been in place since at least the mid 1850s. The Mt. Reuben Wagon Road was built in the late 1880s or early 1900s to link the Gold Bug Mine to Glendale (Jones 2001:64). The road started off as a horse trail, upgraded to a wagon trail, and then a wagon/truck road. The Forest Service built a formal road during 1931 to 1932 from Saw Mill Gap to Glendale (Morey 1991). GLO revestment notes indicate very few roads penetrated the interior of the study area prior to 1916. Later Metzger maps (1932) show a system of trails that primarily follow ridge tops. Field identification of trails is difficult because older skid trails, firelines, and modern roads were often built on top of earlier trails (Ericson 2014).

The settlement at West Fork started in the 1880s when the Oregon California railroad built a railroad from Glendale to West Fork, a distance of 13 miles. In 1887, the Southern Pacific Railroad acquired the Oregon & California Railroad and eventually extended the railroad from Portland into California.

Sawmill operations sprang up between West Fork and Glendale to provide lumber for construction of the railroad and for the local growing communities. One sawmill was located at Wolf Creek and another one was located at Upper Cow Creek (*Oregonian*, April 10, 1882). The small logging settlement of Reuben had a mill from 1907 to 1926, a grade school, and a post office (Shepard 1990). The railroad also gave the farmers access to new markets where they could sell their produce, thus helping develop and expand farming occupations in the valleys.

The Silsby's sawmill near West Fork operated from 1906 to 1915. The mill operated in conjunction with the Glendale Box Company in Glendale. Milled lumber was transported down a dry-flume to a loading area along the Southern Pacific Railroad, east of the West Fork railroad station. A small locomotive hauled logs from the forest to the mill on a small narrow gauge railroad (Ericson 2014).

In 1920, 118 people lived at West Fork, including 32 Chinese railroad workers. West Fork had several railroad section houses and was well-known for its city-size hotel. West Fork was the last motorized stopping point to access the Lower Rogue River. Mail and supplies were dropped off at West Fork and carried by mule teams over the Dutch Henry Trail and the Mule Creek Trail to Marial. From Marial, mail and packages would be delivered all up and down the Rogue River as far as Gold Beach.

The Dutch Henry Trail, a well-known pack trail established in the 1880s, skirts by the northwestern boundary of the analysis area. The Dutch Henry Trail was named after Henry Rosenbrook, an early miner and packer who lived on the Rogue River. The trail begins at Dutch Henry's camp at Little Meadows along the Rogue River and follows a northeasterly course over the Mt. Reuben ridge line (Jones 2001:127). Other trails diverted off the Dutch Henry Trail.

After the West Fork Hotel burned down for the third time, new owners replaced the hotel with a logging camp in the 1950s or early 1960s. The logging camp was dismantled shortly afterwards. The road stopped at West Fork until other roads were built past there in the 1960's (Reed 2010). An interpretive sign is posted at West Fork to remind people passing by about the history of this once thriving community (2014 Historic West Fork website).

With the decline of mining as a significant economic activity, logging and timber exploitation started to play a larger role in the development and economy of southwestern Oregon. The extent and dates of historic logging activity within the study area is not well understood. It is likely that that some milling was done by homesteaders and miners in the mid-1850s, but no commercial sawmills were identified in the literature review prior to the arrival of the Oregon and California Railroad in 1883 (McLane 1995). General Land Office (GLO) revestment notes from around 1916 describe the economic potential and transportation factors of cutting timber. As noted in the revestment notes, little of the area outside the immediate vicinity of Cow Creek and the Oregon & California Railroad (Southern Pacific Railroad after 1887) had been logged (Ericson 2013).

Before trucks and tractors became available to haul commercial timber in the 1920s, timber was hauled to mills by logging railroads. Several mills operated along Grave Creek. A 12-mile long standard-gauge logging-line hauled logs from the Cow Creek hills to their mill in Glendale from 1902 to the 1940s, when the mainline for this operation was converted to a truck road. The largest logging railroads were operated by Glendale Lumber Company (1902-1932), later known as the Ingham Lumber Company (1932-1946), and the Robert Dollar Company (1946-1981) (Ericson 2013; Webber 1997). Little information has been found about the other smaller logging railroads that operated within or near the study area.

The timber industry's most active and productive period extended from the 1960s to the 1980s (Stepp 2001) to meet the demand of the economic boom of the post-World War II era. During this period, more road building occurred to access timber in remote areas. Many of these roads were placed over existing jeep trails which may have been wagon roads or likely prehistoric travel routes. To this date logging continues to be a very important part of the local economy, although it has seen a steady decline since the 1980s due to more strict environmental regulations and a decline in quality timber due to previous overexploitation.

The Civilian Conservation Corps (CCC) was a national employment effort to accomplish conservation and natural resource development work during the 1930's and 1940's. The civilian army of young men made rapid strides to build roads, trails, and recreational improvements, and provided the majority of fire-fighting crews. Between 1933 and 1942, the Civilian Conservation Corp (CCC) employed crews to work on federal land now administered by the BLM, including the study area. During the summer of 1933, six CCC camps were located at Mt. Reuben, and their work included constructing 20 miles of the Mt. Reuben Road (Cooper and Reed 2005: 37).

Archaeological Sites

Historic and prehistoric archaeological sites are expected to occur in the project area.

1,597 acres of the Douglas Fire Recovery Project planning area have been previously surveyed for cultural resources prior to the 2013 wildfire. 271 acres of the 1,597 previously surveyed acres are within proposed treatment units or areas of potential effects. A total of 17 sites and one isolate were identified and previously recorded in the Douglas fire recovery analysis area prior to the 2013 wildfire. The sites are all historic and relate to mining, logging, homesteading, ditch tending, and the Rogue River Wars. Of the 17 sites, 11 sites are located outside proposed project units or areas of potential effects and did not warrant further archaeological investigations for the scope of the proposed fire recovery project. Six of the 17 sites are located within proposed treatment units or areas of potential effects. All six sites were revisited during survey in 2013 and 2014 to monitor site conditions, update the site records, and assess potential impacts from the proposed fire recovery project.

In 2013 and 2014, an additional 1,125 acres were surveyed for the fire recovery project, including 625 acres in proposed salvage units. Archaeologists took advantage of the increased ground surface visibility in the burn area and resurveyed many of the previously surveyed areas. During surveys an additional three new sites and three isolates were recorded. All new findings are historic and relate to mining or are associated with an early 1850s trail system. Of the newly recorded sites, one is located within proposed treatment units or areas of potential effects. In total, six sites are located within proposed treatment units or areas of potential effects. For these six sites, project design features were developed to minimize or prevent effects to cultural resources and therefore result in a no adverse effect. Project design features for all of the sites have been discussed with SHPO. The archaeological survey report, including project design feature recommendations for a no adverse effect, was sent to SHPO for official concurrence on April 7, 2014.

Although prehistoric use of the project area is expected, no prehistoric sites have been recorded to date in the project area. One isolated prehistoric artifact was recorded on a prominent ridge system within the interior mountains of the study area, and an early 1850's map shows a trail along the same ridge line. Many of the early recorded travel routes were likely travel routes in prehistoric times as well.

Culturally Significant Areas / Native American Cultural Resources

Local Tribal members may gather plants for edible, medicinal, ceremonial and utilitarian items. Other culturally significant resources include spiritual trails and viewsheds and Traditional Cultural Properties used by Native Americans for various purposes.

Native Americans have expressed an interest in the integration of prescribed fire as a land management method to reach the desired conditions of culturally significant plant communities. Further they have expressed an interest in the management of gathering areas in order to maintain and enhance the quality of these plant communities to best meet the needs of current and future generations. The Tribes have expressed an interest to use fire management and silviculture prescriptions for certain site locations within the project area to help restore and enhance historic landscapes

Paleontological Sites

Although a number of relatively important paleontological finds have been recorded in Southwestern Oregon, the rock formations (primarily the Galice and Rogue Formations) in the project area are not known for being rich in fossils. The possibility of significant paleontological resources occurring within the project area is considered to be low based on geologic maps and a literature search conducted by the BLM in 1981. To date, no official fossil localities have been recorded in the project area.

The majority of fossils found to date in the region have been in exposures of the Hornbrook formation which forms a northwest-trending band that extends from near Yreka, California, along the valleys of Cottonwood and Bear Creeks to Grave Creek, Oregon (Peck 1956). Fossils found in the Hornbrook formation consist of cephalopods, gastropods, and other marine fauna in an extremely hard sandstone matrix (Jones 1990).

3.8.5 Environmental Consequences

Effects Analysis for Cultural Resources

Effects

This section describes the direct, indirect and cumulative effects to cultural and paleontological resources as proposed under the various alternatives. The cultural resource sensitivity of lands managed by the Medford BLM District varies, largely in response to the underlying geology of the area which guided the development of historic mining districts. Prehistoric sites occur primarily near consistent water sources, but are also scattered across the District. Paleontological resource sensitivity is low to moderate depending upon what area of the District the projects may occur in.

Analysis Measures

The National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places (NRHP). Impacts are assessed using criteria defined by regulations for Protection of Historic Properties (36 CFR Part 800). The process begins with the identification and evaluation of cultural resources for NRHP eligibility, followed by an assessment of effects on eligible resources. If an action could change in any way the characteristics that qualify the resource for inclusion on the NRHP, it is considered to have an effect. An effect is a direct or indirect alteration of the characteristics of an historic property that qualifies it for inclusion in the NRHP. Effects are “adverse” when the alterations diminish the integrity of a property’s location, design, setting, materials, workmanship, feeling, or association. A “no adverse effect” occurs when the project has an effect on the resource but is not harmful to the characteristics that may qualify the resource for inclusion on the NRHP.

Methodology and Assumptions

Assumptions regarding the future management of cultural and paleontological resources in the Medford District under the Douglas Fire Recovery Project Environmental Assessment (EA) are as follows: The BLM will comply with all federal and state cultural resource laws and regulations, including Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations found at 36 CFR 800, the American Indian Religious Freedom Act, Executive Order 13007 (Sacred Sites), and BLM's National Programmatic Agreement with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Offices (SHPOs). In addition, BLM will conduct consultation with appropriate Native American groups and the Oregon SHPO. Finally, BLM will work in accordance with the Protocol Agreement established between the BLM and the Oregon SHPO which specifies the approach for cultural resource protection, including site identification, interpretation, and protection and stabilization efforts.

Assumptions regarding impacts to cultural and paleontological resources were also made. Archaeological remains are widely recognized as being limited in number, nonrenewable and fragile resources (Blackburn 1990). These resources consist predominantly of the physical evidence or cultural debris left on the landscape by past societies. It is critical to understanding the discussions of existing conditions and effects related to cultural and paleontological resources in this EA by examining what impacts are and how the loss of such resources occurs. The following paragraphs provide this necessary background.

Analysis

In the following sections, the analysis of the impacts of each alternative is considered based on the proposed land use management actions and their potential level of impact to cultural and paleontological resources. The analysis of effects to cultural and paleontological resources under the alternatives was completed in accordance with 36 CFR 800 and 43 CFR 8200.

Negligible: The effect on cultural and paleontological sites would be at the lowest levels of detection – barely measurable with any perceptible consequences, either beneficial or adverse, on cultural resources. For purposes of Section 106, the site's NRHP eligibility would not be threatened, and the determination of effect would be no effect.

Minor: The effect on cultural or paleontological sites would be measurable or perceptible, but it would be slight and localized within a relatively small area for a site or group of sites. The effect would be either beneficial or adverse. A beneficial minor effect would involve the maintenance and preservation of sites. The action would not affect the character or diminish the features of a NRHP eligible or listed archaeological site and would not have a permanent effect on the integrity of any cultural resource site. For the purposes of Section 106, the site's NRHP eligibility would remain intact, and the determination of effect would be no adverse effect.

Moderate: The effect would be measurable and perceptible. The action would change one or more character-defining features of a cultural resource, but it would not diminish the integrity of the resource to the extent that its NRHP eligibility would be jeopardized. For purposes of Section 106, the site's NRHP eligibility would be threatened, and the determination of effect would be an adverse effect.

A beneficial moderate effect would involve site stabilization. For purposes of Section 106, the determination of effect would be no adverse effect.

Major: The effect on cultural or paleontological sites would be substantial, noticeable, and permanent. For NRHP eligible or listed archaeological sites, the action would change one or more character defining features of an archaeological resource, diminishing the integrity of the resource to the extent that it no longer would be eligible for listing in the NRHP. For purposes of Section 106, the site's NRHP eligibility would be lost, and the determination of effect would be an adverse effect.

A beneficial major effect would involve active intervention to preserve and improve sites. For purposes of Section 106, the determination of effect would be no adverse effect.

Short Term: The effect anticipated to occur within 1 to 5 years of implementation of the activity

Long Term: The effect that would occur after the first five years of implementation

Impacts
Impacts were assessed using criteria defined by regulations for Protection of Historic Properties

(36 CFR Part 800). An effect is a direct or indirect alteration of the characteristics of an historic property that qualifies it for inclusion on the National Register of Historic Places (NRHP). Effects are adverse when the alterations diminish the integrity of a property's location, design, setting, materials, workmanship, feeling, or association. Examples of adverse effects include but are not limited to the following:

- Physically destroying a property.
- Inappropriately altering a property by not following the Secretary of the Interior's
- Not following Standards for Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines.
- Moving a property from its historic location.
- Changing the physical features within the property's setting that contribute to its historical significance.
- Introducing visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.
- Transferring, selling, or leasing a property out of Federal ownership or control without adequate restrictions to ensure preservation.

The National Historic Preservation Act (NHPA) requires agencies to take into consideration the effects of their actions on properties listed or eligible for listing on the NRHP. Significant cultural resource properties and Native American Traditional Cultural Properties would be protected by management strategies (Project Design Features or PDFs) designed to preserve such sites for future scientific research, educational or Native American use.

Paleontological properties are covered under the Paleontological Resources Protection Act. The act directs federal agencies to coordinate the management and protection of paleontological resources on federal lands using scientific principles and expertise. It also directs agencies to

develop appropriate plans for paleontological resources that address inventory, monitoring, and scientific and educational use. The existing 43 CFR 3809 regulations do not contain a process for inventory and evaluation of paleontological resources like the procedures for cultural resources under the National Historic Preservation Act. However, the existing regulations state that federal agencies cannot knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains.

Impacts Common to All Alternatives

Goals and objectives for cultural and paleontological resources that are common to all alternatives focus on compliance with existing laws, regulations and Executive orders, in addition to the BLM-OR SHPO Protocol agreement, and the National Programmatic Agreement. Protection and preservation of archaeological, culturally significant and paleontological sites are included under management common to all, as well as consultation and coordination with Native American tribes.

Due to the nature of cultural and paleontological resources, it is difficult to state definitively what level of impacts can be expected at any site within a proposed treatment. Negligible to moderate impacts on cultural and paleontological properties are expected as a result of land management activities under both action alternatives, thus a range of impact levels is provided in this analysis. Management actions include salvage harvesting, road construction and maintenance, and activities associated with road safety and/or fire planning. All possess the potential to adversely affect sensitive cultural and paleontological properties. Disclose what avoidance to sites has been performed already, take credit for protection measures already taken.

Before the 2013 wildfire, the BLM met with SHPO and federally recognized Tribes who have an interest in the area, to discuss options for managing and protecting high-priority, sensitive cultural resource sites located in the analysis area, including three sites located within the project APE. These sites are monitored regularly for vandalism and looting. Protection measures were taken to avoid these site areas during fire suppression efforts and post fire activities. The other three sites are on the Medford District's cultural resource monitoring schedule.

Vegetation Removal

Salvage harvest activities would be designed to avoid direct impacts to cultural resources. Flagging sites for avoidance for all activities is the most common type of project design feature to prevent impacts. Skid trails, road routes and landings may need to be re-aligned in order to avoid cultural resources. Logging prescriptions may be changed to lessen impacts and ground disturbance.

Ground based extraction

Mechanical salvage harvest activities would have minor to moderate impacts to unrecorded sites and paleontological deposits through the use of heavy equipment to aid in harvest operations. Ground based logging generally causes the maximum ground disturbance compared to either cable or helicopter logging. Archaeological remains are particularly susceptible to damage or destruction if the equipment disturbs the surface soil layers since that is where such resources are typically found. In one study, researchers discovered that subsurface disturbance within sites was highly varied, and depended in large part on the type of equipment and where equipment was driven (Emerson 1998). Obviously, areas that are directly trafficked by machinery are likely

to sustain the most damage, however turn-around areas are typically the most highly disturbed (Foster-Curley 2008). The most common direct effect from these activities is the crushing or breaking of surface artifacts or fossils, however similar effects can also occur to subsurface deposits as a result of compaction. Also, the disturbance of soils from machinery can displace artifacts from their original context. Oliver et al (1994) notes that various logging systems affect soil differently: tractors with treads compact soil less than tractors with rubber tires. The use of the smallest equipment necessary can help to lessen this effect.

Logging operations that depend upon "skidding" or dragging logs to a landing can have substantial impacts to cultural resource sites. In addition to crushing and breaking of artifacts and fossils, the dispersion and mixing of cultural deposits or the destruction of archaeological features could occur as a result of dragging logs through sites. This has potentially critical implications for buried archaeological deposits, especially those of a single component nature because such disturbance could render the site ineligible for the NRHP. The use of existing skid trails would help to avoid increased disturbance to sites.

Impacts from logging operations on archaeological sites could vary. Whole tree yarding may occur where slash depth exceeds 18 inches. Yarding whole trees has the potential for more ground disturbance than hauling delimbed logs to the road. Ripping also has potential for further ground disturbance. Impacts could occur from the dispersal, crushing and breakage of surface and subsurface artifacts or fossils, destruction of fossils or cultural features and a mixing of cultural deposits. Constructing water bars and earthen barriers may also damage and displace cultural artifacts and features. Piling and burning slash may cause fuels to burn hotter than they would have without treatment or during the 2013 wildfire. Fire related impacts such as a change in the hydration dates obtained from obsidian artifacts could occur, resulting in a loss of valuable scientific information. In addition to the above-mentioned effects, salvage harvesting may increase erosional processes in some areas, which could act to displace artifacts and reduce their interpretive value. Increased visibility of cultural deposits could also be a result of vegetation treatments that would have minor to moderate effects as a result of illegal artifact collection or excavation. Vandalism may be precipitated by the disclosure of site locations either inadvertently through "flag and avoid" tactics which may call attention to untreated islands within project areas, or purposefully through the sharing of sensitive resource information with non-project related personnel.

Cable/Skyline extraction
While the majority of cultural resource sites occur on slopes that are less than 35%, some do occur on steeper slopes. These sites are typically related to historic mining. Impacts as a result of cable based operations would generally be less than ground based operations. With partial suspension cable yarding, ground disturbance would be confined to cable yarding corridors. Less ground disturbance would occur with full suspension rather than partial suspension cable yarding. In addition, no ripping occurs within these project units as it typically does with ground based logging operations.

Helicopter extraction
Direct effects from helicopter logging are minimal compared to cable/skyline logging. There typically is less ground disturbance since logs are transported by helicopter and not dragged across the ground. Ground disturbance is generally confined to landing areas and the landings

are generally bigger than with either cable or ground based logging. To minimize ground disturbance, treatment may be limited to helicopter logging within the site boundary. Another option would be to not do any treatment and leave the dead and dying trees.

New Route Construction/ Reconstruction of Existing Routes/Opening of Existing Routes and Construction of Landings

The construction of new temporary roads and the reconstruction or opening of existing roadways has the potential to cause negligible to major adverse effects to cultural and paleontological resource sites. These impacts could result from the facilitation or public access to otherwise inaccessible areas, or from direct impacts to archaeological remains that have not been identified. The use of heavy equipment to open, reconstruct or maintain existing roads could act to crush, disperse or destroy unrecorded cultural resources and culturally altered soils. Sites that occur within areas of potential effects will be flagged for avoidance or other mitigation measures will be developed in consultation with SHPO and Tribes. In some instances, routes or landings may need to be moved away from the resource to provide better protection. To minimize ground disturbance in culturally sensitive areas, roads would be constructed using the minimum width possible or project activities will stay within existing road prisms. A BLM archaeologist would be notified if any culverts are to be replaced, or water bars or road barriers are necessary

As another mitigation measure, additional post salvage surveys of high cultural sensitivity areas would be conducted after project implementation to see if there is newly exposed buried cultural material. If cultural resources are discovered during project implementation the project would be redesigned to protect the cultural resource values present, or evaluation or mitigation procedures would be implemented based on recommendations from the Resource Area Archaeologist with input from federally recognized Tribes, approval from the Field Manager, and with concurrence from the State Historic Preservation Office.

Hand piling and burning:

In general, hand piling and burning present little in the way of effects to archaeological sites as long as slash piles are located off site prior to burning. The archaeologist would work with District staff as necessary to identify areas outside of sites for piling cut woody materials from inside and outside of sites for burning.

<u>Alternative 1 – No Action</u>

Direct and Indirect Effects

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by past management activities, ongoing management and reasonably foreseeable future actions and events unrelated to the fire recovery project.

There would be no direct effects to archaeological sites because no new management actions would be implemented. However, there would also be no actions taken to remove dead trees around archaeological sites. This could leave a number of sites at greater risk of damage or destruction. A possible indirect adverse effect resulting from no action is the continued risk of damage to sites. Without treatment, sites could be damaged or destroyed from burned or weakened trees that may fall on or damage or displace site deposits. In addition, with the

increased ground surface visibility from the wildfire, cultural resource or paleontological sites may be more visible and more vulnerable to looting and vandalism.

There would be no direct effects to cultural resources or paleontological properties because no new management activities would be implemented. Conditions would not change with the No Action alternative.

Cumulative Effects
There would be no direct effects to archaeological sites because no new management actions would be implemented. However, there is potential for long-term adverse effects if no actions are taken to remove dead trees within and surrounding significant cultural resource locations. A possible accumulative, adverse effect resulting from no action is the continued risk of sites being damaged or become more vulnerable to looting and vandalism.

Alternative 2
Direct and Indirect Effects
Project activities analyzed under this EA would be guided by Project Design Features (PDFs) (EA Section 2.4) to avoid direct effects and minimize indirect effects to cultural resources.

Salvage harvest operations that depend upon "skidding" or dragging logs to a landing can have substantial impacts to cultural resource or paleontological sites through dispersion and mixing of cultural deposits or the destruction of archaeological features. This has potentially critical implications for buried archaeological deposits, because such disturbance could act to destroy the information potential of a site and render it ineligible for the NRHP designation. In general, application of appropriate PDFs would result in no effect to cultural resources as a result of these salvage harvest operations. However, salvage harvest activities could result in increased visibility of cultural materials and illegal artifact collection or excavation. These effects could be minor to moderate.

Hand-piling and burning would have no direct effect on archaeological and culturally significant sites, or paleontological sites, as long as piles are located outside site boundaries.

The construction of new temporary roads and the reconstruction or opening of existing roadways could result in facilitating public access to otherwise inaccessible areas. It could also directly impact archaeological remains that have not been identified. The use of heavy equipment to open, reconstruct or maintain existing roads could crush, disperse or destroy unrecorded cultural and paleontological resources. As with construction of roadways, decommissioning roads could directly impact archaeological remains that have not been identified. The use of heavy equipment to facilitate road closures would have greater impacts to such resources. Decommissioning may have a beneficial indirect effect on cultural resource sites, by blocking vehicular access to sensitive areas.

Cumulative Effects
PDFs would be developed to avoid direct effects and minimize indirect and cumulative effects to cultural resources and paleontological resources, or evaluation and mitigation procedures would be implemented based on recommendations from the Resource Area Archaeologist with input from Tribes, approval from the Field Manager, and with concurrence from the and Oregon State

Historic Preservation Office. Cumulative effects to these resources would be minimal since short and long-term protection measures would be incorporated into the PDFs.

Alternative 3

Direct and Indirect Effects

Project activities analyzed under this EA would be guided by Project Design Features (PDFs) (Chapter 2, Section C.4) to avoid direct effects and minimize indirect effects to cultural resources. With Alternative 3, proposed project activities include more helicopter logging and less road construction and maintenance. Direct effects from helicopter logging are minimal compared to cable/skyline logging; there generally is less ground disturbance associated with helicopter logging since logs are transported by helicopter and not dragged across the ground. As a result, there are less complex PDFs needed for sites under Alternative 3. Ground disturbance is confined to landing areas, which are generally bigger than either cable or ground based logging. Indirect effects would be similar to Alternative 2.

Cumulative Effects

PDFs would be developed to avoid direct effects and minimize indirect and cumulative effects to cultural resources and paleontological resources, or evaluation and mitigation procedures would be implemented based on recommendations from the Resource Area Archaeologist with input from Tribes, approval from the Field Manager, and with concurrence from the and Oregon State Historic Preservation Office. Cumulative effects to these resources would be minimal since short and long-term protection measures would be incorporated into the PDFs.

Comparison of Alternatives

Cultural resource surveys were completed for the Douglas Fire Recovery Project in accordance with the National Cultural Programmatic Agreement and the Protocol for Managing Cultural Resources on Lands Administered by the BLM in Oregon. Archaeological survey identified 17 sites within the analysis area and six sites have been identified within proposed treatment units or other areas identified as Areas of Potential Effect (APEs). For these six sites, project design features were developed to minimize or prevent effects to cultural resources and therefore result in a no adverse effect.

When compared to the No Action alternative, impacts of the proposed action would range from no effect to no adverse effect. PDF's would be designed to avoid direct effects and minimize indirect effects to significant cultural and paleontological resources. With Alternative 2 there is more ground disturbance which may lead to minor to major effects compared to Alternative 3. Alternative 2 would require more post salvage surveys than Alternative 3. Cumulative effects to these resources would be minimal since short and long-term protection measures would be incorporated into the PDFs.

Significant cultural sites, referred to as Historic Properties in the National Historic Preservation Act, that are within project APEs will be protected using Project Design Features (PDFs) or evaluation and mitigation measures will be implemented based on recommendations from the Resource Area Archaeologist with input from Tribes, approval from the Field Manager, and with concurrence from the State Historic Preservation Office.

Overall, it is expected that impacts related to salvage removal will be mitigated through avoidance. Site specific protection measures include directionally falling trees away from cultural resource locations, confine heavy machinery use to road prisms, and by placing burn piles, landings, and staging areas outside site boundaries. Other site protection measures require that no ripping or scarification would be permitted within site boundaries or site sensitive areas. As another mitigation measure, additional post salvage surveys of high cultural sensitivity areas may be required.

Cultural resource protection clauses are included in the logging operations contracts. In some instances, a BLM archaeologist will inspect a site, such as a mining ditch, before closing the sale contract. If damages have occurred, the contractor will repair the feature to acceptable standards.

If appropriate, cultural resource concerns will be discussed with the contractor to insure that they understand the need to avoid site locations and that they will not collect artifacts or disturb cultural resource sites in any way. Another cultural resource protection clause outlines the steps to take if any cultural resources are discovered during project implementation.

3.9 Botany

3.9.1 Methodology

- Information pertaining to T/E, S&M, and ISSSSP plant sites was obtained from the
- Medford District BLM Geographic Biotic Observation (GeoBOB) database.
- GIS was utilized to query BLM-managed acreage, stand age, and weed species reported within the project area.
- The project area boundary was determined o be upper ridgelines within three 10th field watersheds (Middle Cow, Grave Creek, and West Fork) encompassing the affected area.
- High-resolution ortho imagery from the Douglas Complex wildfire incidents was utilized to assess crown scorch and potential islands of low-severity burn activity
- *Douglas Complex Post-Fire Recovery Project _A Process for Conforming to Survey &*
- *Manage Guidelines for Category B Fungi*, finalized March 2014 by the BLM Oregon State Office, delineated circumstances requiring fungi surveys within the Douglas Fire
- Complex Recovery Project Area units.

3.9.2 Assumption

Private land will continue to be harvest and re-planted, and will be subject to requirements listed within Oregon's Forest Practices Act (www.oregon.gov).

3.9.3 Affected Environment

Pre-Fire Conditions

The Klamath Mountains Ecoregion, flanked by the Willamette Valley to the North, the Coast Ranges to the West, Central and Southern California Chaparral and Oak Woodlands to the South,

and the Cascade range to the east, consists of the Klamath and Siskiyou Mountains of Northern California and southwestern Oregon (Sleeter and Calzia, 2014). The Klamath Ecoregion has been influenced by fire for centuries: wildfires have played an integral role in ecosystem function and process prior to European settlement, and fire activity is considered a key natural disturbance within the Ecoregion (Atzet and Wheeler 1982). Before the age of fire suppression, which began in the early 20th century, wildfires of varying intensities regularly burned throughout this region. As a result, certain forest types and associated understory vegetation which could tolerate heat and conditions associated with wildfire events became the dominant regenerating species (Halofsky et al, 2011). Fires regulated stand densities, and kept meadows free of encroaching conifer species.

The Douglas Fire Complex Recovery (DFCR) project area is nestled within the northern portion of the Klamath Ecoregion. Prior to the Douglas Complex wildfires, the land encompassed within the DFCR project area boundary primarily consisted of a patchwork of early, mid and late seral forest environments, interspersed within a checkerboarded ownership alternating between private and various public entities. Many plantations on both public and private lands were present, as the area is largely utilized for timber production.

The combination of fire return intervals, climate, unique soil types (frequent serpentine and serpentine-influenced soils), and geographic location has resulted in rich biological diversity. The Klamath Ecoregion hosts a plethora of botanical species, including several endemic species, many of which are associated with serpentine soil (Sleeter and Calzia, 2014).

Land within the DFCR project area contains special status plant and fungi species, however, 'uncommon' plant sites occur at lower densities as compared to other regions within the Klamath Ecoregion, such as the Illinois Valley (GeoBOB, 2014). Prior to the Douglas Complex wildfires in 2013, 312 plant sites, each comprised of one of 50 'uncommon' plant or fungi species, were documented within the DFCR project area boundaries, per the BLM's Geographic Biotic Observation (GeoBOB) database. GeoBOB is used by OR/WA BLM to track documented sites of targeted plant and animal species. 'Uncommon,' as used in the context of this writeup, is a broad definition encompassing all species included in the three basic designations guiding BLM plant species conservation efforts:

- Federal Threatened or Endangered (T/E), governed by the Endangered Species Act (ESA),

- Interagency Special Status/Sensitive Species Program (ISSSSP), governed by BLM Special Status Species policy, as outlined in BLM Manual 6840, and

- Survey and Manage (S&M), governed by the Northwest Forest Plan (2001).

It should be noted some of the aforementioned 50 species are no longer considered uncommon because new populations have been found over a broad geographic range as a result of botanical survey efforts conducted by BLM and USFS units nationwide.

Post-fire Conditions

The Douglas Complex wildfires burned 48,671 acres of timber in various seral stages within various land ownerships, the majority of which are located on steep, mountainous terrain. Of the 48,671 acres affected, 36,791 acres are within the GPRA. The fires burned with different intensities - ranging from low to moderate to high intensity -throughout the affected acreage. Suppression efforts included constructing dozer lines / handlines / helispots, clearing openings to create safety zones, re-opening and brushing system roadsides, water drops via helicopters, and retardant drops via air tankers. Rehabilitation efforts, including but not limited to waterbar installation, slash/root wad placement, and spreading certified weed-free straw and approved grass/forb seed mixes, were completed during fall 2013 and winter 2014.

The DFCR project area boundary encompasses 25,349 acres of BLM-managed land. Of that, the proposed activities are relegated to 1669 ac, or 5.2% of BLM land within said project area. These acres sustained burns of varying intensities as a result of the Douglas Complex wildfires, and most vegetation was consumed. Due to the mosaic pattern of burned, unburned, and partially burned vegetation, lightly-burned patches, or 'green islands' remain within a subset of the final proposed units.

Considering fire has been an integral part of the Klamath Ecoregion for centuries prior to fire suppression, it is probable that the fire had a neutral or perhaps even beneficial effect on many botanical species. As previously stated, there were 312 plant and fungi sites within the DFCR project area prior to the fire. Of the 312 plant sites documented in GeoBOB, 120 were not burned over (per the BAER soil-severity shapefile), as wildfires burn with different intensities and can skip entire stands/patches. Within project area units, 29% of acres burned at high severity, 45% at moderate severity, 19% at low severity, and 7% were unburned (per the Douglas Fire Complex BARC data, which bases fire severity on soil burn severity).

Plant and fungi species previously found within final proposed unit boundaries are broken out into their respective designations/categories and discussed in more detail below.

Threatened and Endangered (T&E) Plants – NOT PRESENT, NOT AFFECTED

Of the three federally listed plants on the Medford District (*Fritillaria gentneri, Limnanthes flocossa* ssp. *grandiflora*, and *Lomatium cookii)*, only *Limnanthes flocossa ssp. grandiflora* does not have a range which extends into the GPRA. Final units within the Douglas Complex Recovery Project do not fall within the range of the three aforementioned T&E species, as determined by the 2014 US Fish and Wildlife Service Biological Opinion (Tails # 01EOFW00-2014-I-0013). As such, final units were not surveyed according to the Service's protocol. Vascular plant surveys which have occurred under the pretenses of other land management projects located within the Douglas Fire Complex Recovery project perimeter have occurred since 1991, and no new *Fritillaria gentneri* sites were found. There would be no anticipated effect from the Proposed Action on any federally listed plants.

Bureau Special Status (ISSSSP / BSS) & Survey and Manage (S&M) Plants and Fungi – PRESENT, NOT AFFECTED

ISSSSP Policy – Vascular, Nonvascular, and Fungi

On July 26, 2007 a new Special Status Species list went into effect (IM No. OR-2007-072), coupled with a new Interagency Special Status/Sensitive Species Policy (ISSSSP). This new list has two categories, (ISSSSP) Sensitive and Strategic. The former categories of Bureau Assessment and Bureau Tracking no longer exist. Per Bureau 6840 regulations, the agency must not trend a Sensitive species toward federal listing under the Endangered Species Act (ESA). To comply with 6840 regulations, Sensitive species require a pre-project clearance and, if found as a result of pre-disturbance surveys, site management to prevent them from trending toward federal listing. There is no pre-project clearance or management required for the Strategic Species at the BLM District level, thus Strategic Species will not be analyzed in this document.

Background and S&M Standards and Guides – Vascular, Nonvascular and Fungi

In addition to the aforementioned Special Status Species policy, Survey and Manage requirements have been re-instated as of April 2013. On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Sherman, et al.*, No. 08-1067-JCC (W.D. Wash.), granting Plaintiffs' motion for partial summary judgment and finding NEPA violations in the *Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (USDA and USDI, June 2007). In response, parties entered into settlement negotiations in April 2010, and the Court filed approval of the resulting Settlement Agreement on July 6, 2011. Projects that are within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 ROD, as modified by the 2011 Settlement Agreement. However, due to another decision issued April 2013, the 2011 list has been rescinded and interim guidance directs projects to be analyzed under the 2001 list without Annual Species Reviews (ASRs), unless the project meets one of the four Pechman exemptions.

Proposed activities encompassed in the Douglas Fire Complex Recovery (DFCR) project do not fit the criteria of any of the Pechman exemptions. However, the project is consistent with the Medford District Resource Management Plan/Forest Land and Resource Management Plan as amended by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001 ROD).

Special Status (ISSSSP) – Specific to Fungi

With the exception of approximately 620 acres, surveyed in 1998, 1999, and 2000, the Douglas Fire Complex Recovery project was not surveyed for ISSSP Sensitive fungi. Pre-disturbance surveys for Special Status fungi are not practical, nor required per BLM – Information Bulletin No. OR 2004-121, which states "If project surveys for a species were not practical under the Survey and Manage standards and guidelines (most Category B and D species), or a species' status is undetermined (Category E and F species), then surveys will not be practical or expected to occur under the Special Status/Sensitive Species policies (USDA/USDI 2004a, p.3)." Current special status fungi were previously in the aforementioned S&M categories which did not consider surveys practical, and are therefore exempt from survey requirements (See Table 43). With the recent instatement of the new Interagency Special Status/Sensitive Species Policy (ISSSP), 14 species of fungi were designated as Sensitive; 10 are suspected to occur on Medford

District, while the remaining 4 have been documented (Table 43). As mentioned above, none of these species require surveys.

Table 43: Bureau Sensitive Fungi Documented or Suspected on Medford BLM

Species	S&M Category	ISSSSP / Bureau Status	Suspected or Documented on Medford District?
Arcangeliella camphorate	B	SEN	S
Boletus pulcherrimus	B	SEN	D
Chamonixia caespitosa	B	SEN	S
Dermocybe humboldtensis	B	SEN	S
Gastroboletus vividus	B	SEN	S
Gymnomyces fragrans	B	SEN	S
Helvella crassitunicata	B	SEN	S
Phaeocollybia californica	B	SEN	D
Phaeocollybia oregonensis	B	SEN	S
Psuedorhizina californica	B	SEN	S
Ramaria spinulosa var. diminutiva	B	SEN	S
Rhizopogon chamaleontinus	B	SEN	S
Rhizopogon ellipsosporus	B	SEN	D
Rhizopogon exiguous	B	SEN	D

*SEN – Sensitive; D – Documented; S – Suspected

Of the 4 documented species, two (per the Oregon/Washington Geographic Biotic Observation (GeoBOB) database), *Phaeocollybia californica* (PHCA40) and *Rhizopogon ellipsosporus* (RHEL3), have been found in the GPRA. The closest *Phaeocollybia californica* site exists approximately 14 miles south of the closest unit in the DFCR Project area, and the closest *Rhizopogon ellipsosporus* site is approximately 8 miles south of the project area. Dispersal via spore transport and/or mycelia network are improbable, as these sites and the DFCR Project Area reside within different HUC 10 watersheds (both the PHCA40 and RHEL3 sites are in the Hellgate Canyon-Rogue whereas the DFCR project is in Grave Creek, Middle and West Fork Cow Creek Watersheds) and Grave Creek Watershed is separated from the other aforementioned watersheds by steep ridges, several ravines, and the Rogue River. There are no documented sites of either of these species in the Grave Creek, Middle, and West Fork Cow Creek HUC 10 watersheds, where the DFCR Project Area is located.

While it is possible that this project is occurring within potential habitat for some species, there is very little information available describing the *exact* habitat requirements or population biology of these species (USDA/USDI 2004c, p.148). The 2004 FEIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines addresses this type of incomplete and/or unavailable information (p. 108-109). In addition, the Douglas Complex wildfires burned the majority of acres within the DFCR project, thereby reducing much of what might have been considered suitable habitat (mature/late successional stands) to an early seral state.

Based on the above information, the likelihood of a sensitive fungi occurring within a single unit(s) encompassed in the Project Area is low. The likelihood of contributing toward the need to list is not probable.

Survey and Manage – Specific to Fungi

Aside from the 620 acres previously surveyed, final units within the DFCR project area were not surveyed for fungi to Survey and Manage protocol standards. For NEPA decisions signed in fiscal year 2011 and beyond for habitat-disturbing activities in old-growth forests, the 2001 S&M ROD (Forest Service and Bureau of Land Management 2001, Standards & Guides (S&G) -9) gives direction to conduct equivalent effort surveys for category B fungi species if strategic surveys have not been completed for the province encompassing the project. The Survey and Manage Standards and Guides defines old growth forest as an ecosystem distinguished by old trees and related structural attributes that are usually at least 180 to 220 years old (USDA, USDI S&G, 2001).

Strategic surveys have not been completed for category B fungi for the province containing the DFCR project area, and equivalent effort surveys have not been completed because the majority of units were not over 180 years of age (the age triggering fungi surveys IF there is suitable habitat). Units with a 180+ year old component were either dropped from the project if there was a 'green island' that exhibited suitable habitat components, or kept within the project if, after field verification, it was determined the green island/patch did not contain components of suitable habitat. Components of suitable habitat include, but are not limited to the following; at least 2 canopy layers, large snags, large accumulations of logs and other wood on the ground, and a >60% average live forest canopy (USDA, USDI S&G, 2001).

The likelihood of jeopardizing persistence (S&M species) or contributing toward the need to list (ISSSP species) is not probable.

Pre-Project Clearance - Vascular, Nonvascular, and Fungi Pre-Fire Survey Results

Since 1991, vascular and/or nonvascular plant surveys have been conducted in preparation for separate projects that may or may not have resulted in final implementation - in more than 1230 acres (74% of the project area unit acreage) encompassed in the final proposed units of the Douglas Fire Complex Recovery (DFCR) Project. In addition, fungi surveys were conducted within approximately 620 acres (37% of the acreage in project area units) from 1998 through 2001 under the pretenses of separate projects which may or may not have been finalized and/or implemented. Surveys generally occurred in the spring months for vascular plants, spring, fall and winter months for nonvascular plants, and in fall and/or spring for fungi.

In units surveyed prior to the Douglas Complex wildfires, surveys were conducted by professional botanists using intuitive controlled methodology, wherein areas supporting high potential habitat were surveyed more intensively. Surveys targeted Threatened and Endangered (T&E) species, Survey and Manage (S&M) species, and Bureau Special Status (BSS, also ISSSSP) species. Surveys conducted in 1998 or later were in compliance with the version of Survey and Manage protocol (and T&E and BSS, respectively) applicable at the time (some target species are different depending on which S&M list was used), but all were consistent in requiring surveys for Category A and C species. Survey and Manage protocol requires managing known (documented) sites of Category A, B, C, and E species, managing 'high-

priority' Category D species, and no site management requirement of Category F species (USDA/USDI, 2001).

Past surveys occurring in one or more seasons from 1991-2012 within final proposed DCFR units revealed the following sites (see Table 1-1); (1) *Allium bolanderi*, (3) *Buxbumia viridis*, (4) *Chaenotheca ferruginea*, (7) *Chaenotheca furfuracea*, (1) *Cypripedium fasciculatum*, (3) *Gymnomyces punctifolius*, (2) *Helvella compressa*, (1) *Lotus stipularis*, (4) *Otidea onotica*, (2) *Otidea leporina*, (1) *Phaeocollybia olivacea*, (1) *Phaeocollybia piceae*, (4) *Plectania milleri*, and (1) S*arcosoma mexicana*.

Allium bolanderi (Bureau Strategic) and *Helvella compressa* (S&M) are no longer on their respective lists and with the exception of inclusion in Table 44, will not be analyzed further.

All previously documented sites have been compiled and listed in Table 44.

Table 44: Bureau Sensitive and Survey and Manage Plant Sites in Proposed Units

Species	Common Name	Sensitive	Survey & Manage Category	Number of Sites	TRS (unit)
Allium bolanderi	Bolander's onion	No	No	1	23-10C, 23-7
Buxbaumia viridis	Bug on a stick	No	D	3	23-10C , 11-5 (2)
Chaenotheca ferruginea	Needle lichen	No	B	4	09-1c, 19-3, 11-2(2)
Chaenotheca furfuracea	Sulphur pin lichen	No	F	7	9-1, 12-2, 12-3A, 12-3B, 13-B, 27-4, 25-6
Cypripedium fasciculatum	Clustered lady's slipper	Yes	C	1	23-2A
Gymnomyces punctifolius	--	No	B	3	03-1 (3)
Helvella compressa	Elfin saddle	No	No	2	21-6 (2)
Lotus stipularis	Balsam bird's-foot trefoil	Yes	NA	1	9-5
Otidea leporina	Rabbit's ears	No	B	2	03-1 (2)
Otidea onotica	Hare's ear	No	F	4	03-1 (4)
Phaeocollybia olivacea	--	No	D	1	03-1
Phaeocollybia piceae	--	No	B	1	03-1
Plectania milleri	--	No	B	4	27-B, 11-2, 9-5 (2)
Sarcosoma mexicana	Mexican gel cup	No	F	1	9-1

Pre-Project Clearance – Vascular, Nonvascular, and Fungi Pre-Fire Post Fire Habitat Assessment

Acres that have not been surveyed (roughly 26% of the project area) but are within final proposed units will not receive pre-disturbance surveys, as in most instances, there is a lack of vegetation to survey as a result of the fire. Instead, in an effort to minimize effects to potential Bureau Sensitive or S&M species which may be present, areas including green islands or patches of relatively intact vegetation which may be affected by salvage logging activities – such as yarding corridors and road construction - will be subject to the following Project Design Features;

1. Temporary route construction would avoid green trees within 180 year or older stands. In addition, where temporary route construction cannot avoid green trees greater than 80 years old, clearing limits would be limited to the minimum extent possible.

2. In mix severity and green areas, project activities would be confined to areas which have current botany surveys.

3. If, during implementation of the proposed project, additional Special Status plant sites are found, the project botanist would prescribe appropriate measures based on species, proposed treatment, site-specific environmental conditions, and available management recommendations.

Recommended Plant and Fungi Site Protection

Vascular species including *Cypripedium fasciculatum*, and *Lotus stipularis* may receive a protection buffer ranging from 25-200 feet in diameter, depending on site specific conditions and unit prescription(s). If the sites experienced high severity burns, no buffers(s) would be applied.

For Survey and Manage (S&M) species, S&M protocols state Category A, B, and E species are under a "manage known sites" requirement. However, wildfire activity within final proposed DFCR units resulted in removal of suitable habitat - as defined in 2001 USDA/USDI Standards and Guides, p. 79 - by understory vegetation removal and overstory reduction or removal. Survey and Manage Standards and Guides clarify that historic locations previously considered as known sites do not require mitigation if the species or its habitat no longer occur (USDI, 2001). Therefore, the Category A, B, and E species in the above table would not receive buffers. If, however, they occur within green islands, or patches, within proposed units or road construction prisms, aforementioned PDFs would be applied and would provide the equivalent of a 25-200 foot buffer – via re-routing or exclusion - protecting the site(s) from salvage logging and/or associated activities.

Category C and D species are 'manage high-priority site' species. The 2001 Survey and Manage Standards and Guidelines, p. 10, states that "high priority sites will be managed according to the Management Recommendation for the species" and if there aren't any Management Recommendations for the species, then "a combination of professional judgment, Appendix 12 in the Northwest Forest Plan final SEIS, and appropriate literature will be used to guide individual site management." The 2001 S&G defines 'high-priority sites' as being a subset of 'known sites', which do not require protection if the species or its habitat no longer occur. As in the case of Category A, B, and E species within the context of this proposed salvage project, Category C and D species listed in Table 44 would not receive buffers. If, however, they occur within green islands, or patches, within proposed units or road construction prisms, aforementioned PDFs would be applied and would provide the equivalent of a 25-200 foot buffer – via re-routing or exclusion - protecting the site(s) from salvage logging and/or associated activities.

It is important to note that the above-mentioned buffers, the actual buffer itself may be comprised of either a physical buffer made from flagging, or a virtual buffer provided on a map. In either case, the intent of the buffer is to provide awareness of the site, and to prevent any activity from occurring within the buffer radius that would jeopardize species persistence.

3.9.4 Alternative 1 – No Action

Direct and Indirect Effects

T&E, ISSSSP Sensitive, & Survey and Manage Plants (Vascular and Nonvascular) and Fungi

There would be no direct or indirect effects to ISSSSP Sensitive or Survey and Manage vascular or nonvascular plants, or fungi under Alternative 1 because no physical disturbance would occur that could impact them. There would be no additional loss of late-successional forests which may provide suitable habitat for the 10 suspected and 4 documented Medford District BLM Sensitive fungi.

Cumulative Effects

Alternative 1 would not contribute additional cumulative effects to ISSSSP or S&M vascular, nonvascular, or fungi species. The amount of mid-seral and late-successional forest on BLM-managed lands would remain unchanged.

Past, present, and reasonably forseeable activities within the DFCR project area are broken out into their respective categories for further review.

Past activities

Douglas Complex Wildfires

The Douglas Complex wildfires and associated suppression activities are perhaps the most notable agents of disturbance affecting the DFCR project area in recent years. Wildfires burning with varying intensities, have created a mosaic landscape of burned and unburned stands, and are a natural agent of disturbance. In response, many plant species re-grow and respond quickly after wildfire events, and plant response is largely dependent on plant characteristics, their susceptibility to fire, and burn severity (Lentile et al 2007).

As mentioned in the affected environment, fire has played an integral part in the Klamath Ecoregion. Plant species here and within other parts of the Pacific Northwest exhibit life strategies such as seed-banking that ensure successful post-fire regeneration (Lentile et al 2007)." Prior to fire containment, the project botanist noted bear grass and bracken fern were sprouting within severely burned areas, less than two weeks after Douglas Complex wildfires burned through their locations. In addition, within the same timeframe, Pacific madrone and manzanita were stump-sprouting in areas which had experienced high-severity burns.

While we can visibly see re-sprouting vascular plants, our knowledge is limited as it pertains to ectomycorrhizal (EM) fungi and how they interact in natural environments both within and without the presence of a disturbance such as wildfire (Smith et al 2002). While some studies indicate that large-scale disturbances often result in significant increases in sporocarp production and EM species composition, others show stand biomass and species richness of (hypogeous) EM fungi is significantly less in early seral stands (4-27 years) compared to adjacent late seral Douglas fir stands (Smith et al 2002). However, as Smith et al (2002) point out, "most field data on EM fungal species ecology are based on occurrence of sporocarps…" and "…sporocarp studies of EM fungal communities typically underrepresent belowground EM fungal diversity..." which confirms that there is still much to be determined regarding underground structure and function of EM fungi species. Furthermore, all of these studies underscore the propensity of mycelial networks to survive large-scale disturbance.

Timber Harvest on private land
Information is not available about rare plant populations in the DFCR Project area prior to BLM botanical surveys, which began during the last 30 years. However, past activities, described in the affected environment, likely affected Special Status plants and populations by damaging or destroying individuals or reducing or degrading suitable habitat.

Present and Reasonably Foreseeable activities

Discretionary Activities
The following activities have been previously analyzed and approved projects would still occur within the project area in the near future; the Fire Resiliency Project, Wolf Pup Timber Sale, Regor Thin Timber Sale, McKnabe Timber Sale, Young Stand Management Project, Major Federal Highway projects, Medford Road Maintenance Categorical Exclusion, Discretionary and Non-Discretionary road safety actions and ongoing Emergency Stabilization and Rehabilitation (ESR) projects. Appendix C provides a description of the activities that are occurring within this project area under these projects.

Timber Harvest on private land
Although specific logging plans for private industrial forest lands are not available, industry has been actively salvage logging within the DFCR project area and will continue to do so. Once salvage logging is complete, it is assumed focus will shift back to unburned stands, where commercial harvest will occur in the future on relatively short rotations, and that privately-owned forests will remain in early to mid-seral stages. Sensitive and Survey and Manage species do not receive protection on privately-owned lands, but will continue to be protected and conserved on federal lands, according to BLM policy (IM OR-91-57).

3.9.5 Alternative 2

Proposed Action summary
Proposed DFCR project activities include temporary route construction and reconstruction (including associated decommissioning), skid trail construction and decommissioning, landing construction and rehabilitation, yarding operations, activity fuels treatments, and salvaging trees exhibiting a 75% chance of mortality, indicated by crown scorch, which varies by species. Green islands, or patches of conifers exhibiting a 26% or higher percent chance of survival, will not be salvaged as they do not meet the silvicultural prescription. However, some green trees may be affected by salvage operations and/or associated activities listed above. Treatment areas proposed under Alternative 2 of this project comprise approximately 5% of BLM-managed acres within the DFCR project area.

Direct and Indirect Effects
Background – Complexity associated with determining effects to species in a post –fire environment
Addressing direct and indirect effects to ISSSSP and S&M vascular, nonvascular and fungi species is complicated due to the existing post-fire condition, which resulted from fire activity less than a year ago. Botanical species are known to recolonize areas disturbed by fire over time, especially when green islands or adjacent unburned stands serve as refugia for seeds/bulbs of vascular species, spores and vegetative parts of nonvascular species, and mycelial networks of fungi. The time associated with recolonization depends on several factors, including but not

limited to the species, the proximity of seed/bulb/vegetative part/mycelial source, burn intensity, climatic conditions, and microclimate at the site(s).

For fungi, direct and indirect effects are further complicated because surveys completed within protocol 1) have not occurred within all DFCR planning acreage, and 2) address only fruiting bodies, or sporocarps, not the mycelial network. This fruiting body and mycelial situation is analogous to looking for a flowering plant which reproduces from a bulb, but does not produce flowers every year. In any given year, the plant may not flower, but the underground bulb is still present.

In an effort to address areas which did not receive pre-fire surveys which may harbor suitable habitat and/or known sites, PDFs were identified and incorporated into the DFCR Proposed Action. Past field survey data within adjacent acres, coupled with probable post-fire suitable habitat potential was analyzed and the resulting information was used to identify and defer most areas that have the potential for suitable habitat and/or site (specific to ISSSSP and S&M plant and fungi species) degradation as a result of this project. It is expected that the implementation of said PDFs will eliminate or minimize direct and indirect effects of this proposed project on ISSSSP and S&M vascular, nonvascular, and fungi species within the project area.

Direct and Indirect Effects to all ISSSSP/S&M Vascular, Nonvascular, and Fungi Species
In the short term (1-3 years), proposed management actions would result in soil displacement and erosion, affecting plant and fungi species recolonization efforts within the treatment units and along roads. While the effects of this type of soil disturbance to above-ground plants have been well documented, much less information pertaining to below-ground fungi is available. Addressing short term direct and indirect effects to ISSSP and S&M fungi species is complicated, as fungi surveys were performed for ISSSP Sensitive / S&M fungi within a subset of acres within the DFCR project area. Thus, in units which did not receive surveys prior to the fire, it is unknown if Bureau Sensitive fungi are present in the treatment units. Although fire burn intensities can damage fruiting bodies and/or the shallow portions of mycleial networks, studies have demonstrated that fires do not necessarily decimate mycelial networks (Baar et al, 1999).

Direct and Indirect Effects Specific to (Ectomycorrhzal (EM)) Fungi
Potential habitat for many of the ISSSSP Sensitive and S&M species existed in portions of the Project Area prior to the fire, as specific areas of the project area exhibit a predominant Douglas-fir component (generally considered an indicator species). However, predicting presence of ISSSSP/S&M fungi is difficult because habitat requirements are poorly understood within unburned areas – and even less understood within burned areas. Because of their rarity across the Northwest Forest Plan area, it is unlikely that populations are present in the final treatment units. However, if present, potential effects which pose direct or indirect adverse impacts by the proposed actions will be mitigated by PDFs as previously listed. Proposed activities and potential associated direct and indirect effects to fungi are detailed below.

Salvage Commodity Extraction – ground based
Harvest can have varying degrees of adverse impacts on fungi, depending on the level of tree removal and ground disturbance. Removing, disturbing, or compacting the top layer of organic material and mineral soil could negatively impact fungi. The main and most extensive part of

the fungus consists of a below-ground mycelia network that resides in the top few inches of mineral soil. Mycelia networks are often connected to multiple trees through their root systems. In one study, fungal mycelia networks ranged in size from 1.5 - 27 square meters (Dahlberg and Stenlid 1995). Disruption of mycelia networks could occur during timber harvest, construction or ripping of roads or landings, removal of host trees that sustain the ectomycorrhizae, or burning post-harvest slash piles. The effect of these activities on fungi is a short term loss of species diversity and abundance (Amaranthus et al. 1996), although more recent studies indicate fungi species persist under a variety of management regimes (Gordon, 2012). In addition, in a study conducted on a timber harvesting project by Jennings et al (2011), results suggested "that nutrients critical to soil productivity were reduced by mechanical applications used in timber harvesting, yet soil bacteria and fungi, essential to mediating decomposition and nutrient cycling, appeared resilient to mechanical disturbance."

Although Alternative 2 presents a potential risk of impacting Sensitive/S&M fungi, if present, the inclusion of aforementioned PDFs and known site management protection measures would minimize the potential effects of proposed activities.

Salvage Commodity extraction – Helicopter based
In general, helicopter-based logging systems pose less potential for ground disturbance compared to ground-based systems. Helicopter logging has been shown to result in maintaining species richness in relation to green trees retained in non-salvage logging operations (Luoma et al, 2006). Many DFCR units are directly adjacent to stands containing green trees, the roots of which serve as refugia for many EM fungi mycelium (Luoma el al, 2006).

Road / Landing Construction
Potential direct and indirect effects to fungi resulting from road/landing construction are similar to effects of logging, albeit on a smaller scale. While roads do not typically involve as much affected acreage as units, they have a period of heavy use by log trucks and logging equipment, resulting in concentrated soil compaction. Studies have shown that roads which are sub-soiled after use are colonized by EM fungi which, in addition to other findings, suggests disturbance on the forest floor has less of an effect to soil microbial communities (including mycelial networks) than overstory removal (Jennings et al 2011). PDFs have been established to avoid suitable habitat which may contain ISSSSP/S&M fungi mycelium, and no effects are anticipated.

Treatment of Activity Fuels – Lop and Scatter, Piling, and/or Pile Burning
Of the activity fuel treatments, pile burning presents the highest likelihood of affecting ISSSSP/S&M fungi species. Fungi could be directly impacted from radiant heat during burning of post-harvest slash piles. Effects of pile burning include damage or death of mineral soil, which may host mycelia and spores of fungi, loss of litter, organic matter and large wood, resulting in reduced moisture retention capability, loss of nutrient sources, and changes in fungal species diversity and abundance.

Implementation of Alternative 2 creates the greatest threat of damage to fungi from burn piles because trees would be harvested and treatment of activity fuels could result. However, salvage activities do not produce as much slash as green-tree commercial thinning or regeneration harvesting, and the area impacted by burn piles would be a small percentage of acreage compared to the total amount of acres in the project area.

Direct and Indirect Effects, Summarized
There would be no direct or indirect effects to previously documented ISSSSP or Survey and Manage vascular, nonvascular or fungi species resulting from proposed activities because 1) re-locatable sites with intact habitat within final planning units (Table 44) would receive protection buffers or deferred from project activities, 2) PDFs were identified and incorporated into the DFCR Proposed Action to mitigate temp road construction in areas which were green but have not received surveys (listed under 'Pre-project Clearance'), and 3) PDFs would reduce the risk of introducing or spreading noxious weeds during project implementation, which could potentially impact Bureau Sensitive vascular plant habitat and 4) harvest activities would likely occur when many species are dormant so possible effects to sites would be further minimized.

No ISSSSP Sensitive Status or Survey and Manage vascular, nonvascular, or fungi species would trend toward listing (ISSSP) or cease persisting (S&M) as a result of implementing the activities proposed in Alternative 2.

Cumulative Effects
Information is not available for rare plant populations in the Douglas Fire Complex Recovery project area prior to BLM botanical surveys, which began within the last 30 years. However, it is assumed that past activities, such as logging, road building and activities such as those listed as present and foreseeable in Alternative 1 likely affected Sensitive / S&M vascular, nonvascular and fungi species by damaging or destroying individuals / populations, or reducing or degrading suitable habitat. Furthermore, it is assumed that the Douglas Fire Complex and associated mosaic of burn intensities affected Sensitive / S&M plant and fungi and populations across the landscape, regardless of ownership, by burning their respective habitats with varying intensities. Those effects are discussed in detail in the Cumulative Effects Section of Alternative 1.

The potential cumulative effect of the Douglas Complex wildfires coupled with the proposed project on ISSSP/S&M vascular, nonvascular, and fungi species would be the risk of impacting rare populations on 1669 acres during salvage implementation. However, the proposed harvest would occur on matrix lands, which are designated for timber production and harvest.

Across the Northwest Forest Plan area, approximately 14% of the 8 million acres of late-successional forest are designated as matrix lands and are available for harvest, while 86% are designated as late-successional reserves, congressionally reserved and administratively withdrawn areas, and Riparian Reserves. It is estimated that over the next 50 years, late-successional forest would develop at 2.5 times the rate of loss through stand-replacement fires and harvest (USDA/ USDI 2004c, 107-111). This reserve system spread across the landscape is intended to provide protection and development of late seral habitat for the protection and expansion of late-successional associated rare plants. Under the Northwest Forest Plan, at least 15% late seral (80-plus years old) conifer forest must be maintained in each 5th field watershed (USDA/USDI 1994, p. C-44).

Because of their rarity across the Pacific Northwest Forest Plan Area, it is unlikely ISSSSP Sensitive fungi are present in the DFCR salvage units. The risk is low that they would be impacted. The same holds true for Survey and Manage A & C fungi. It is protection of species at the landscape level that ensures Bureau Sensitive species will not trend toward listing and S&M species will persist. The assumption is made that protecting known sites (current and

future found) of these Sensitive and S&M (categories A-E) fungi, in addition to conducting large-scale inventories throughout the Pacific Northwest, will be adequate in ensuring that this project and future projects would not contribute to the need to list them (USDI 2004, 5-2) or jeopardize persistence (2001 S&M Standards and Guidelines p-3).

3.9.6 Alternative 3

Direct and Indirect Effects

There would be no additional direct or indirect effects to ISSSSP Sensitive or Survey and Manage vascular, nonvascular, or fungi species under Alternative 3 as compared to Alternative 2, because no additional physical disturbance would occur that could impact them.

Cumulative Effects

Alternative 3 would not contribute to additional cumulative effects to ISSSSP or S&M vascular, nonvascular, or fungi species compared to Alternative 2. The amount of mid-seral and late-successional forest on BLM-managed lands would remain unchanged.

3.10 Noxious Weeds

3.10.1 Methodology

GIS was utilized to query BLM-managed acreage and weed species reported within the project area. The project area boundary was determined, for this resource, to be upper ridgelines within three 10th field watersheds (Middle Cow, Grave Creek, and West Fork) encompassing the affected area.

3.10.2 Assumptions

BLM assumes that there are noxious weeds present on private lands within the project area, and that although industry is treating a subset of noxious weeds within selected areas, other private landowners are not.

3.10.3 Affected Environment: Pre- and Post-Fire Condition

Over the last 150 years activities such as motor vehicle traffic, recreational use, rural and urban development, timber harvest, road construction, and natural processes have introduced and transported noxious weeds into the Rogue Valley. Noxious weeds are defined as plants that are "considered by a governmental agency to be injurious to public health, agriculture, recreation, wildlife, or property" (ODA, 2013). Noxious weeds are spread by the wind and by seed via attachment to vehicles and vectors such as humans, animals, and birds, and are able to grow on suitable habitat - generally considered as any newly disturbed ground and/or an influx of light due to canopy removal.

Since the 1970's, a recognition that weeds were causing environmental damage resulted in the passage of State noxious weed laws, the Carson-Foley Act of 1968 – Plant Protection Act of 2000, and Presidential executive orders like Invasive Species E.O. 13112, which directs federal agencies to combat noxious weeds on federal lands. Additional direction is provided by the Medford District RMP, which states the district is to "contain and/or reduce noxious weed infestations on BLM-administered land...(p. 92)," and "...survey BLM-administered land for noxious weed infestations…(p. 93)." However, these activities are funding dependent.

The RMP directions for weed management are intended to be met at a landscape level; whether the direction is achieved is not intended to be measured at the site specific level nor with the implementation of each project. Thousands of acres of weed treatments have occurred on federal (and non-federal) lands over the last decade across the Medford District with the RMP-driven objective of containing or reducing – not eradicating - noxious weed populations (Budesa, 2006). In an effort to continue to contain and/or reduce noxious weeds on federal land, the BLM annually treats known weed populations within the GPRA.

In 2013, over 500 acres of BLM land in the Grants Pass RA were treated. However, fire activity precluded treatment of roadsides within the DFCR project area (which had been slated for treatment in 2013). Several roadsides within the DFCR project area have been treated for noxious weeds since 2010.

The Douglas Complex wildfires burned through 48,671 acres of timber in various seral stages within various land ownerships, the majority of which are located on steep, mountainous terrain. Of the 48,671 acres affected, 36,791 acres are within the Grants Pass RA and are the focus of this planning effort. The fires burned with different intensities – ranging from low to moderate to high intensity - throughout the affected acreage. Suppression efforts included initial attack and eventual mop-up by firefighting crews, constructing dozer lines/handlines/helispots, clearing openings to create safety zones, re-opening and brushing system roadsides, water drops via helicopters, and retardant drops via air tankers.

Suppression activities vary in probability of introducing noxious weeds into burned areas. If an undercarriage wash is available to clean equipment upon arrival to the incident, suppression activities involving heavy machinery such as excavators and bulldozers have a low probability of establishing new noxious weed populations, because the wash removes both invasive weed seeds and dirt potentially containing weed seeds prior to use on the fireline. In addition, fire rehabilitation activities (discussed in more detail below) involving spreading certified weed free straw and approved grass/forb seed mixes pose a low risk to spreading noxious weeds, as the straw is devoid of noxious weeds, and the approved seed mixes go through a stringent cleaning process.

Activities with a higher probability of introducing noxious weeds into burned areas include firefighting and retardant use. Seeds can be transported into units by firefighter crews, as seeds can stick to chaps, sox, bootlaces, etc. However, the amount of seed transported in this manner would be indistinguishable from seed transported into the burned area as a result of processes listed in Table 45. The use of retardant involves an increased risk of spreading noxious weeds, because retardant has many of the same ingredients as fertilizer and may provide noxious weeds an advantage in reestablishment. Noxious weeds are more apt to capitalize on the nitrogen and phosphorus contained in retardant, which native bunchgrasses and forbs are more prone to ignore because they have adapted to nutrient poor soil (Besaw et al, 2011). However, for a noxious weed to capitalize on the fertilizer-effect of retardant, a noxious weed population and/or seed source would have to be present within the immediate vicinity of the retardant drop site, or seed would have to be transported via wind current or animal vector. If no noxious weed populations are present, the risk is mitigated by the absence of seed. In addition, retardant is often used in areas experiencing intense fire activity; therefore, it is reasonable to assume that in many, if not all, of the areas retardant was used, there is a high likelihood the fire was burning at a very high

intensity, which would consume all green vegetation, including noxious weed populations, and associated seed beds, if present.

To mitigate potential new weed populations, soil disturbance, or other environmental consequence directly resulting from suppression activities, fire rehabilitation occurs upon containment of the wildfire. Rehab efforts are integral to most wildfire incidents, as the intent is to lessen or prevent natural processes – such as erosion, mass wasting, and noxious weed establishment, which capitalize on newly disturbed, open environments – from further exacerbating effects of ground disturbance created by suppression activities.

Rehabilitation efforts, including but not limited to waterbar installation, slash/root wad placement, and spreading certified weed-free straw and approved grass/forb seed mixes, were completed during fall 2013 and winter 2014.

Noxious weed surveys have not occurred since the Douglas Complex wildfires were contained in the summer of 2013. However, many units within the DFCR Project Area have been surveyed for noxious weeds since 2007. In addition, several historic sites located along roadsides within the project area have been treated (not all in the same year) annually since 2010. Documented sites within the project area include *Cytisus scoparius* (Scotch Broom), *Dipsacus fullonum* (teasel), *Hypericum perforatum* (St. John's wort), *Lathyrus latifolius* (perennial peavine), *Lythrum salicaria* (Purple loosestrife), *Rubus armeniacus* (Himalayan blackberry), *Senecio jacobaea* (Tansy ragwort) *Centaurea debeauxii* (Meadow knapweed), and *Centaurea solstitialis* (yellow starthistle). Documented sites within final proposed DFCR units include Scotchbroom, Himalayan blackberry, Tansy ragwort, Meadow knapweed, and Canada thistle. The total acreage of these final proposed acres harboring noxious weeds, prior to the fire, was 0.7 ac, or 0.04% of the project area units. It is estimated by the area botanist that some of these populations were burned and are no longer present.

Emergency Stabilization (ES) funds have been secured for noxious weed treatments within the DFCR project area, which will fund a BLM noxious weed crew – tasked with documenting and treating noxious weed sites within the fire perimeter - for one year. After one year, funding will be reassessed and could be authorized for up to two additional years. This funding and the associated task of locating and treating noxious weed populations within the Douglas Complex wildfire perimeter would occur regardless of implementation of salvage activities proposed in this document.

3.10.4 Alternative 1 – No Action

Direct and Indirect Effects

Under the No Action Alternative, noxious weeds within the project area would continue to spread into suitable habitat at an unknown rate. The rate at which noxious weeds spread is impossible to quantify, as it depends on a myriad of factors including, but not limited to, logging on private lands, motor vehicle traffic, recreational use, rural and urban development, and natural processes (Northwest Area Noxious Weed Control Program EIS, p. 59). Table 45 illustrates how each of these activities affects noxious weed dispersal.

Table 45: Factors Affecting the Determination of the Rate of Noxious Weed Spread

Activity	Role in Potential Noxious Weed Seed Dispersal
Private Land	Private lands host a perpetual source for noxious weed seed, which can be dispersed when seeds attach to tires, feet, fur, feathers or feces, or when natural processes such as wind and/or flooding events transport the seed from its source to another geographical vicinity.
Logging on Private Lands	Logging activity presents a key dispersal opportunity for noxious weed seeds per 1) attachment to tires/tracks of mechanized logging equipment, tires of log trucks, and various other logging-related substrates which subsequently transport the seed from its source to another geographic vicinity, 2) creation of openings for potential noxious weeds colonization and 3) a lack of PDFs – such as equipment/vehicle washing, etc. - which attempt to reduce the activity's spread of noxious weed seeds.
Motor Vehicle Traffic (including Log Trucks)	Roads on public land include public use, which results in a plethora of seed-dispersing activities occurring on a daily basis. Private landowners use public roads to haul logs, undertake recreational pursuits, and/or access their properties. This transportation often occurs along BLM-administered roads, which are situated within a checkerboarded ownership arrangement. How or when seed detachment occurs is a random event could take place within feet or miles from the work site/seed source, presenting a high likelihood of detachment on public lands.
Recreational Use	The public often recreates on BLM-managed public lands, and can spread seed from their residences to public land in a variety of ways such as attachment to vehicle tires, hikers' sox, shoes, or other clothing, the fur of domesticated animals, etc.
Rural and Urban Development	Rural development occurring within the checkerboard land arrangement often requires public landowners to acquire a Right-of-Way (ROW) from the BLM to legally access their parcel(s). These ROWs, or use of BLM-administered roads is often granted. Please refer to 'Motor Vehicle Traffic' and 'Private Land,' for clarification of how this affects the spread of noxious weeds from private to public lands.
Natural Processes	Wind, seasonal flooding, and migration patterns of birds/animals are a few natural processes that potentially spread noxious weeds, especially from private land to public land. Wind carries seeds, and deposits them at random intervals. High water caused by flooding reaches vegetation (often harboring a noxious weed component) growing on the banks of rivers/creeks/streams, and deposits seeds downstream.

The abovementioned activities would contribute to noxious weed spread, which could degrade some elements of the environment. To predict the rate of this degradation would be highly speculative, as the extent of weed expansion is dependent on so many factors that it is considered impossible to quantify. The degree of degradation would depend on the noxious weed species, as some, such as scotch broom and meadow knapweed, are more intrusive and/or have a higher tolerance to heat generated from wildfires than others.

Across the Grants Pass RA, the more aggressive species are prioritized and slated for treatment under Medford District's *Integrated Weed Management Plan and Environmental Assessment OR-110-98-14* under a separate project. However, the success of implementing the weed management plan would be temporary, as logging on non-federal lands, recreational use, rural and urban development, natural processes and vehicle traffic – coupled with the open, disturbed environment resulting from the Douglas Complex wildfires - will continue to spread noxious weed populations into the project area regardless of extraction activities proposed in this document.

<u>Cumulative Effects</u>

The following activities have been previously analyzed and approved projects would still occur within the project area in the near future; the Fire Resiliency Project, Wolf Pup Timber Sale, Regor Thin Timber Sale, McKnabe Timber Sale, Young Stand Management Project, Cow Creek

Federal Highway project, Medford Road Maintenance Categorical Exclusion, Discretionary and non-Discretionary road safety actions and ongoing Emergency Stabilization and Rehabilitation (ESR) projects. Below is a description of the activities that are occurring within this planning area under these projects.

Cumulative indirect effects of noxious weed spread include the potential degradation of wildlife habitat (Rice et. al. 1997, Harris and Cranston 1979), a decline in natural diversity (Forcella and Harvey 1983; Tyser and Key 1988; Williams 1997), and decline in water quality (Lacey et al. 1989); however, a very small amount of DFCR unit acreage (approx. 0.04% of unit acreage under Alternative 2) harbored noxious weeds prior to the fire, making it difficult to quantify any potential decline in ecosystem health related to existing noxious weed populations, or to quantify the potential decline in ecosystem health related to any additional noxious weed populations potentially established by the activities described in Table 45.

3.10.5 Alternative 2

Direct and Indirect Effects

In the short term (approximately 1-5 years), proposed activities within the project area – including road construction, landing construction, lop-and-scatter and/or piling and burning of activity fuels, roadside hazard tree removal, salvage logging and associated hauling – could result in spreading noxious weeds. However, the rate at which this potential spread would occur is unknown due to the indistinguishable causal effect of weed spread resulting from 1) the fire's effects (of increasing open, disturbed sites which weeds are prone to invade) versus weed spread as a result of salvage activities, and 2) other activities and factors listed in Table 45 on the spread of noxious weeds.

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 1669 acres,
- openings caused by landing construction, 6.59 miles of temporary route construction, and .32 miles of new road construction,
- increased vehicle traffic which could increase, or at least perpetuate, weed infestations along road systems via seed dispersal.

Openings and disturbance provide the greatest opportunity for the establishment of noxious weeds. In an effort to address the potential for project activities to increase the rate of spread of noxious weeds, Project Design Features (PDFs) have been included in the project to decrease the potential spread of weeds associated with the Proposed Action. Project Design Features include washing equipment prior to moving it on-site, mulching with certified weed-free straw, and seeding and/or planting newly created openings with native/approved vegetation to reduce the potential establishment of noxious weeds. These PDFs are widely accepted and utilized as Best Management Practices (BMPs) in noxious weed control strategies across the nation (Thompson, 2006). Table 46 delineates the PDFs and their expected implementation results.

Table 46: Project Design Features and Expected Implementation Results

Project Design Feature (PDF)	Result of Implementing PDF
Washing vehicles / equipment	Removes dirt that may contain viable noxious weed seeds, thereby reducing the potential for noxious weed spread
Operating vehicles/equipment during the dry season	Reduces the potential for viable noxious weed seed to be transported and dispersed via mud caked on the undercarriages/tires/tracks of logging equipment.
Seeding and/or planting newly created openings with native/approved seed.	Introduces native/approved vegetation to the site prior to noxious weed seed recruitment, allowing native/desireable plants an advantageous jump-start in reestablishment, which reduces the potential for noxious weed infestation.
Covering disturbed soil with certified weed-free straw	Reduces the potential for erosion and suppresses potential annual weed invasion by covering soil to prevent soil/seed contact needed for germination (UC-IPM, 2014). When combined with seeding with native/approved species, increases the potential for desireable vegetation to germinate and outcompete noxious weeds.

Implementing the suite of PDFs that reduce the potential spread of noxious weeds associated with the Proposed Action, and using native species for seeding/planting newly disturbed openings is expected to result in a similar potential of noxious weed expansion as associated with the No Action Alternative.

In the long term (5-100 years), tree canopies would eventually expand and reduce light levels, creating a less desirable growing site, thus discouraging weeds from growing and expanding within treated areas, because populations typically decline as the amount of light reaching the plants diminishes. Consequently, in the long term, remaining weed populations would be confined to the road prism and adjoining (private) disturbed land as canopy is re-established in treated areas over time.

The effect of implementing Alternative 2 could possibly result in the establishment of new noxious weed populations. Although the *immediate* potential for weed spread would be less with the No Action Alternative than for the Proposed Action, the potential for the spread of existing noxious weeds and the introduction of new species is considered similar for both alternatives, because of the inclusion and implementation of all PDFs in Alternative 2, and the fact that under the “No Action” Alternative, populations would continue to establish and spread due to seed transport by vehicular traffic, wildlife, and other natural dispersal methods listed in Table 45.

Indirect effects associated with noxious weed population enlargement are similar to those mentioned in the No Action Alternative, and are known to include, generally, declines in the palatability or abundance of wildlife forage (Rice et al., 1997), declines in native plant diversity (Forcella and Harvey, 1983; Tyser and Key, 1988; Williams, 1997), reductions in the aesthetic value of the landscape, encroachment upon rare plant populations and their habitats, potential reductions in soil stability and subsequent increases in erosion (Lacey et. al, 1989), and an overall decline of ecosystem health.

However, considering implementation of Alternative 2, there are three main reasons why potential weed establishment which may be caused by the Proposed Action is not expected to

result in a detectable effect to overall ecosystem health. First, when compared to the BLM managed land within the project area boundary (32,219.6 ac), a very small percentage of BLM managed land is proposed for salvage (1,669 ac, or 5.2% of the 32,219.6 BLM-managed acres within the project area). The proposed project acres experienced moderate to high intensity burns which left little to no green understory vegetation – including noxious weed populations. Therefore, it is reasonable to deduce that within the burn area, seed sources have been reduced from what they originally were pre-fire. Second, past survey efforts identified sites located in or adjacent to some proposed units, and some of these sites (depending on how aggressive the species is) have already received treatment under Medford District's *Integrated Weed Management Plan and Environmental Assessment OR-110-98-14,* which means that the acreage in the Project Area affected by noxious weeds is now even closer to 0% until ongoing activities listed in Table 45 would potentially re-introduce weeds into the Project Area. Third, as aforementioned, Project Design Features (PDFs) have been established to minimize the rate at which project activities might potentially spread noxious weed seed from outside/adjacent sources.

Cumulative Effects

In order to address the cumulative effects of the Proposed Action on the spread of noxious weeds, the condition of non-federal lands must be considered. However, there is limited available or existing data regarding noxious weed occurrence on local non-federal lands. Therefore, for purposes of this analysis, BLM assumes that 1) there is a perpetual source of noxious/invasive weeds on non-federal lands that can spread to federal lands, especially when the land ownership is checkerboarded, as within the Project Area, and 2) conversely, that noxious weeds are not established on these lands, and therefore there is a need to reduce the risk of spread of noxious weeds from the federal lands to the adjoining non-federal lands. Seeds are spread by the wind, by animal/avian vectors, natural events, and by human activities - in particular through soil attachment to vehicles. BLM's influence over these causes of the spread of noxious weeds is limited to those caused by human activities. Additional human disturbance and traffic would increase the potential for spreading noxious weed establishment, but regardless of human activity, spread of these weeds would continue through natural forces. Thus, the BLM cannot stop the spread of noxious weeds; it may only reduce the risk or rate of spread.

Given the unpredictable vectors for weed spread, such as the vehicle usage by private parties, wildlife behavior, and wind currents, it is not possible to quantify with any degree of confidence the rate of weed spread in the future, or even the degree by which that potential would be increased by the Proposed Action.

Foreseeable activities within the project area are listed under the No Action Alternative, and are expected to be similar to past and current activities: motor vehicle traffic, recreational use, rural and urban development, timber harvest, road construction, and firewood collection. These types of activities could result in new disturbed sites available for colonization by existing noxious weed populations, and they do offer the possibility of introduction of new noxious weed species to the project area under any alternative, including the No-Action Alternative. As stated above, there is no available or existing data concerning the rate of weed spread occurring on either federal or non-federal lands as a consequence of these specific types of activities. Also, as discussed above, there is no information on what, if any, increase in the rate of weed spread the Proposed Action would cause, and hence, it is not possible to quantify with any degree of

confidence what the incremental effect of the Proposed Action on the spread of noxious weeds would be when added to the existing rate of weed spread caused by past, present, and future actions.

PDFs exist to reduce the potential that the Proposed Action would contribute to the spread of weed seed and establishment of new populations. PDFs are not intended or expected to completely eliminate any possibility that the Proposed Action would contribute to the spread of weed seed and establishment of new populations; however, PDFs ensure that any incremental contribution of the Proposed Action to the spread of weeds, when added to the rate of weed spread caused by past, present, and future actions, would be so small as to be incapable of quantification or distinction from background levels.

As described above, PDFs for this project include washing vehicles/equipment, mulching openings with certified weed-free straw, and seeding/planting newly created openings with native vegetation. BLM, and other federal and non-federal organizations involved in combating noxious weed spread, routinely utilize these PDFs as noxious weed control strategies. These PDFs are widely accepted as Best Management Practices (BMPs), as they are inexpensive to implement, easily attainable, and accomplish the objective of reducing the potential of spreading noxious weeds as a result of project-oriented activities.

Data collection would not reduce the inherent speculation in predicting incremental effects of the proposed action on the spread of weeds because of (1) the unpredictable natural factors that largely determine whether weeds would spread after project activities, (2) the unlikelihood that future data collection would be able to detect or measure any difference between background rates of weed spread and the rate of weed spread as affected by the Proposed Action and correspondingly reduced by PDFs, and (3) the included PDFs that would reduce, if not eliminate, any project effects on the rate of weed spread that would make the already undetectable effects of the Proposed Action even more undetectable. Finally, further data collection on the rate of spread would not alter the PDF techniques already being applied to reduce that rate of spread. It cannot be over emphasized that under the “No Action” Alternative, noxious weeds are likely to spread over time regardless of whether or not the Douglas Fire Complex Recovery project occurs, and that rate would not be altered to any detectable degree by the Proposed Action.

3.10.6 Alternative 3

Direct and Indirect Effects

Alternative 3 proposes more helicopter logging and less ground-based logging as compared to Alternative 2. Although both Alternatives increase available light, thereby creating favorable growing environments for noxious weeds, Alt 3 involves less soil disturbance resulting from heavy machinery. Direct and indirect effects resulting from Alternative 3 would be similar to or less than those discussed in the Alternative 2 section.

Cumulative Effects

Cumulative effects resulting from Alternative 3 are similar in scope and do not exceed those listed under Alternative 2.

3.11 Recreation and Visual Resource Management

3.11.1 Methodology

The Douglas Fire Complex Area was evaluated in the following manner to provide an assessment of the visual characteristics and the effects of the proposed projects on these characteristics associated with the 2013 Douglas Fire Complex:

- Reviewed Resource Management Plan (RMP) and the associated Visual Resource Management designations and classes.

- A field review was conducted of the overall Douglas Fire Complex Planning Area. A visual resource assessment was made along routes to obtain an overall sense of the visual landscape characteristic. These routes are described as follows:

  - Grants Pass to the Grave Creek to Marial Back Country Byway.

  - Dutch Henry Road to the lower Cow Creek Back Country Byway.

  - The Cow Creek Back Country Byway north to the Bureau of Land Management (BLM) Medford District and Roseburg District boundary line.

  - The Back Country Byway, with observations at the BLM's Skull Creek Recreation Site, to Glendale, Oregon.

  - Portions of the 33-7-2.1 Road. and associated roads to points where observations could be made of the Planning Area.

  - Along the Lower Wolf Creek Road, west from Wolf Creek, Oregon, to a Project Unit located along the 33-7-36.1 Road.

- Visual Contrast Worksheets for three locations were completed that captured the general characteristics of the Project Area as they may apply to visual resource management.

The Visual Contrast Rating Worksheets were completed from Key Observation Points (KOPs) as a field tool to assess if the proposed activities would change the natural characteristic of the landscape.

<u>KOPs</u>

KOPs were selected to identify potential effects to the visual resources from viewpoints that captured the area that had been affected by the Douglas Fire Complex. These areas are classified as VRM III and IV. The points were selected within the fire area and along the Backcountry Byways.

These areas were assessed to see if views would be within moderate levels of change to the characteristic landscape for VRM III and IV. Also, the area that had been affected by the fire was assessed to see if any proposed forest management actions would allow for the retention of

the basic elements of form, line, color, texture, and scale found in the predominant natural features of the landscape.

As recommended in the BLM VRM manual 8341, the visual assessment locations considered the season of use, light conditions, angle of observation, number of viewers, and length of time the project is in view.

3.11.2 Affected Environment

Recreation

Recreation use across the Medford District BLM is described in the 1995 Medford District Resource Management Plan. BLM-administered lands fall into two recreation management categories: Special Recreation Management Areas (SRMA) and Extensive Recreation Management Areas (ERMA). ERMAs are all BLM administered lands not included in SRMAs identified in the 1995 RMP (PRMP/EIS, p. 3-71) that provide for dispersed recreation opportunities across the Medford District BLM. An estimated 799,243 acres provide for dispersed recreation use across the Medford District (PRMP/EIS p. 3-84). SRMAs are those areas identified with high concentrations of recreation use and developed facilities. The Douglas Fire Complex Planning Area is primarily an ERMA. The Planning Area contains Skull Creek Recreation Site as a potential recreation site, and the Cow Creek Road Back Country Byway as a new Back Country Byway (1995 RPM pgs. 64 and 65). The Skull Creek Recreation Site has been developed and the Cow Creek Road Back Country Byway is being managed multiple recreational opportunities. Recreation in the Planning Area is generally dispersed use, and includes but is not limited to; sightseeing, driving for pleasure, Off Highway Vehicle (OHV) activities, hunting, mushroom picking, target shooting, camping, and picnicking.

VRM

"Visual Resources are the land, water, vegetation, structures, and cultural modifications that make up the scenery of BLM-administered land." Medford District BLM-administered lands have been classified under a Visual Resource Management (VRM) Inventory Class system established by the BLM. The criteria used to determine VRM classes were scenery quality ratings, public sensitivity ratings and distance zone-seen area mapping criteria. Approximately 60 percent of the viewsheds in the Medford District RMP planning area have fragmented land ownership patterns with private lands dominating the viewed landscape (RMP/EIS p. 3-70).

Under the 1995 Medford District Resource Management Plan, RMP VRM Classes for the Douglas Fire Project are VRM III and IV. The management guidance for these VRM Classes (1995 RMP) are as follows:

VRM Class III objectives are to manage lands for moderate levels of change to the characteristic landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

VRM Class IV objectives are to manage lands for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities

through careful location, minimal disturbance, and should repeat the basic elements of form, line, color, and texture.

The affected environment that has VRM Class III objectives are the Back Country Byway along Cow Creek and treatment units north of Lower Wolf Creek Road as designated in the Resource Management Plan.

The area referred to as the "Douglas Fire Complex" was subjected to wildfire during the summer of 2013. The effects of the fire on the visual characteristics of the landscape changed the basics elements of form, line, color, and texture. The visual resource management classes for the area are Class III and IV. The project areas are occurring in an area that wildfire has burned through and changed the visual characteristics of the landscape from areas of unburned to mixed severity and high severity burned landscapes. The overall visual characteristics are dynamic due to salvage efforts on lands not administered by the BLM. The landscape characteristics reflect common forest harvesting practices before and after the fire.

3.11.3 Alternative 1 – No Action

Recreation

In the No Action Alternative, recreation opportunities would remain unchanged or potentially increase in the Project Area as it currently exists. Recreational activities such as sightseeing, driving for pleasure, OHV activities, hunting, target shooting, camping, and picnicking will continue. Changes that may affect recreational use would primarily be due to the change in the vegetation and road construction not related to BLM actions. Timber harvest, timber hauling, mushroom harvesting, OHV use, etc. would be the types of activities that occur. These and other activities are currently occurring within the Planning Area on both BLM and lands not administered by the BLM.

VRM

In the No Action Alternative visual characteristics of the landscape will be dependent on forest practices that occur on lands that are adjacent to the public lands managed by the BLM.

3.11.4 Alternative 2 and 3

Direct and Indirect Effects

Recreation opportunities would remain unchanged or potentially increase in the Planning Area as it currently exists. Recreational activities such as sightseeing, driving for pleasure, OHV activities, hunting, target shooting, camping, and picnicking will continue. Changes that may affect recreational use would primarily be due to the change in the vegetation and road construction due to the fire. Timber harvest, timber hauling, mushroom harvesting, OHV use, etc. are currently occurring within the Planning Area on both BLM and lands not managed by the BLM. The projects within the Planning Area that involve road maintenance, timber harvest and removal, or other improvements may increase some recreational vs. administrative conflicts over the short-term. These conflicts involve increases in log truck traffic, increased recreational vehicle traffic accessing the area for mushroom picking, OHV use, target shooting, sightseeing, etc. Temporary roads that are constructed and closed may be used to access areas that were not accessed before the projects. However, these activities are common in the area and are likely to be seen as common activities within the landscape. Project Actions such as the construction of roads should consider mitigation of any negative recreational uses. Roads, if burmed, may

become backdrops for target shooting. Roads that are ripped may continue to be used as OHV routes. While not the intended use of these roads the BLM will continue to monitor dispersed OHV use and mitigate the negative impacts of these activities Mitigation measures should include monitoring and education where needed. No changes in the use of the Back Country Byways or Skull Creek Campground have been identified.

VRM

The area where the Douglas Fire Complex occurred has been altered by the 2013 fire. The fire burned BLM and timber lands not managed by the BLM. Much of the lands not managed by the BLM have been salvage logged modifying the landscape characteristics. "Generally, viewsheds that are noticeably altered can be furthered modified with less adverse visual effect than viewsheds with little or no visible alteration." (PRMP/EIS p. 4-86)

In accordance with the 1995 RMP, a visual resource contrast rating system analysis was completed for the area affected within the Douglas Fire planning Area. The area was analyzed as described in Section 1.3 Methodology. Three Key Observation Points (KOPs) were selected as described below. The KOPs are in VRM III and IV management areas and were used to complete the visual resource contrast rating system analysis. Views of the landscape from these areas and travel routes are adjacent to and within the Douglas Fire Planning Area. The KOPs were analyzed to determine if any changes in the landscape would be evident to the casual observer traveling these routes or visiting these areas.

From travel routes and the KOPs, many of the Project units will not be visible due to terrain and vegetation. Project areas may be visible or partially visible traveling these routes, however, the project units are not inconsistent with the landscape or landscapes commonly observed in VRM Class III and IV designated areas.

KOP 1

Projects are occurring in an area that wildfire has burned through. The surrounding landscapes are in a dynamic period with forest practices occurring all around the proposed projects areas changing form, line, color, and texture. The landscape shows a great degree of variable color. The project units will not influence the complexity of the landscape or noticeably dominate or distract from it. Treated project areas should be indiscernible as they are viewed across the landscape.

KOP 2

This observation point was selected because it generously captured the characteristics of the landscape where the Douglas Fire occurred. The point is located off the 32-8-30.1 Road along the Grave Creek to Marial Back Country Byway. It looks towards the area where the Douglas Fire occurred and common forest practices are evident when viewing the landscape. Forest practices include harvesting of timber and providing access (road construction) to these areas. The proposed projects will not influence the complexity or overall characteristics of the landscape to a degree that will noticeably detract or dominate form, line, color or texture.

KOP 3

This observation point has been effected by fire, borders a road, and generally faces East. The area above the project site was consumed by fire. One residence is visible while driving along

the travel route. The project treatment should be indiscernible from forest practices and other natural landscape features in the adjacent landscape.

The field review determined the prescriptions for these units would result in a “weak” change in the contrast of color of the land, and a “weak” change in contrast in all four elements (form, line, color, texture) of vegetation. The surrounding landscape is varied and numerous examples of vegetative modification exist.

The silviculture prescriptions for these units will not significantly change the visual characteristic elements of form, line, color, texture, and scale found in the predominant features of the characteristic landscape.

Project sites will not dominate or detract from the visual resource or its characteristics as they are observed from points commonly visited by the users of public or adjacent lands. These areas include the Back Country Byway and the Skull Creek Recreation Site.

Cumulative Effects

Cumulative effects to recreation are considered within the spatial and temporal scale of this analysis as described as the Planning Area. Current or foreseeable projects that have effects to recreation in the Planning Area are as follows: Fire Resiliency Project, Rueben Hazardous Fuels Reduction Project, Emergency Stabilization and Rehabilitation (ESR) projects, Regon Thin, McKnabe Timber Sale, Young Stand Management Project, Boney Skull, Discretionary and Non-discretional road safety actions and the Wolf Pup Project. A description of these referred to projects is found in Appendix C.

All of the projects listed above would be implemented using standard Project Design Features which would greatly reduce the amount of access available from timber management and fuels reduction activities. All projects except the Young Stand Management and Pump Chance Maintenance Categorical Exclusions would require road work and maintenance actions that would result in increased access for OHV and recreational opportunities. These would be minimized through use of the standard and/or site specific PDFs that were required during the implementation of each of these projects.

No actions are expected to change the determination effects made related to the VRM assessment. The projects listed above meet the current VRM standards set forth by the 1995 RMP.

The use of the appropriate PDFs and BMPs would reduce the impacts of recreation (OHV, hunting, and camping) access by blocking and decommissioning the temporary routes constructed during the project. The 0.3 miles of permanent route construction will become part of the permanent transportation system and will be open for public use. Any increased access and use of sites within the project area will be short term (1-3 years) until vegetation occurs.

Chapter 4 Preparers, Consultation and Coordination

4.1 IDT Members

List of Preparers	Title	Responsibility
Colleen Dulin	Hydrologist	Hydrology/Water Resources/Soil Erosion
Erica Freeman	Engineer	Road Specification/Engineering
Ferris Fisher	Environmental Planner	NEPA Writer/Editor
Leah Schofield	Environmental Coordinator	NEPA Compliance/Project Lead
Marlin Pose	Wildlife Biologist	Wildlife
Jason Reilly	Wildlife Biologist	Wildlife
Merry Haydon	Archaeologist	Cultural Resources
Mike Crawford	Fish Biologist	Fisheries
Mike Main	Fuels Specialist	Fire and Fuels/Air Quality/Safety
Rachel Showalter	Botany	Plants/Noxious Weeds
Sarah Queen-Foster	Forester	Harvest Systems & Road Design
Sean Gordon	Silviculturist	Vegetation/Soil Compaction and Productivity

4.2 Consultation and Coordination

4.2.1 Northern Spotted Owl, Section 7 Consultation

The federally threatened northern spotted owl is the only threatened and endangered wildlife species in the Douglas Fire Recovery Project Area. The Medford District prepared a biological assessment for proposed actions included in the Douglas Fire Recovery Project and submitted it to the US Fish and Wildlife Service on April 29, 2014.

4.2.2 Tribal Coordination

The BLM sent the Douglas Fire Complex Recovery Project scoping letter to local federally recognized Tribes interested in Medford District Bureau of Land Management proposed projects, including the Cow Creek Band of Umpqua Tribe of Indians, Confederated Tribes of the Grand Ronde Community of Oregon, Confederated Tribes of Coos, Lower Umpqua & Siuslaw, Coquille Indian Tribe, and Confederated Tribes of the Siletz Indians of Oregon. In addition, the project has been discussed at formal government-to-government meetings held regularly with Tribes as well as between BLM archaeologists and tribal cultural resource program representatives.

The Tribes and SHPO have been involved with this project since the onset of the 2013 wildfire season. The Medford District Archaeologist contacted the Tribes and the Oregon State Historic Preservation Office (SHPO) to inform them of the fires and the status of cultural resource protection effects during fire suppression activities. The District Archaeologist continued to provide them weekly updates during fire suppression efforts and then every two weeks during post-fire work. Since then, the BLM has provided regular project updates in the form of phone calls, emails, meetings, and field trips. The BLM formed a consultation work group with local, interested federally recognized Tribes and SHPO to discuss protection measures and future management options for significant sites within the analysis area.

The BLM continues to work with individual tribal governments to further identify and address Native American concerns and traditional uses of lands administered by the BLM, including the fire recovery project.

4.2.3 State Historical Preservation Office Consultation

Archaeological reconnaissance surveys were completed for the Douglas Fire Recovery Project in accordance with the National Cultural Programmatic Agreement and the Protocol for Managing Cultural Resources on Lands Administered by the BLM in Oregon. The BLM has been working closely with the State Historic Preservation Office (SHPO) to develop protection measures to avoid or reduce effects to cultural resources. Site specific protection measures have been developed for each site in consultation with SHPO. The BLM submitted the Cultural Report to SHPO on April 7, 2014. Consultation with SHPO continues and will be completed prior to making a decision on the Douglas Fire Complex Recovery Project.

4.2.4 Federal, State & Local Agency Coordination

The following federal, state, and local agencies have received project information from the beginning of the project development.

Federal		
United States Senator Jeff Merkley	Congressman Peter Defazio	
United States Senator Ron Wyden	U.S. Fish & Wildlife Service	
State of Oregon		
Dept of Consumer & Business Services	Dept of Environmental Quality	Dept of Fish & Wildlife
State Historic Preservation Office	Dept of Forestry	Dept of State Lands
Oregon Occupational Safety and Health Administration		
Local		
Association of O&C Counties	The Mayor's Office, City of Glendale	
Umpqua Soil and Water Conservation District	Jackson County Board of Commissioners	
Douglas County		
Douglas County Board of Commissioners	Douglas County OSU Extension Service	Douglas County Public Works
Douglas County Weed Advisory Board	Douglas Forest Protective Association	Douglas Soil and Water Conservation District
Josephine County		
Josephine County Board of Commissioners	Josephine County Forestry Department	Josephine County Library
Josephine County Planning Department	Josephine County Public Works	

4.6 Cooperators

The BLM is the lead agency on the Douglas Fire Complex Recovery Project. Cooperating parties who participated during the IDT process are as follows:

Table 47: Cooperators on the Douglas Fire Complex Recovery Project

Cooperator	Representative Individual
Douglas County	Ron Yockim
Cow Creek Band of Umpqua Indians	Tim Vredenberg

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Appendix A – Compliance with Aquatic Conservation Strategy

Aquatic Conservation Strategy Assessment

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual

projects or small watersheds. (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, page B-9).

ACS Components:

Riparian Reserves (ACS Component #1)

The ROD/RMP (pg. 26) defined Riparian Reserves as widths equal to the height of two site potential trees on each side of fish-bearing streams and one site-potential tree on each side of perennial or intermittent non-fish bearing streams, wetlands greater than an acre, and constructed ponds and reservoirs. Riparian Reserve widths were developed using the Regional Ecosystem Office approved methodology in determining site potential tree heights. This methodology uses average site index computed from inventory plots throughout the fifth field watershed. The proposed project is located in three HUC 10 watersheds: Grave Creek, Middle Cow Creek, and West Fork Cow Creek. The site potential tree height for the Grave Creek, Middle Cow Creek, and West Fork Cow Creek is 200 feet, 195 feet, and 205 feet respectively.

Key Watersheds (ACS Component #2)

Key Watersheds were established "as refugia . . . for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species [ROD/RMP, pg. 22]." West Fork Cow Creek, 26,410 acres, is a Tier 1 Key Watershed. "Tier 1 watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species [ROD/RMP, pg. 22]." One of the key components of the management actions/direction for key watersheds is to reduce existing system and nonsystem road mileage outside roadless areas and no net increase in the amount of roads in key watersheds.

Watershed Analysis (ACS Component #3) and other pertinent information:

In developing the project, the Grave Creek, Middle Cow Creek, and West Fork Cow Creek Watershed Analyses was used to evaluate existing conditions, establish desired future conditions, and assist in the formulation of appropriate alternatives. The Grave Creek, Middle Cow Creek, and West Fork Cow Creek Watershed Analyses are available for public review at the Medford District office or can be viewed under "Plans & Projects" on the Medford District website at http://www.blm.gov/or/districts/medford/plans/inventas.php

Watershed Restoration (ACS Component #4)

Road surface improvement, route reconstruction, and route decommissioning of temporary spurs would occur under the proposed project. Typical road surface improvements would include placing rock aggregate that is resistant to erosion on natural surfaced roads, or additional aggregate surfacing on rocked roads. The objectives of decommissioning include: improve water quality by reducing short and long term road related sediment; restore hydrological processes modified by water routing and compaction; reduce road maintenance cost; and reduce impacts to aquatic and wildlife. The temporary route decommissioning (6.59 miles) outside Riparian Reserves would lessen the risk of sediment delivery into Riparian Reserves and Coho Critical Habitat since the routes would be used for salvage efforts and decommissioned during the dry season of a single calendar year.

Since 1995, numerous stream enhancement projects have been implemented in the Grave Creek Watershed. These include: riparian planting projects (2 acres), replacing seven culverts identified as barriers to fish passage, improving or decommissioning 15.2 miles of road to reduce road sediment impacts to aquatic systems, and 0.2 mile of instream restoration.

Since 1995, numerous stream enhancement projects have been implemented in the Middle Cow Creek Watershed (Middle Cow Creek Water Quality Restoration Plan, 2004). These include replacing 14 culverts identified as barriers to fish passage to open up access to additional habitat, improving or decommissioning 25 miles of road to reduce road sediment impacts to aquatic systems, and implementing 1.7 miles of instream restoration. Since 2009, the GPRA has focused on large woody debris projects within the watershed to improve threatened Oregon Coast Coho habitat. Over seven miles of habitat within fourteen streams have been restored under the watershed restoration component to increase pool habitat and complexity.

West Fork Cow Creek has seen numerous watershed improvement projects (West Fork Cow Creek Water Quality Restoration Plan, 2004). Restoration included replacing three culverts identified as barriers to fish passage to open up access to additional habitat, improving or decommissioning 12 miles of road to reduce road sediment impacts to aquatic systems.

Range of Natural Variability within the Watershed:

Based on the dynamic, disturbance-based nature of aquatic systems in the Pacific Northwest, the range of natural variability at the site scale would range from 0-100 percent of potential for any given aquatic habitat parameter over time. Therefore, a more meaningful measure of natural variability is assessed at scales equal to or greater than the watershed scale. At this scale, spatial and temporal trends in aquatic habitat condition can be observed and evaluated over larger areas, and important cause/effect relationships can be more accurately determined. Natural disturbance events to aquatic systems in the Pacific Northwest include wildfires, floods, windstorms, and landslides. The fire return intervals for each HUC 10 are as follows:

> "Historic fire frequency in this area can be as low as 15-30 year intervals for ponderosa pine and mixed conifer types (Agee, 1993). Most of the areas in this watershed have not had any fire events in the last 70 years, and often much longer than that, resulting in stands that have an abnormally high fire hazard. Vegetation type, soils, and aspect have an important effect on the magnitude of this hazard [Grave Creek Watershed Analysis, 1999]".
> "Fire has also greatly affected the vegetation patterns in the watershed. Frequent, low intensity fires were the rule in this area, caused by both lightning and Native American ignitions. There have been large, stand-replacement fires, most recently in the Stevens Creek and Whitehorse drainages. Effective fire suppression has allowed many areas to develop a higher level of stocking of small Douglas fir, hardwoods or brush. This shift in plant species composition and density in some areas has generated concerns for long term forest health. The high density of small trees and brush may result in large, intense fires or widespread disease or insect damage. The extent and locations of these conditions are not well documented, but are known to exist in the Dads Creek area and elsewhere [Middle Cow Creek Watershed Analysis, 1999]."
> "The fire frequency for southern Oregon has been reported as from "less than 3 years to more than 50 years" and from "20 to 200 years" (Reforestation Practices in southern Oregon- 1992). A forest survey done in 1900 observed, "There is not a single forested township either on the west side or the east side of the range in which the timber isn't more or less fire marked" (Leiberg 1900). While it is not possible to determine the exact fire frequency it is likely that the drier, rockier sites, dominated by the Douglas-fir/tanoak/canyon live oak sub-group, had fire frequencies of less than 50 years. The higher rainfall areas in the western part of the watershed, in the mixed conifer and Douglas- fir/tanoak main groupings, likely had fire frequencies of at least 50 - 80 years, if not substantially longer [West Fork Cow Creek Watershed Analysis, 1997]."

The project area is located within the Klamath geomorphic province and soils in the Middle Cow Creek Watersheds are primarily derived from metasedimentary rock types.

Timber harvesting and road construction over the past 50 years have increased the frequency and distribution of landslides above natural levels in the Grave Creek, Middle Cow Creek, and West Fork Cow Creek Watersheds. Since implementation of the NWFP, there is a downward trend in landslide incidence that is associated with improved management practices such as better road building and timber harvest techniques, road maintenance, and implementation of Riparian Reserves on BLM managed lands. On BLM-managed land, future landslides, occurring mostly during large storm events, are expected to deliver large wood and rock fragments to lower-gradient streams. This is a direct result of Riparian Reserve protection and the recognition of their role as critical source areas for large wood and sediment to downstream habitats. As a result, these events would more closely resemble landslides within relatively unmanaged forests. These disturbance events are the major natural sources of sediment and wood to a stream system and are very episodic in nature.

Map 8, within the Middle Cow Creek Watershed Analysis, shows areas that are potential sources of sedimentation resulting from erosion. Surface disturbance by road building and tractor logging as well as natural processes, such as landslides and mantle creep, pose a potential hazard of sedimentation. Within West Fork Cow Creek, a small portion of the metavolcanic zone contains serpentine-derived soils. These soils are typically rocky, shallow, and inhibit most plant growth.

Due to the dynamic nature of these disturbance events, stream channel conditions vary based on the time since the last disturbance event. This results in a wide range of aquatic habitat conditions at the site level. Site level habitat conditions can be summarized by Oregon Department of Fish and Wildlife (ODFW) habitat surveys. ODFW Survey data exist for many of the Grave Creek, Middle Cow Creek, and West Fork Cow Creek Fifth Field streams (Grave Creek Watershed Analysis, 1999, Middle Cow Creek, 1999, and West Fork Cow Creek 1997).

Planning Area Habitat Summary

Surveys within the planning area have reported on habitat characteristics (See Table X-X in the Fish/Aquatics section). Survey results indicate approximately 14.1 percent fines and 36.9 percent gravel in riffle units. These levels would receive ratings of adequate and desirable for sediment using the ODFW Habitat Benchmark rating system. Pool habitat components accounted for 29.1 percent of overall habitat units and were rated as adequate. Surveyors counted an average of 9.8 pieces of wood and 4.5 cubic meters of wood per 100 meters of stream. Both of these levels received ratings of undesirable. Many tributaries within the Grave Creek, Middle Cow Creek, and West Fork Cow Creek Watershed have had large wood removed from streams as a result of historic placer mining, water diversions, or forest management practices (Grave Creek and Middle Cow Creek WA, 1999).

ACS Summary:

Based upon the information presented above, the proposed action would meet ACS goals and objectives at the site and watershed scales. Therefore, this action is consistent with the ACS goals and its objectives at both the site and watershed scales.

Table 48: Individual Aquatic Conservation Strategy Objective Assessment

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
	Scale Description: Units identified in this project are located in twenty-eight seventh-field drainages distributed throughout the three watersheds totaling roughly 63,515 acres in size. The BLM manages approximately 32,219 acres in these drainages (51%). Units (1,669 acres) proposed for treatment represent a maximum of 3% of the drainages (depending on the alternative), and 5% of the BLM-managed lands in the drainages.	Scale Description: This project is located in the Grave Creek, Middle Cow Creek, and West Fork Cow Creek HUC 10 watersheds. These watersheds are roughly 273,236 acres in size. The BLM manages approximately 124,785 acres in these watersheds (46%). Salvage treatments (1,669 acres) represent less than 1% of the total watershed area, and less than 1.5% of the BLM-managed lands in the watershed.
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.	Within the drainages, Riparian Reserves would be not treated. Riparian Reserve established along streams would maintain existing canopy coverage and structure subsequent stream temperature regimes. By not harvesting timber in Riparian Reserves, there would be no disturbance to stream channels and stream banks. Mitigation measures such as contour falling at the outer edge of the Riparian Reserve would adequately arrest any sediment from entering active waterways.	Absent of any proposed action in the Riparian Reserves and/or effects to the aquatic environment, there would similarly be no effect at the watershed scale.
2. Maintain and restore spatial and temporal connectivity within and between watersheds	Within the drainage, the proposed project would have no influence on aquatic connectivity since actions will not be entering Riparian Reserves. Therefore this treatment would maintain the existing connectivity condition at the site scale.	Absent of any proposed action in the Riparian Reserves and/or effects to the aquatic environment, there would similarly be no effect at the watershed scale.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations	Riparian Reserves established on all streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks. Mitigation measures such as contour falling, occurring below treatment units and outside the Riparian Reserve, would adequately arrest any sediment from entering active waterways. Therefore, these treatments would maintain the physical integrity of the aquatic system at the site scale.	Absent of any proposed action in the Riparian Reserves and/or effects to the aquatic environment, there would similarly be no effect at the watershed scale.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
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 proposed actions will take place within Riparian Reserve. Remaining canopy, post fire and burn severity dependent, will not be influenced by the proposed project. Riparian Reserve distances and mitigation measures such as contour falling adjacent to proposed project would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to be filtered out before reaching active waterways. Increases of stream turbidity are not expected as a result of this action. Therefore, this treatment would maintain the existing water quality at the site scale.	Absent of any proposed action in the Riparian Reserves and/or effects to the aquatic environment, there would similarly be no effect at the watershed scale.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	As mentioned above, Riparian Reserve established on streams in or adjacent to proposed project would prevent disturbance to stream channels and stream banks. Upslope mitigation will effectively eliminate soil creep, allowing any management related sediment transported by overland flow to settle out before reaching active waterways. Therefore, this project would maintain the existing sediment regime. No road construction within the Riparian Reserves will occur in the proposed action. All temporary spurs, outside of Riparian Reserves, will be decommissioned after use. Due to BMPs/PDFS, sediment is not expected to enter streams.	Absent of any proposed action in the Riparian Reserves and/or effects to the aquatic environment, there would similarly be no effect at the watershed scale.
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.	Treatments would not reduce canopy closure to an extent that could enhance peak flows. Where subwatersheds are already at risk for peak flow enhancement, the proposed action will not reduce residual, intact canopy in patches >0.25acres (EA, pg. 23). Intermittent seeps and springs would receive a 25 foot buffer. All buffered streams, seeps, and wetlands have been field verified. In addition, new road construction (0.32 mile) would not extend the drainage network or contribute to a potential increase in peak flow because the new roads would be located on ridge tops or stable side slopes with adequate cross drain structures. Therefore, this treatment would maintain stream flows within the range of natural variability at the site scale.	Where subwatersheds are already at risk for peak flow enhancement, the proposed project will not exacerbate existing conditions by removing additional canopy cover. Where subwatersheds are not at risk for peak flow enhancement, the proposed project will not increase the risk to a point of enhancement. Therefore, at the larger watershed scale, this treatment would also maintain stream flows within the range of natural variability.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and woodlands.	As discussed in #6 above, this project would maintain stream flows within the range of natural variability at the site scale. Therefore, it would also maintain stream interactions with the floodplain and respective water tables at the site scale.	At the watershed scale, this project would also maintain stream interactions with the floodplain and respective water tables within the range of natural variability.
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.	Within the drainages, Riparian Reserves would be not treated. Riparian Reserves established along streams would maintain structural diversity of plant communities. Therefore this treatment would serve to maintain plant species composition and structural diversity at the site scale.	Absent of any proposed action in the Riparian Reserves and/or effects to the structural diversity of plant communities, there would similarly be no effect at the watershed scale.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	As mentioned previously, one of the objectives of this project is to maintain riparian stand conditions within the project area. Implementation of BMPs and PDFs will help maintain adequate habitat to support riparian-dependent species at the site scale.	Absent of any proposed action in the Riparian Reserves and/or effects to the aquatic environment, there would similarly be no effect at the watershed scale.

Appendix B – Definitions

Abiotic: Nonliving basic elements and compounds of the environment.

Activity Fuels: Slash created from forest management activities timber and vegetative cutting. To reduce the fuel loading, activity slash within units may be machine or hand pile/burned, chipped, or lopped and scattered based on a post-harvest assessment of fuel loading.

Biological Assessment (BA) - Document prepared by or under the direction of BLM concerning listed and proposed species and designated and proposed critical habitat that may be present in a project area(s) and contains the BLM's determination of potential effects of the action on such species and habitat. Biological assessments are required for formal consultations and conferences on "major construction projects." They are recommended for all formal consultations and formal conferences and many informal consultations where a written evaluation of the effects of an action on listed or proposed species and on designated or proposed critical habitat is needed.

Burn Severity: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

Low burn severity – Litter is charred to partially consumed; upper duff layer may be charred but the duff is not altered over the entire depth; surface appears black; soil is not visibly altered; woody debris is partially burned; logs are scorched or blackened but not charred; foliage and smaller twigs are partially to completely consumed; branches are mostly intact.

Moderate burn severity – Litter is mostly to entirely consumed, leaving coarse, light-colored ash (ash soon disappears leaving mineral soil); duff is deeply charred, but not visibly altered; woody debris is mostly consumed; logs are deeply charred and burned out stump holes are evident; foliage twigs and small stems are consumed; some branches are still present.

High burn severity – Litter and duff are completely consumed, leaving fine white ash (ash disappears leaving mineral soil); mineral soil is charred and/or visibly altered, often reddish; sound logs are deeply charred and rotten logs are completely consumed; all plant parts are consumed, leaving some or no major stems or trunks, any left are deeply charred.

Canopy Base Height: The average height from the ground to a forest stand's canopy bottom. Specifically, it is the lowest height in a stand at which there is a sufficient amount of forest canopy fuel to carry fire vertically into the canopy.

Cable yarding - Removes logs by use of wire cable(s) and tower for full or partial suspension log removal from harvest units.

Canopy Cover: Commonly expressed as a percentage of total ground area; for example, at 50 percent canopy cover, half of the total ground area is covered by the vertical projection of tree crowns (Scott, J. H. 2007).

Coarse Woody Debris - Portion of trees that have fallen or been cut and left in the woods. Usually refers to pieces at least 20 inches in diameter.

Compaction - Refers to soil becoming consolidated by the effects of surface pressure often from heavy machinery or vehicle and pedestrian traffic.

Critical Habitat Unit - Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species. For further information see (Federal Register (57):1796-1838) for the 1992 CHU designation and Federal Register (73): 47326-47522 for the 2008 CHU designation.

Crown scorch: A measure of the proportion of foliage that has been killed by the fire relative to the entire amount of foliage present before the burn (SWOFIDSC 2001).

Decay Class: Any of five stages of deterioration of logs in the forest. Stages range from essentially sound (decay class 1) to almost total decomposition (decay class 5).

Diameter Breast Height (DBH): Tree diameter, measured 4.5 feet above ground on the uphill side of the tree.

Dry Condition: Hauling on hydrologically connected natural surface or rocked roads would only be allowed during dry conditions as described any time where these following conditions are not present: water is flowing in the ditchlines of hydrologically connected natural surface or rocked roads, surface displacement such as rutting or ribbons; continuous mud splash or tire slide; fines being pumped through road surfacing from the subgrade and resulting in a layer of surface sludge; road drainage causing a visible increase in stream turbidities, or any condition that would result in water being chronically routed into tire tracks or away from designed road drainage during precipitation events. Hauling on natural surface or rocked roads would not resume for a minimum of 48 hours following any storm event that results in ½ inch or more precipitation within a 24 hour period, and until road surface is sufficiently dry to prevent any of the above conditions from reoccurring

Early Seral Condition (Early Successional Stage): A stage of development of an ecosystem from a disturbed, relatively un-vegetated state, to a plant community that is up to about 30 years old. Stand structure is seedling and sapling size shrubs and trees.

Early Seral Stage: The first of five seral stages in a series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage; the period from disturbance to the time when crowns close and conifers or hardwoods dominate the site. Under the current forest management regime, the duration is approximately 0 to 10 years. This stage may be dominated by grasses and forbs or by sprouting brush or hardwoods. Conifers develop slowly at first and gradually replace grasses, forbs, or brush as the dominant vegetation. Forage may be present; hiding or thermal cover may not be present except in rapidly sprouting brush communities (USDI 1995, 112).

Erosion - Detachment or movement of soil or rock fragments by water, wind, ice, or gravity. Accelerated erosion is more rapid than normal, natural, or geologic erosion, primarily resulting from the activities of people, animals, or natural catastrophes.

Evolutionary Significant Unit - The National Marine Fisheries Service (NMFS, NOAA Fisheries) definition is as follows: a population must satisfy two criteria to be considered an ESU: (1) it must be substantially reproductively isolated from other conspecific population units; and (2) it must represent an important component in the evolutionary legacy of a species. 69 Fed. Reg. at 31355

Fine Fuels: Fast-drying dead or live fuels, generally characterized by a comparatively high surface area-to volume ratio, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry.

Fire Behavior: The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire duration: The length of time that combustion occurs at a given point. Fire duration relates closely to downward heating and fire effects below the fuel surface as well as heating of tree boles above the surface.

Fire Fighter Safety: a work environment where foreseeable risks have been minimized through the mitigation of known hazards associated with wildfire suppression.

Fire Intensity: The measure of the amount of heat generated or energy released by an active fire; it can be measured or mathematically calculated, and is usually expressed as heat per unit area of flaming front or simply as flame length. Fire Intensity is usually what kills or damages the above ground portion of live vegetation.

Fire-Injured Tree: Portion of the tree crown is scorched. Crown is not entirely scorched and retains green needles. Also includes trees with cambium damage, bark char, and potentially girdled or partly girdled by fire.

Fire-Killed Tree: 100% of the crown is scorched with brown needles or the crown is black with no needles.

Fire Regime: Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured, such as fire return interval.

Fire Return Interval: Number of years between fires at a specified location.

Fire Risk: The probability or chance of fire starting. A rating of high, moderate or low is assigned based on the concentration and/or frequency of human presence and on historic lighting occurrence.

Fire Severity: A qualitative assessment indicates the degree of environmental change caused by fire. Is the effect of a fire on ecosystem properties, usually described by the degree of soil heating or mortality of vegetation. Fire Intensity + Fire Duration = Fire Severity

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity (NWCG 2012). Wildfires with flame lengths less than 4 feet can be controlled by hand. Flame lengths greater than 4 are considered too intense to attack by hand and should be controlled with mechanical equipment.

Fuels: Comprised of living and dead vegetation that can be ignited. It is often classified as dead or alive and as natural fuels or activity fuels (resulting from human actions). Fuels components refer to such items as downed dead woody material by various size classes, litter, duff, herbaceous vegetation, live foliage etc.

Fuel Bed Depth: The average height of surface fuel that is contained in the combustion zone of a spreading fire front.

Fuel Hazard: A fuel complex defined by kind, arrangement, volume, condition, and location that presents a threat of ignition and resistance-to-control.

Fuel Loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually expressed as dry weight (i.e., tons per acre, pounds per acre, or kilograms per square meter).

Fuel Models: A set of surface fuel bed characteristics (load and surface-area-to-volume-ratio by size class, heat content, fuel moisture and depth) organized for input to a fire model (Anderson 1982, Scott and Burgan 2005).

Fuel Moisture (Fuel Moisture Content): The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Hand Pile/Burning: Prescribed fire used to remove man-made or natural collections of concentrated woody debris.

Ladder Fuels: Flammable vegetation (live and dead) that forms a continuum that can carry fire from the surface fuels to the canopies of trees. Consist of small trees and shrubs, needles, vines, mosses, and any other combustible material located between the top of the surface fuels and the crowns of the trees.

Intermittent Stream - Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Lop and Scatter: Scattering of tree limbs and small diameter logs to facilitate its decomposition.

Matrix - Designated under the 1995 Medford District Resource Management Plan, Matrix lands were identified as areas where timber harvesting would occur and comprise approximately 20% of the total 24 million acres of federal lands identified in the Northwest Forest Plan. There are additional management restrictions, such as for Riparian Reserves that overlap Matrix lands and retaining at least 15% of the watershed in late successional forest patches. The desired condition in Matrix lands on the Medford Bureau of Land Management is a patchwork of different aged forests created by thinning younger forest stands to assure high levels of volume production and regeneration harvesting older forest stands on an approximate 100 year rotation length.

Mixed Severity Fire (Mixed Severity Burn): A mixed severity fire exhibits a wide range of effects on the dominant vegetation. Some areas of a mixed severity fire exhibit low fire severity, having experienced little damage to the overstory vegetation; other areas exhibit moderate fire severity, having experienced considerable overstory mortality but not complete replacement; and yet other areas exhibit high severity, having experienced complete overstory mortality (Scott, J. H. 2007).

National Environmental Policy Act of 1969 (NEPA) - This law requires the preparation of environmental impact statements for every major Federal Action which causes a significant effect on the quality of the human environment.

No-Action Alternative - The No-Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The No-Action alternative provides a baseline for

estimating the effects of other alternatives. When a proposed activity is being evaluated, the No-Action alternative discusses conditions under which current management direction would continue unchanged.

Non-attainment - Failure of a geographical area to attain or maintain compliance with ambient air quality standards.

Noxious Weeds - Rapidly spreading plants that can cause a variety of major ecological or economic impacts to both agriculture and wildland.

Peak Flow - The highest amount of stream or river flow occurring in a year or from a single storm event.

Percent Crown Scorch: A measure of the proportion of foliage volume 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) (SWOFIDSC 2001).

Perennial Streams - Streams that flow continuously throughout the year.

Rate of Spread (ROS) is the speed the fire travels through the surface fuels. The ROS is the spread rate of the head of the fire spreading uphill with the wind blowing straight uphill. The ROS predictions use the Rothermal (1972) surface spread model, which assumes the weather, topography and fuels remain uniform for an elapsed period of time. Measured in chains/acre. One chain equals 66 feet.

Resistance-to-Control: An estimate of the suppression force required for controlling a unit of fire perimeter.

Salvage: The removal of trees either killed or severely injured from a disturbance event such as fire, disease, insect infestation, or wind.

Slash: The residue left on the ground after forest management activities or left after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

Sediment - Any material carried in suspension by water, which would ultimately settle to the bottom. Sediment has two main sources: from the water channel itself and from disturbed upland sites.

Snag - A standing dead tree usually without merchantable value for timber products, but having characteristics of benefit to cavity nesting wildlife species.

Soil Compaction - An increase in bulk density (weight per unit volume) and a decrease in soil porosity resulting from applied loads, vibration, or pressure.

Soil Productivity - Capacity or suitability of a soil for establishment and growth of a specified crop or plant species, primarily through nutrient availability.

Surface Fuels: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants (NWCG 2012).

Succession: A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax. An example is the development of series of plant communities (called seral stages) following a major disturbance (USDI 1995, 115).

Timber Productivity Capability Classification (TPCC) - Classification of BLM lands based on the physical and biological capability of the site to support and produce forest products on a sustained yield basis.

Threatened Species - Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range, and which has been designated in the Federal Register as such. In addition, some states have declared certain species in their jurisdiction as threatened or endangered.

Tree Fragmentation: The breakage and falling of stems, branches, limbs, and treetops of burned trees onto the forest floor; strongly associated with larger snags.

Wildfire: Any wildfire not designated and managed as a priscribed fire with an approved prescription.

Wolf Tree: A large older tree with heavy branching or poor form

Appendix C – Cumulative projects for consideration

An assessment was performed to determine which projects would be considered in the cumulative effects analysis for the project. Each resource analysis determined if any of the projects below would, when considering the effects Alternatives 1, 2 or 3 would have a cumulative effect. Cumulative effects resulting from the alternatives proposed in this project, if any are described in the resource sub-sections of Chapter 3.

Medford District BLM/Grants Pass Resource Area
Douglas Fire Complex Recovery Cumulative Effects Project List

Project Name	Past/Present/Foreseen (or year?)	Description of Action (ie. 500 acres Matrix Thin, 1 mile temp rd)
Farout Timber Sale	Implement in 2014. Outside Douglas Complex Project Planning Area.	N/A (see column at left)
Mini Mule Timber Sale	Past. Outside of Douglas Complex Project Planning Area.	N/A (see column at left)
Elk Valley Road Maintenance Project (Daylighting)	Past. Outside of Douglas Complex Project Planning Area.	N/A (see column at left)
Boney Skull Project	Timber sale dropped as a project so EA never completed, I believe due to WOPR DTMA. Fuels work done through a 2007 CX (before the authority was internally withdrawn). Past action.	N/A (see column at left)
Fire Resiliency Project	Active stewardship now. Present Action. Rattlesnake Project is mostly inside the Douglas Complex Project Planning Area, rest of activities outside this area.	Rattlesnake acres are 219 acres of understory thinning and 181 acres of density management. LUA =Matrix & RR
Susan's Dad	Not foreseeable until a Proposed Action provided to the public.	N/A (see column at left)
Rueben Hazardous Fuels Reduction Project	Past, except maybe some under burning would occur in the future. Past action primarily. Within Douglas Complex Project Planning Area.	DR signed in 2010 for 1,076 acres of hazardous fuel reduction. LUA = Matrix & RR
Wolf Pup Project	Active now. Present action. Within Douglas Complex Project Planning Area.	218 acres of Commercial Thin, 4 acres of daylighting road maintenance, 0.04 miles of temporary route construction, and 0.19 miles of road renovation/improvements. LUA = Matrix and RR

		Post fire- green trees within the sale are being harvested. Part of the sale that incurred mortality is being analyzed under Douglas Fire Recovery.
Regor Thin Timber Sale	Implement in 2014. Present or foreseeable action.	Most of the two units of TS within Douglas Complex Project Planning Area which is 70 acres of Commercial Thin and 0.48 miles of temp route construction. LUA = Matrix & RR
London Peak Timber Sale	Under protest. Foreseeable action. Outside Douglas Complex Project Planning Area.	N/A (see column at left)
McKnabe Timber Sale	Done with logging, activity slash may not be treated yet. Present action.	Most of the two units of the McKnabe TS within Douglas Complex Project Planning Area which is 13 acres of Commercial Thin and 45 acres of Commercial Density Management. LUA = Matrix & RR
Boomerang Timber Sale	Not implemented yet – there may be complications (potentially foreseeable). Outside Douglas Complex Project Planning Area.	N/A (see column at left)
Stratton Brimstone CX	Foreseeable action. Outside Douglas Complex Project Planning Area.	
Young Stand Management Project (FY11-15) CX	Past and active and foreseeable	CX/DR does not note an acreage limit, nor does the CX category. Approximately 5,000-7,000 acres of planting will occur on within the Douglas Fire perimeter on Medford District. LUA =Matrix, RR, LSR, ACEC/RNA 2,020 acres of planting are proposed to occur on the Roseburg BLM District.
Major federal highway projects (Medford/Roseburg)	Foreseeable	Approximately 11 miles on Cow Creek highway are proposed for road improvement (Medford). Approximately 19 miles on Roseburg District.
Grants Pass Programmatic Hazardous Fuel Reduction EA	Past, outside Douglas Complex Project Planning Area.	N/A (see column at left)
Roseburg District Rabbit Mountain LSR	Foreseeable. Planning area is on Roseburg BLM (Rabbit Mountain)	-9.5 miles of roadside safetying (~487 acres) -Directional felling hazard trees into/towards streams (all classes) within 1 site potential tree buffer - Plant ~681 acres of plantations (mod/high fire severity)on

		approximately 300 acres ~ inserting logs into Middle Creek
Pump Chance Maintenance CX	Past and Foreseeable. Areas identified in right column are within Douglas Complex Project Planning Area.	Maintenance action without acreage tied to it…. -Bonnie Riffle (to be active) -Skull Creek (to be active) -Dutch Henry (past) -Bear Creek Pump Chance (past)
ESR Projects	Past present and foreseen	Noxious weed treatment; contour falling on steep slopes; ditch cleaning; road repair work; hazard tree removal; culvert replacement. Road maintenance activities are proposed on routes outside of haul routes identified in Douglas Fire Recovery project.
Elk Valley Daylighting CX	Past. Outside Douglas Complex Project Planning Area.	N/A (see column at left)
Discretionary and Non-discretional road safety actions	Current and Reasonably foreseeable. Along roads within the Douglas Fire Complex perimeter	Approximately 400 acres along 42 miles of road could be assessed for hazard tree removal within the fire perimeter as per the *OSHA Field Guide Removal for Danger Tree Identification and Response*. These actions may occur in Matrix, Riparian Reserves, 100 acre NSO activity centers, nest patches, etc. Retention of snags and course wood could be applied where conditions provide for safety. Assessment of Discretionary on Non-Discretionary actions is found in the project record.
Forest Management activities on adjacent private industrial forest land.	Current and Reasonably foreseeable	Industry forest and County lands are currently planning to reforest approximately 15,030 acres.

Appendix D – Review of Elements of the Environment Based on Authorities and Management Direction.

The National Environmental Policy Act (NEPA) is one of many authorities that contain procedural requirements that pertain to treatment of elements of the environment when the BLM is considering a Federal action. The following table summarizes the results of the interdisciplinary team review of elements of the environment.

Elements of the Environment/Authority	Remarks/Effects
Floodplains (E.O. 11988, as amended, Floodplain Management, 5/24/77)	This project is in compliance with this direction because the proposed treatments would not change of affect floodplain functions.
Wetlands (E.O. 11990 Protection of Wetlands 5/24/77) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because no wetlands are within the proposed.
Native American Religious Concerns (American Indian Religious Freedom Act of 1978 (42 USC 1996)	This project is in compliance with this direction because no Native American religious concerns were identified during the scoping period.
Environmental Justice (E.O. 12898 "Environmental Justice" February 11, 1994)	This project is incompliance with this direction because this project would have no effect on low income populations.
Hazardous or Solid Wastes (Resource Conservation and Recovery Act 1976 (43 USC 6901 et seq.)) Comprehensive Environmental Response Compensation, and Liability Act of 1980, as amended (43 USC 9615)	This project would have no effect on this element because no hazardous or solid waste would be stored or disposed of on BLM lands as a result of this project.
Forests and Rangelands (Healthy Forests Restoration act 2003 (P.L. 108-148))	This project is in compliance with this direction because the proposed treatments would decrease the quantity of standing dead timber and reduce the likelihood of insect epidemics which will help restore forests to healthy functioning condition.
Energy (Executive Order 13212)	This project is in compliance with this direction because this project would have no effect on energy development, production, supply and or distribution.
Prime and Unique Farm Lands	This project is incompliance with this direction because there are no prime or unique farm lands in the Planning Area.

Douglas Scoping Period: 11/22/2013 - 12/23/2013

Date	Comment	Resource Identified
12/13/2013	The need exists to log the burned areas to keep future fires from damaging neighboring private lands. The timber adjacent to his property is burned and he worries about the potential fuel loading if the timber is left onsite.	Fire Management
10/24/2013	The board supports forestation action including the salvage of lands impacted by wildfires. The proceeds from any salvage logging should be applied to the O& C mandated annual timber harvest with funds going to the counties. There is a need for more active management to decrease the fire risk and severity in the future. BLM and other federal agencies have failed to comply with O& C act and in doing so has left the O& C counties to pay for the negative consequences.	Silvicultural / Salvage Logging Prescriptions
10/25/2013	Road networks and reciprocal right of ways between public and private landowners needs to be clear of hazard trees that may pose a threat to workers safety	Realty (RoWs)/Safety
10/25/2013	Hazard trees that border the land boundaries between public and private lands need to be clear of hazard trees due to the anticipated aggressive nature of the private landowners salvage practices. Please consult the 2008 field guide for danger tree identification and response.	Safety
10/29/2013	expedite restoration of lands burned by 2013 wildfires and to meet the requirements of the O & C act. Merchantable material should be considered towards the annual mandate. Please refer to the quick action taken by Josephine County to salvage an area of 2,600 acres.	Silvcultural/Management for O&C Funds
11/12/2013	Strategic prioritization will be key to expedite post fire recovery. County appreciates that BLM understands that the clearing of roadside hazards to be a top priority right now	Safety
11/12/2013	Management on LSR lands will be using an update to the LSR management assessment which Douglas County wants to be performed carefully and thoroughly with emphasis on future large scale fire disturbance. DFPA cannot effectively respond to fire without appropriate management of fuels and snags.	Safety / Fire Management
11/12/2013	LSR update should be more aggressive as per the Northwest Forest Plan that allows for more aggressive action in the Oregon Klamath Province. "Salvage operations should focus on the reduction of catastrophic fire threats" (C-13).	Safety / Fire Management

11/15/2013	BLM needs to consider projects for the Burned areas that will reduce future fire risk and to help protect wild land firefighters. Leaving high number of snags at or near ridge tops will greatly increase the risk of fire spread.	Safety / Fire Management
11/15/2013	BLM needs to keep the road systems open to facilitate fast response times to help control the spread of fire.	Roads
11/15/2013	Please Consider concepts to specifically protect landowners in the area	Safety / Fire Management
11/19/2013	Aggressive removal of snags for workers safety along roads to reduce future wildfire fuel loads. Suggested 300 - 400' spacing between snags and low on the slope. Concentrations of snags should be no larger than an acre. Non-action on this threatens adjacent landowners.	Safety
11/19/2013	Road networks need to be kept open and functioning, specially in areas where snags are left on site incase of future wildfire. Suggested roads in working condition and failing that to make sure no slash or debris is put on closed road incase it is needed in the future.	Safety
11/19/2013	Water sources to be maintained, with a suggested 3 mile radius of all lands for use by helicopters.	Land Management / Aquatic
11/19/2013	Management on seedlings to be planted prior to Tan oak/Manzanita establishment. Active management needed to keep brush and shrug levels to minimum to reduce future fire risk.	Silvcultural/ Fire Management
11/27/2013	Removal of snags and large wood from burned areas to reduce fire risk as well as to protect adjacent private landowners from increased fire risk and potential economic loss	Safety / Fire Management
12/9/2013	Water source in affected areas has a 4 acre without a hydrant, BLM would increase its fire resiliency by adding a hydrant to this pump to allow tanker trucks to fill.	Land Management / Aquatic
12/11/2013	BLM needs to get in and remove farther upslope then downslope of roads immediately to prevent future disturbances to accomplish this safety task. Suggested cut, remove the logs and replant as soon as possible on upslope of roads, much more important then downside of roads.	Safety / Silvcultural
12/16/2013	Is there a possibility to take the down wood as firewood	Firewood
12/6/2013	Roads: How many miles of roads will be treated and what the proposed length of treatment upslope of road and downslope. Will any roads be decommissioned during the course of the project	Roads
12/6/2013	Trees: Will there be any green tree harvest and if so how much and for what reasons.	Silvicultural

12/6/2013	Riparian: Does BLM have an estimated riparian area size and will there be treatment within	Aquatic / Silvicultural
12/6/2013	Safety: How many landowners reside within the project area and have landowners been notified that are directly outside of the project area in adjacent watersheds/sub watersheds due to landslide risks	Safety / Soils
12/6/2013	Brimstone fire, is there to be a recovery planned	Land Management
1/4/2014	Support the salvage opportunities on BLM land, Need to focus on safety for people and the firefighters	Safety / Fire Management
1/23/2014	Need for action on salvage because humans have already disturbed normal natural processes for forest recovery due to presence. Need to accomplish the salvage under the O & C act to send revenue to counties.	Land Management / O&C funds
1/23/2014	Need to accomplish salvage to prevent more economic destruction to forests and safety for wildlife.	Land Management / Fire Management / Safety
1/23/2014	Removal of gates on BLM lands for safety purposes	Engineering / Gates
1/23/2014	Need to accomplish the salvage under prescribed O & C act under which BLM has timber mandate	Land Management / O&C funds
1/23/2014	Salvage is needed to support the local economy under O & C act. The salvage will also reduce stress on landscape and promote faster forest regeneration	Land Management / O&C funds / Silvicultural
1/23/2014	Sent in material on the 2002 biscuit fire to show the importance of salvage logging and the impact delay can have. Delaying logging the burned areas will have negative impact on forest stands	Land Management / Silvicultural
12/20/2013	Provided research *Lindenmayer, D.B., P.J. Burton, and J.F. Franklin. 2008. Salvage Logging and its ecological consequences.* KS Wild pointed out specific parts of the book highlighting ecological processes and detrimental effects salvage logging has on the ecosystem. Please Refer to handout @ T:\GP-GL\NEPA Planning\Administrative Project Records\Douglas Recovery\Public Involvement\Scoping Comments Received	All Resources
2/11/2014	Need to accomplish the salvage under the O & C act to send revenue to counties. This will also help diminish fuel loading and increase safety	Land Management / O&C Funds / Fire Management
12/16/2013	Economic recovery should not be a directive because private land will be providing O&C input	Land Management / O&C Funds / RMP
12/16/2013	Snags: needed for ecological function of landscape (Birds, Aquatic input, Sediment control, soil reclamation)	Soils / Silvicultural / Wildlife / Aquatic
12/16/2013	Snags: Timber objectives should not look to snags since there will be a snag deficit with no new snags being created in the next few decades in the high severity burn areas	Silvicultural
12/16/2013	Snags: NSO uses burned areas and needs large snags for roosting and nesting habitat	Wildlife
12/16/2013	Snag: regeneration of stands is limited with salvage logging further delaying the next phase of snag retention.	Silvicultural
12/16/2013	Snags: Plantations create a greater fire risk with the potential to wipe out any remaining snags	Silvicultural

12/16/2013	Snags & Dead wood: BLM should adopt new retention standards that are more in line with available science and comply with NEPA and NFMA. Require a change to RMP. SNAG Retention Protocols fail to address non-wildlife needs. RMP Change Required	Silvicultural / Land Management / RMP
12/16/2013	Reforestation: Salvage logging and subsequent planting/fuel operations will delay and shorten any early seral habitat the naturally regenerates	Fire and Fuels
12/16/2013	EIS: Salvage Logging is controversial and requires an EIS. To many adverse effects, requires an EIS.	NEPA / EIS
12/16/2013	Tree Retention Prescriptions: retain all trees that have ANY green needles because they MAY survive	Silvicultural
12/16/2013	Large tree retention is needed to ensure the SNAG gap is as small as possible	Silvicultural
12/16/2013	NEPA: Disclose all reasons TO REMOVE and NOT TO REMOVE snags in any stand in the NEPA document	NEPA / Disclosure
12/16/2013	Economic recovery should be measured against Ecological recovery of sites. Few reasons exist to salvage log at all	Land Management
12/16/2013	NEPA: Cumulative Effects disclosure from Logging after a fire. Make sure NEPA discloses the additive effects of logging on a habitat damaged by severe fire (Fragile soils, impaired aquatics, invasive species)	NEPA / All Resources / Cumulative Effects
12/16/2013	Roads: reconstruction, Construction needs to disclose full effects on damaged landscape. Need to decommission as much as possible. Causes compaction and impairs natural water delivery to streams.	Roads / Engineering
12/16/2013	Vegetation: needed natural regeneration to allow for increased site productivity due to natural plants helping replenish the soils and repair damage caused by fire. Ecological Damage if lower level vegetation is removed during clean up operations after salvage logging	Silvicultural / Botany / Soils
12/16/2013	Aquatics: Impaired Watersheds need to be fully disclosed. Increased sedimentation from Fire lines, Roads, Compacted areas if salvage logged. Failure to achieve ACS objectives if no large wood is left to naturally pulse into streams.	Aquatic / Silvicultural
12/16/2013	Soils: prevention of compaction and soil damage is easier and cheaper than recovery	Soils
12/16/2013	NEPA: disclose all effects in analysis and ensure all MAPs that show any effected environment (fire severity, wildlife, soils, roads) are included into NEPA documents.	NEPA / MAPS
12/20/2013	Review of literature that was submitted and is found on the s: drive at S:\Shared\Planning\District NEPA\Fire_Salvage_ESR_2013\Public comments\KSWC scoping attachments	ALL RESOURCES
12/20/2013	EIS must be prepared because salvage logging inherently has significant effect impact. Past BLM/FS operations have used EIS's for salvage logging so BLM using an EA now is dishonest	NEPA / EIS (TIMBERED ROCK)
12/20/2013	Natural Regeneration of a site is interrupted by Salvage logging and keeps the stand from recovering.	Silvicultural

12/20/2013	Salvage loggings presents the opportunity to damage resources (aquatic input, sedimentation, soil compaction and nutrient cycling, habitat restoration, stand regeneration, snag retention)	Silvicultural / Soils / Wildlife / Botany / Aquatic
12/20/2013	Planting trees causes Tree Plantations to exhibit increase fire risk. Cite BAER report that showed higher severity fire in younger plantation areas	Silvicultural
12/20/2013	Salvage logging causes higher instances of ground fuels by slash and debris. This increase current fire risk and creates return fire risk that could destroy young naturally regenerating stands	Fire and Fuels
12/20/2013	Maps: Please provide maps for each resource and available stand information	NEPA / MAPS
12/20/2013	Maps on soil type and site productivity need to be included in the NEPA documents	NEPA / MAPS
12/20/2013	tractor yarning is a destructive practice and will cause significant effects on fragile soils. If this practice is used then an EIS would be required.	Silvicultural
12/20/2013	Snags: high severity fire creates natural biodiversity by increase the level of snags across the landscape and creating a natural regeneration site	Silvicultural / Wildlife
12/20/2013	NEPA document needs to have Maps and accurately documented stand information that includes Fire Severity across the landscape that is detailed between each fire type.	NEPA / MAPS / Fire
12/20/2013	Cumulative Effects needs to be fully disclosed. The effects should include the past harvesting, fire effects, and the destructive practices of fire suppression and post fire logging. These effects are significant and should be presented an in EIS.	All Resources
12/20/2013	LSR and Riparian areas are not allowed for Timber extraction for O&C funds. If cutting happens it will destroy key features of LSR, RRs and KSOACs	Land Management / O&C Funds / LSR
12/20/2013	Fire management goals for this area will need to be properly document in the NEPA document. This action should be framed for future fire management	Fire Management
12/20/2013	Invasive species need to be documented. Salvage logging creates an environment where invasive spread and can take over and destroy natural habitat	Botany
12/20/2013	Snag issues for Biodiversity as well as habitat and nutrient cycling within the stands. Snags help control sediment when they fall and allow for down wood to be recruited to the streams helping aquatic habitats recover	Soils / Silvicultural / Aquatic
12/20/2013	Snag gaps should not be created	Silvicultural
12/20/2013	Snags create habitat for different bird species and is used by fire resilient species like the woodpecker and NSO. The NSO uses it for foraging and roosting. Need a high level of snags for species that migrate to fire areas.	Wildlife
12/20/2013	Salvage logging is not recovery and should not be labeled as such. LSRs and RRs cannot be salvaged logged in per the RMP. Former admission by BLM (Timbered Rock) stated that salvage logging does not provide ecologically benefits.	Land Management / RMP
12/20/2013	Timbered Rock was an EIS and now BLM is trying an EA. This is dishonest and does not fully comply with the NEPA process	NEPA / EIS vs EA (Timbered Rock)
12/20/2013	Alternative Proposed action based on 1995 Beschta Paper on management actions proposed within the paper. Located at: T:\GP-GL\NEPA Planning\Administrative Project Records\Douglas Recovery\Science	ALL RESOURCES / Review

12/20/2013	ACS objectives are not being met by salvage logging because ACS does not require logging. Cutting is only required if try to attain ACS. This is not the case here	Aquatic / Silvicultural
12/20/2013	Roads: Need to address the fire line access, sedimentation from fire suppression use, roads being used for the project. Projected road drainage upkeep	Roads / Engineering
12/20/2013	Roads create significant effects because they are not blocked after use and third parties get in and destroy the roads and culverts. Need proper blockage of roads and to decommission all logging roads	Roads / Engineering
12/20/2013	NEPA: Why is Grants Pass planning their own EA outside of Roseburg when management promised a joint action. This is an attempt to separate effects which is not allowed by the NEPA process	NEPA / Management / BAER / Timely
12/20/2013	Management needs to comply with their promise of joint action from Roseburg and Medford district in a corporate plan	NEPA / Management / BAER / Timely
12/20/2013	Only 1 BAER report compiled. There needs to be only 1 NEPA document to ensure all cumulative effects are presented and evaluated.	Management / BAER / all resources
12/29/2013	Soils: Avoid damaging sensitive Soils, avoid building new roads and use helicopter logging	Soils
12/29/2013	Trees: Do not remove habitat that is used for many different bird species. Avoid planting plantations because they do not produce fire resilient forest and are more likely to burn in the next fire.	Silviculture
12/23/2013	NEPA: Use of RMP references is inadequate because not all socioeconomic classes have the same access to the documents or computers to procure the documents needed to give thoughtful comments to the project	NEPA
12/23/2013	NEPA: Scoping period was inadequate for public input because the email address was wrong and the correction publication from BLM did not occur until the first of December. Timetable should have been reset	NEPA
12/23/2013	NEPA: EIS instead of an EA to give more thoughtful analysis over recommended actions	NEPA
12/23/2013	Soils & Safety: fragile soils being impacted due to geological conditions and post fire status could led to compacted soils not allowing recharge and creating conditions conducive to landslide.	Soils / Safety
12/20/2013	Timber: Salvage logging needs to occur for economic reasons and to facilitate safety conditions on the ground for forest users. Snags should be left for legal requirements but only in areas where safety is not compromised and scattered	Silvicultural
12/20/2013	Fire Safety: Snag treatments should include the removal of snags unless they are being left on lower slopes and lighter numbers to reduce future fuels.	Fire / Safety
12/23/2013	Snags: Removal of all snag for economic reasons and because they create a fire hazard for future fuel loads. All snags and dead and dying trees should be removed 300 feet above and below roads for safety of all users.	Silvicultural / Fuels / Safety
12/23/2013	Roads: keep all road maintenance going and protection measures in place for future needs. All roads should be improved and reconstructed as possible.	Roads / Soils

12/23/2013	Silvi: need for immediate replanting and plantation creation for all areas that experienced fire killed stands.	Silvicultural
12/23/2013	Silvi: need to developed prescriptions that are not restrictive to ground based logging methods and reserve helicopter logging as the least desired option. Need to allow logging within Riparian Reserves and accomplish reforestation of any fire killed stands.	Silvicultural
1/20/2014	Fire planning for fuel loads on the landscape	Fire / Safety