REVISED ENVIRONMENTAL ASSESSMENT

for the

RIO CLIMAX FOREST MANAGEMENT PROJECT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT OFFICE
ASHLAND RESOURCE AREA

(DOI-BLM-OR-M060-2011-0010-EA)

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT OFFICE

EA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Rio Climax Forest Management Project

EA NUMBER: DOI-BLM-OR-M060-2010-0010

LOCATION: T 37 S, R 1 E, in sections 11, 13, 14, 17, 21, 22, 24, 25, 27, and 35; T. 37 S., R. 2 E. in sections 17, 19, 20, 29, 31, and 32; T. 38 S., R. 2 E., in sections 3, 6, 7, 8, and 9. Willamette Meridian, Jackson County, Oregon.

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List of Changes Made to this Revised Environmental Assessment:

This provides a summary/listing of changes made to the Rio Climax Forest Management Project Environmental Assessment between July 22 and November 22, 2011 (Note: page number references are from this Revised EA).

Table of Contents:

Updated to reflect EA updates.

Chapter 1

P. 1-5, under the section "Addresses the costs for managing the lands in the Project Area" the sentence beginning with *"[h]elicopter yarding was eliminated as a viable economic method*" was removed from the paragraph since helicopter yarding was considered for several units under both Alternatives 2 and 3.

Chapter 2

P. 2-2, second paragraph, last sentence was updated with the following: *"all new roads constructed would be closed following use (e.g. barricaded or gated), and monitored to ensure closure is maintained."*

P. 2-2, the third paragraph was added to describe the proposed temporary operator spurs.

P. 2-10, Map 2-4 was edited to add unit 29-6A, which was included in the list of units and total acreage but was inadvertently left off of the map, and to edit the Riparian Reserve in Sections 29 and 32, T. 37 S., R. 2 E., reflecting corrections based on field verification.

P. 2-16 the second to last sentence of paragraph 2 was updated with the following: *" roads would be closed following use (e.g. barricaded or gated), and monitored to ensure closure is maintained."*

Chapter 3

P. 3-9, the fourth paragraph was revised to clarify the amount of road related sediment anticipated from new road construction under Alternative 2.

P. 3-21, the second paragraph was revised to clarify that there would be no changes to peak flows or stream temperatures from the Rio Climax Forest Management Project.

P. 3-23, the second paragraph was updated to disclose that the Lake Creek OHV Road and Trail Decommissioning Project was completed.

P. 3-26, the second paragraph was updated to disclose that the Lake Creek OHV Road and Trail Decommissioning Project was completed.

P. 3-29, the fifth paragraph was updated to disclose that the Lake Creek OHV Road and Trail Decommissioning Project was completed.

P. 3-37, the second paragraph was revised to clarify that tree removal in Riparian Reserves was analyzed in association with new road construction.

P. 3-38, the first paragraph was revised to clarify that tree removal and yarding is considered and analyzed as part of the disturbance associated with new road construction.

Pp. 3-55 to 3-56, the last paragraph of p. 3-55 and first paragraph of p. 3-56 were updated to disclose that formal consultation concerning the northern spotted owl was completed with the U.S. Fish and Wildlife Service. This paragraph was also updated to provide a brief summary of the anticipated effects to spotted owls, the status of historic owl sites affected by habitat downgrade in association with the Rio Climax proposal, and the availability and location of BLM's Biological Assessment and the Service's Biological Opinion.

Pp. 3-63 to 3-64, last paragraph on p. 3-63 and first paragraph on p. 3-64 were updated to clarify the effects determination and rationale for land birds.

P. 3-64, the fifth paragraph was added to describe required project design features that would mitigate the effects of new road construction or road reopening on deer winter range; the paragraph was also updated to reflect recent BLM actions taken to reduce the effects of roads and off-road vehicle activity on resources including deer winter range.

P. 3-65, the last paragraph was updated to disclose the amount of new permanent road construction in Deer Winter Range and Elk Management Area.

P. 3-76, the first sentence of paragraph four was revised to remove the statement "while maintaining existing owl habitat" as not all units proposed were designed to treat and maintain owl habitat. It was decided to propose some habitat downgrade to meet the silvicultural objective of maintaining pine species.

P. 3-76, the sixth paragraph was revised to add a reference to Table 2-2 directing readers to view a unit-by-unit listing to better understand which forest stands were selected for treating and maintaining northern spotted owl habitat.

P. 3-79, the sub-heading for paragraph 3, "*Thinning in Non-Habitat or Outside of the 1.2 Mile Home Range Radius of NSO sites*" and first sentence starting with "*Outside of the 1.2 mile radius home range…"* were deleted since the described Density Management Thinning is also proposed within the 1.2 mile home range radius of three historic northern spotted owl (NSO) sites to meet silvicultural objectives.

P. 3-101, paragraph four was revised to clarify the difference in new road construction between Alternatives 2 and 3, and to discuss a helicopter landing associated with Alternative 3. This

paragraph was also revised to reflect the challenges associated with closing roads to all vehicles and a required project design feature employed to improve efficacy of road closures.

P. 3-103, the first paragraph was edited to disclose field visits by BLMs botanist concerning the review current road closures that could potentially be access points to new road construction proposed under the Rio Climax Project.

P. 3-107, the fifth paragraph was added to describe the risk for indirect effects to plant communities from OHV use, and proposed project design features that would be implemented to reduce this risk.

P. 3-110, the second paragraph below Table 3-30 was revised to clarify the differences in proposed new road mileage between Alternatives 2 and 3 and to correct a table reference.

P. 3-123, Section 4, Cultural Resources, was added to describe compliance with National Historic Preservation Act of 1966.

P. 3-123, Section 5, Environmental Justice, was added to describe compliance with Executive Order 12898.

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CHAPTER 1 - PURPOSE AND NEED

A. INTRODUCTION

The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the Rio Climax Project, a forest management project. The Rio Climax Forest Management Project is designed to implement specific Management Objectives for lands allocated to the production of Timber Resources under the Bureau of Land Management's Medford District Resource Management Plan (RMP). This Environmental Assessment (EA) documents the environmental analysis conducted to estimate the site-specific effects on the human environment that may result from the implementation of the Rio Climax Forest Management Project on BLM-administered lands. The analysis documented in this EA will provide the BLM responsible official, the Ashland Resource Area Field Manager, with current information to aid in the decision-making process. This EA complies with the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Department of the Interior's regulations on Implementation of the National Environmental Policy Act of 1969 (43 CFR part 46).

B. WHAT IS BLM PROPOSING& WHERE IS THE PROJECT LOCATED?

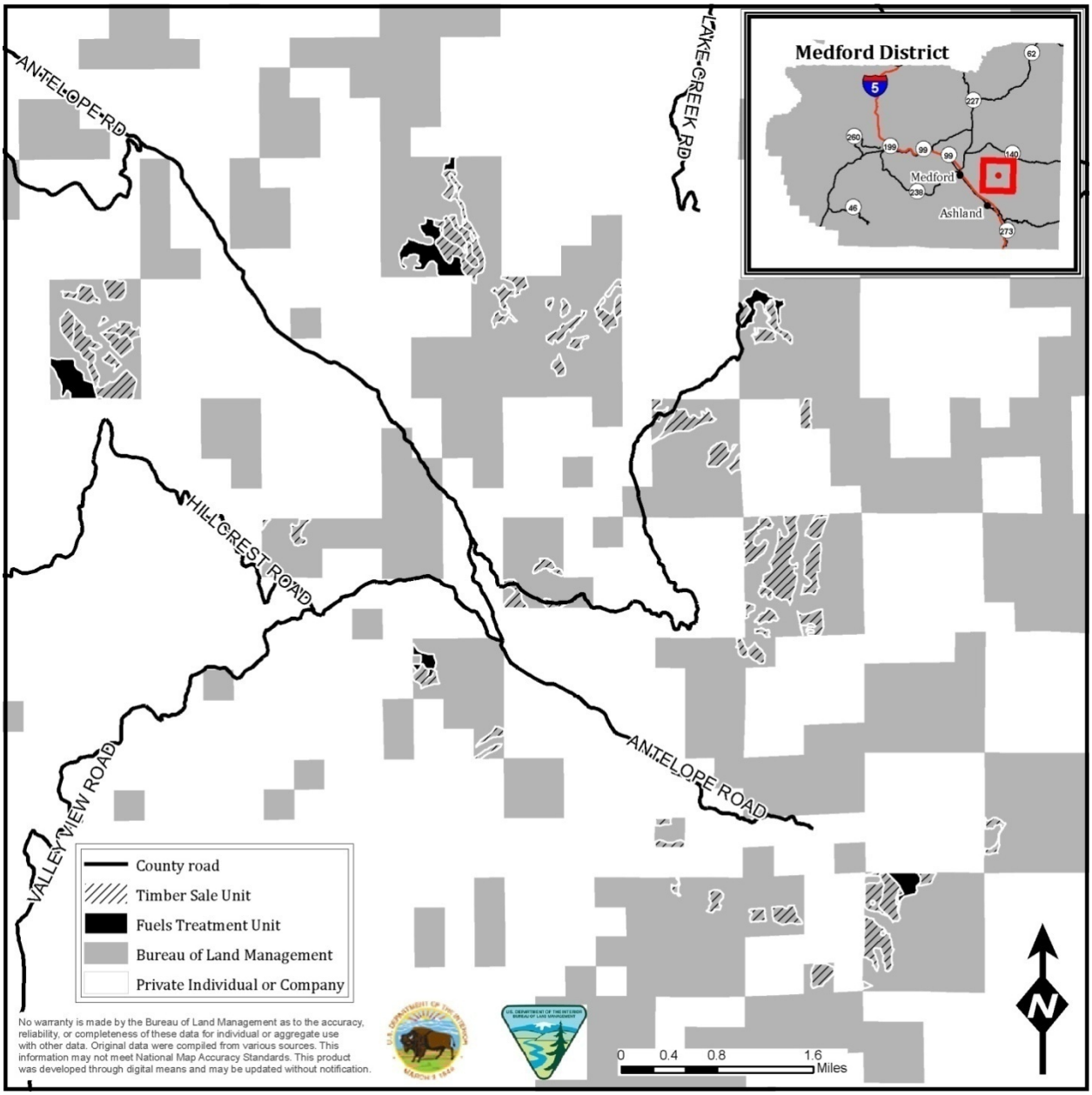
This section provides a brief summary of BLM's proposal for forest management. A more detailed description of alternatives designed to implement forest management for timber production is included in Chapter 2, Alternatives. The proposed Rio Climax Project would harvest trees in conifer forest stands on BLM-administered land in the Antelope Creek and Lake Creek drainages of the South Fork Little Butte Creek Watershed.

Forest management would be accomplished using a combination of timber sale, stewardship, and service contracts. Forest thinning (or other silvicultural) treatments, designed under the principles of sustained yield forestry, are tailored to forest and site conditions to meet the desired long term objectives for each forest stand type. Forest management would be designed to improve tree vigor and growth, reduce the impacts of forest disease, and promote the maintenance of fire resilient species such as pine and incense cedar.

Alternatives analyzed in detail under this EA would harvest timber on 801 to 948 acres utilizing tractor, cable, and helicopter yarding systems. The alternatives also include unit-specific activity fuels treatments and pre-commercial thinning. A range of 1.25 to 2.75 miles of new road construction is proposed to access harvest units. An estimated 61 to 65 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards.

The project area is defined as the area where action is proposed. The Public Land Survey System description for the proposed Rio Climax Timber Sale Project is: T 37 S, R 1 E, in sections 11, 13, 14, 17, 21, 22, 24, 25, 27, and 35; T. 37 S., R. 2 E. in sections 17, 19, 20, 29, 31, and 32; T. 38 S., R. 2 E., in sections 3, 6, 7, 8, and 9. Willamette Meridian, Jackson County, Oregon (Map 1-1).

Map 1-1. Vicinity Map - Rio Climax Project



C. WHY IS THE BLM PROPOSING THIS FOREST MANAGEMENT PROJECT?

The design and development of the Rio Climax Forest Management Project began under Medford District's 1995 Record of Decision (ROD) and Resource Management Plan (RMP), which incorporated the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan) (USDA and USDI 1994). As described above, this project proposal is also consistent with timber resource management objectives of the 2008 Medford District Resource Management Plan, which is to provide for long-term forest (timber) production in the Rio Climax Project Area. Specifically, this forest management proposal is designed to:

- Ensure sustainable forest production, and the renewable resources they provide, by managing forests to improve conifer forest vigor and growth (2008 RMP, p. 38 and 40; 1995 RMP, p. 72-73);

- Provide timber products from Timber Management/Matrix land allocations in accordance with the direction in the Medford District's Resource Management Plan (2008 RMP, p. 38-40;1995 RMP,
- p. 72-73);

- Reduce hazardous fuels in the Wildland Urban Interface (2008 RMP, p. 46; 1995 RMP, p. 89); and

- Maintain a transportation system within the project area that serves the management of resource program areas including timber management (2008 RMP, p. 49; 1995 RMP, p. 84-88).

1. Need for the Proposed Rio Climax Project

The following discussion provides more detail concerning the need for forest and road management based on the RMP Management Objectives and Direction that apply to the Uneven-aged Timber and Timber Management (Matrix) land allocations, current forest and road conditions, and their desired future conditions:

There is a need to maintain and promote vigorously growing conifer forests, reduce tree mortality, and provide timber resources, in accord with sustained yield principles, on BLM-Administered Matrix lands within the Rio Climax Project Area.

One of the applicable laws governing the major portion of BLM-administered lands in the Rio Climax Project Area is the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act of 1937 (O&C Act), for which sustainable timber production is the primary purpose. Timber Management/Matrix lands within the Rio Climax Project Area are to produce a sustainable supply of timber and other forest commodities. Timber products produced from this area would be sold in support of the District's Allowable Sale Quantity declared in the RMP (2008 RMP, p. 38; 1995 RMP, p. 17, 72-73). The Rio Climax Forest Management Project proposes commercial forest thinning and selection harvest prescriptions designed to direct future stand growth, initiate new forest development, reduce the impacts of insect and diseases and increase fire resiliency on forest stands to the extent possible.

There is a need to treat hazardous fuels to reduce the threat of fire damaging resources on public lands and threatening adjacent private lands.

The 2008 Medford District RMP (and 1995 RMP) provides direction to apply fuels management and treat fuels generated by management activities to reduce fire hazard and the chance of large-scale high intensity wildfires threatening homes in the wildland urban interface and damage to resources on public and private lands (2008 RMP, p. 46; 1995 RMP, p. 89). Fire hazard is an assessment of vegetation by type, arrangement, volume, condition, and location. These characteristics combine to determine the threat of fire ignition, the rate of fire spread if ignition occurs, and the difficulty of fire control. In general the existing fuel profile within the project area represents a moderate to high resistance to control under average fire weather conditions. Hazardous fuels reduction is needed to reduce the threat of fire damaging resources on public lands and threatening adjacent private lands.

There is a need to provide a transportation (road) system within the Rio Climax Project Area that provides access for the management of resource program areas (2008 RMP, p. 49; 1995 RMP p. 86) including timber resources, while reducing their effects on water, soils, fish, and wildlife.

The existing transportation system for the Rio Climax Project Area is insufficient to provide economically feasible access to BLM-administered lands in need of forest management. Roads throughout the project area have also been identified that need surface and drainage improvements to reduce road related erosion and sedimentation to stream courses.

Surface improvements may include grading the road surface and or spot rocking where the road is soft or badly pot holed. Drainage improvements may include adding armored rolling dips, cross drain culverts, or cleaning existing structures and catch basins. Roadside drainage ditches would be maintained as needed, such as where ravel or debris has plugged the ditch to the extent that water is forced into the running surface of the road. Trees and shrubs would be pruned or cut to improve visibility and safety for vehicular use of the roads. Road construction and improvements are included in the Rio Climax Forest Management Project to improve road conditions and to access to areas in need of forest management.

D. DECISION FRAMEWORK

This Environmental Assessment will provide the information needed for the responsible official, the Ashland Resource Area Field Manager, to select a course of action to be implemented for the Rio Climax Forest Management Project. The Ashland Resource Area Field Manager must decide whether to implement action based on the action alternatives or whether to select the No-Action alternative.

The decision will also include a determination whether or not the impacts of the action are significant to the human environment. If the impacts are determined to be within the range analyzed in the Medford District Resource Management Plan Environmental Impact Statement, or otherwise determined to be insignificant, a Finding of No Significant Impact (FONSI) can be issued and the decision implemented. If this EA determines that the significance of impacts are unknown or greater than those previously analyzed and disclosed in the RMP/EIS, then a project specific EIS must be prepared.

The forthcoming decision record will document the authorized officer's rationale for selecting a course of action based on the needs/objectives described above, the effects documented in the EA, and the extent to which the decision:

Contributes toward the Districts Allowable Sale Quantity

The Rio Climax Forest Management Projectis located on BLM-administered lands allocated to produce a sustainable supply of timber. Timber products removed to meet Timber Resource Objectives (ROD/RMP p.17, 72-73) would contribute toward the District's Allowable Sale Quantity.

Addresses habitat needs of the northern spotted owl, listed as Threatened under the Endangered Species Act.

To contribute to the recovery and survival of the northern spotted owl, the responsible official must consider the extent to which the Rio Climax Forest Management Project affects the current acreage and distribution of northern spotted owl habitat within the analysis area. A description of northern spotted owl habitat follows:

Nesting, roosting and foraging (NRF) habitat is characterized by forested stands with older forest structure with characters such canopy closure of 60 percent or greater, trees with large crowns, multiple canopy layers, snags and down wood. However, southwest Oregon NRF habitat varies greatly and one or more of these habitat components might be lacking or even absent.

Dispersal-only habitat for spotted owls is defined as stands that typically have a canopy closure of 40 percent or greater, and are open enough for flight and predator avoidance, but do not meet the habitat criteria of NRF habitat. Dispersal-only habitat is used throughout this document to refer to habitat that does not meet the criteria of NRF (nesting, roosting, or foraging) habitat, but has adequate cover to facilitate movement between blocks of suitable NRF habitat.

Addresses the costs for managing the lands in the Project Area (economically practical)

The RMP directs that all silvicultural systems (forest thinning strategies) applied to achieve forest stand objectives would be economically practical (RMP p. 180; RMP/EIS p. 2-62).

Meets the BLM's obligation to protect resources consistent with existing laws, policy, and the direction of the Medford District Resource Management Plan

The relevant issues listed below (Scoping and Issues) provide the necessary framework for assessing the merits and the consequences to the physical, biological, human environment of implementing the Rio Climax Forest Management Project. The Section titled Land Use Conformance and Legal Requirements (below) provides the context for determining the project's consistency and conformance with land use plans, agency policy, and existing laws.

E. LAND USE CONFORMANCE& LEGAL REQUIREMENTS

Conformance with Land Use Plans

The BLM initiated planning and design for this project to conform and be consistent with the Medford District's 1995 Record of Decision (ROD) and Resource Management Plan (RMP), which incorporated the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (Northwest Forest Plan) (USDA and USDI 1994). The 1995 Medford District Resource Management Plan was 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.*

Following the March 31, 2011 decision by the United States District Court for the District of Columbia in Douglas Timber Operators et al. v. Salazar, which vacated and remanded the administrative withdrawal of the Medford District's 2008 ROD and RMP, we evaluated this project for consistency with the 2008 ROD and RMP. The proposed Rio Climax Forest Management Project is located on lands allocated by the 2008 Medford District RMP to Uneven Age Timber Management Area, Timber Management Area, and Riparian Management Area. The 2008 Medford District ROD/RMP specifically states: "Manage forests to achieve continuous timber production that could be sustained through a balance of growth and harvest" (USDI 2008, p. 38).

The Rio Climax Forest Management Project contains Project Design Features that apply Best Management Practices of the 1995 RMP (Appendix D), which are also consistent with Best Management Practices contained in the 2008 RMP (Appendix C). While this EA contains discussions of land allocations and components of the 1995 RMP (e.g., Riparian Reserves, Aquatic Conservation Strategy Objectives, etc.), which are not components of the 2008 ROD and RMP, the 2008 ROD and RMP do not preclude the application or discussion of these components. As designed, this project complies with Management Direction, Objectives, and Best Management Practices of the 2008 ROD and RMP, as well as the plan in place prior to March 31, 2011, the 1995 Medford District RMP.

Statutes and Regulations

The Proposed Action is 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 facilities.

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

- **National Environmental Policy Act of 1969 (NEPA)**. Requires the preparation of environmental impact statements for major Federal actions which may have a significant effect on the environment.

- **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 of 1987 (CWA)**. Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.

F. RELEVANT ASSESSMENTS AND PLANS

Watershed Analysis (USDI 1997)

Watershed Analysis is a procedure used to characterize conditions, processes and functions related to human, aquatic, riparian and terrestrial features within a watershed. Watershed Analysis is issue driven. Analysis teams of resource specialists identify and describe ecological processes of greatest concern in a particular "fifth field" watershed, and recommend restoration activities and conditions under which other management activities should occur. Watershed Analysis is not a decision making process. Rather, Watershed Analyses provides information and non-binding recommendations for agencies to establish the context for subsequent planning, project development, regulatory compliance and agency decisions (See Federal Guide for Watershed Analysis 1995 p. 1).

The Rio Climax Project Area falls within the Little Butte Creek Watershed Analysis Area. The Watershed Analysis focused on the use of existing information available at the time the analysis was conducted, and provides baseline information. Additional information, determined to be necessary for completing an analysis of the Rio Climax Forest Management Project, has been collected and is considered along with existing information provided by the 1997 Little Butte Creek Watershed Analysis. Management Objectives and Recommendations provided by the Watershed Analysis were considered and addressed as they applied to the Rio Climax proposal.

The current condition of the lands affected in the Rio Climax Project Area is the result from a multitude of natural processes and human actions that have taken place over many decades. The Little Butte Watershed Analysis reported that past road development throughout the watershed has increased surface erosion, contributed to slope instability, confined stream channels (leading to stream downcutting), aggregated the effects of natural flood events, and increased rates of sediment produced to streams above historical reference conditions (LBWA p. 60-61).

The Little Butte Watershed Analysis also reported the effects of past timber harvesting (primarily clear-cutting) and tractor yarding on soil compaction, slope stability, hydrologic processes, water quality, and aquatic and wildlife habitat (including coarse woody material and snags). The current condition of the lands affected by the proposed action are described in Chapter 3 under the affected environment section specific to each resource. The current conditions described in the affected environment, reflect both natural processes and human actions that have taken place over many decades in the Little Butte Creek Watershed. This EA will address the effects of the Rio Climax Project, which includes road construction and timber harvesting, by analyzing the potential for cumulative impacts that may result when adding the incremental effects of the Rio Climax propose action together with the effects of past, current and reasonably foreseeable future actions. (see Chapter 3).

Water Quality Restoration Plan – Lower Little Butte Creek (USDI 2010)

This document describes how the Bureau of Land Management (BLM) will implement and achieve the Oregon Department of Environmental Quality's (DEQ's) *Rogue River Basin Total Maximum Daily Load (TMDL)* (ODEQ 2008) for 303(d) listed streams on BLM-administered lands. Its organization is designed to be consistent with the DEQ's *Rogue River Basin Water Quality Management Plan (WQMP)* (ODEQ 2008). The area covered by this Water Quality Restoration Plan (WQRP) includes all lands managed by the BLM, Medford District within the Lower Little Butte Creek Analysis Area from the confluence of the North and South Forks to the mouth of Little Butte Creek. This area is referred to as the analysis or plan area and includes Antelope and Lake Creeks, both of which are within the Rio Climax project area.

The analysis and recommendations found in this WQRP use data from the watershed analysis. Additional analysis and recommendations have been included in this WQRP where the watershed analysis data were incomplete or new information was available. Although passive restoration will be the primary means for achieving the stream temperature goals, active restoration measures will be considered for BLM-managed lands adjacent to streams with current shade that is less than 80 percent.

The primary means to achieving the channel modification goals on BLM-administered lands will be through passive restoration and protection of unstable areas. Active restoration measures will focus on promoting riparian conifer growth for future large wood recruitment through silvicultural treatment, maintaining and improving road surfaces, reducing the number of road crossings, and reducing road and trail densities. The highest priority areas for road/trail treatments will be Riparian Reserves and unstable areas.

U.S. Department of Interior, Bureau of Land Management, Western Oregon Districts, Transportation Management Plan (1996, updated 2002)

This transportation management plan, is not a decision document, rather it provides guidance for implementing applicable decisions of the Medford District Resource Management Plan (which incorporated the Northwest Forest Plan).

Southwest Oregon Fire Management Plan

The Southwest Oregon Fire Management Plan (FMP) provides Southwest Oregon with an integrated concept in coordinated wildland fire planning and protection among Federal, State, local government entities and citizen initiatives.

The FMP introduces fire management concepts addressing fire management activities in relation to resource objectives stated in the current Land and Resource Plans (parent documents) of the Federal agencies, the laws and statutes that guide the state agencies and private protective associations, and serve as a vehicle for local agencies and cooperators to more fully coordinate their participation in relation to those activities.

G. SCOPING AND ISSUES

Scoping is the process the BLM uses to identify issues related to the proposal (40 CFR 1501.7) and determine the extent of environmental analysis necessary for an informed decision. It is used early in the NEPA process to identify (1) the issues to be addressed, (2) the depth of the analysis, and (3) potential environmental impacts of the Proposed Action.

A letter briefly describing the Proposed Action and inviting comments was mailed to adjacent landowners, interested individuals, organizations, and other agencies on March 25, 2010.

1. Relevant Issues

An interdisciplinary (ID) team of resource specialists reviewed the proposal and all pertinent information, including public input received, and identified relevant issues to be addressed during the environmental analysis. Some issues were determined to be out of the scope of analysis for the Rio Climax Project; those issues are discussed below under subsection G, 2, Issues Considered but not Further Analyzed. Some issues identified as relevant to this project proposal were analyzed in association with broader level environmental analyses. Where appropriate, this EA will incorporate by reference the analysis from broader level NEPA documents (40 CFR §1508.28), to be considered along with project specific analysis. The following issues related to the Proposed Action were identified by the interdisciplinary team based on internal and external scoping.

- Logging (particularly tractor yarding) and road construction could increase soil compaction, and alter hydrologic flow, including peak flow and low flow.
- There is potential for adverse effects to water quality from increased sediment produced from disturbance associated with timber harvest activities including road construction, timber yarding, and timber hauling.
- There could be short-term increases in sediment from roadbed and drainage ditch disturbance associated with road maintenance activities.
- Proposed tractor logging and road construction would increase soil compaction, displacement, and reduce site productivity.
- The effects of timber harvest and road construction, when combined with other past, ongoing, and reasonably foreseeable future actions on public and private lands, could potentially contribute to adverse cumulative effects to soils, water quality, hydrologic function, and aquatic and terrestrial habitats.
- Increased sedimentation to streams from the implementation of the project proposal could potentially impact aquatic habitat and fish.
- Timber harvest and road construction has the potential to affect northern spotted owl nesting, roosting, foraging, and dispersal habitat.
- Timber harvest, including the treatment of Douglas-fir dwarf mistletoe infected trees, could reduce the complexity of forest structure including vertical and horizontal diversity, snags, and downed wood that provides habitat for variety of wildlife species.
- Thinning in forest stands with latent infections of Douglas-fir dwarf mistletoe can stimulate the growth of mistletoe and its adverse effects on growth and vigor forest stands.
- Lower volumes associated with light thinning in many project units could affect the overall economic feasibility of project implementation.

- Some commenters expressed concern that silvicultural prescriptions were not meeting silvicultural objectives and long-term sustained yield objectives of BLMs Resource Management Plan due to constraints imposed for the management of northern spotted owl habitat.

- Seasonal restrictions for resource and fire protection reduce operating time which can affect economic feasibility of project operations.

- Timber harvest and road construction activities have the potential to affect Bureau Special Status vascular plants, bryophytes, lichens, and fungi.

- Forest management and logging can increase the risk of introduction and spread of noxious weeds.

- Timber harvesting would increase surface fuels over the short-term (6 months to 2 years) in stands treated.

- Fuels management activities generate particulate pollutants (smoke) in the process of treating natural and activity related fuels. Smoke from prescribed fire has the potential to affect air quality within the project area and surrounding areas.

2. Issues Considered but not Further Analyzed

The following comments or issues were discussed by the interdisciplinary team. It was determined these issues were beyond the scope of this project. These issues along with a rationale for their being "considered but not analyzed in detail" in this EA are listed below. Also see Chapter 2, Alternatives Considered but not Analyzed in Detail for options and alternatives considered but not further analyzed.

Slope Instability in South Fork Little Butte Creek and Dead Indian Canyon: Comments were received stating concerns that the Little Butte Watershed Analysis (p. 59) identified numerous areas of instability in the South Fork Little Butte Creek and Dead Indian Canyon during slope stability mapping for the Shellick, Owens and Dead Indian timber sales.

> ***Rationale for Eliminating from Detailed Analysis:*** These timber sale areas are located on Forest Service managed lands approximately 5 miles east and up-watershed from the Rio Climax Timber Sale. Any activities in the Rio Climax Project Area would have no influence on areas of slope instability located in the Shellick, Owens, and Dead Indian Timber Sale Areas located on Forest Service managed lands of Dead Indian Creek and South Fork Little Butte Creek drainages.

South Fork Little Butte Creek Key Watershed. Scoping comments received identified concerns that the Rio Climax Forest Management Project would increase the equivalent roaded area (ERA), soil compaction and soil displacement throughout the South Fork Little Butte Creek Key Watershed.

> ***Rationale for Eliminating from Detailed Analysis***: While the effects of road construction and tractor yarding will be addressed throughout this environmental Assessment, the Rio Climax Project is **not** located in a designated Key Watershed. The designated Tier 1 Key Watershed is located up-watershed from the Rio Climax Analysis Area. The Lake Creek and Antelope Creek catchments drain into the South Fork of Little Butte Creek below the Key Watershed Designation.

Effects of clearcuts on hillslope processes. Commenters submitted a quote from the Little Butte Watershed Analysis stating, "[m]any of the hillslope processes are most active near … managed areas … such as … clearcuts."

> ***Rationale for Eliminating from Detailed Analysis***: While the effects of any past clear-cutting in the watershed will be addressed when assessing the current watershed conditions, the Rio Climax Forest Management Project does not propose clear-cutting.

Foreseeable cumulative impact from treatment of future mistletoe infections: One commenter suggested that BLM must consider future treatments of Douglas fir dwarf mistletoe as a reasonable action for management to suppress the disease.

Rationale for Eliminating from Detailed Analysis: Silvicultural prescriptions proposed under this Rio Climax Forest Management Project are assumed to be the extent of timber harvesting that would occur in proposed units for the next 15 to 30 years (average of 20 years). The type of silvicultural treatment these stands may need in the future (approximately 20 years) would be determined at that time based on stand conditions at a point in time in the future. To try and analyze future treatment needs at this time would be speculative.

Development of Quarry in T. 38 S., R. 2 E., in Section 7: An adjacent land owner expressed concerns that any further expansion of the rock quarry on the northwestern flank of Grizzly (T. 38 S., R. 2 E., in Section 7) could adversely affect his water right from Hurst Creek. He is concerned that quarry expansion would affect the amount of subsurface flow that would enter Hurst Creek and the reservoirs that capture the flow from Hurst Creek.

Rationale for Eliminating from Detailed Analysis: While there is a possibility that any existing loose rock could be used to spot rock roads under this project, there are no plans for further expansion of the rock quarry in T. 38 S., R. 2 E., in Section 7; therefore, no further hydrologic analysis is warranted at this time. This does not preclude future expansion of the quarry; however, appropriate analysis under NEPA would be necessary. Adjacent landowners and interested individuals would be notified and would have the opportunity to review and provide input on environmental analysis and NEPA documentation.

CHAPTER 2 - ALTERNATIVES

A. INTRODUCTION

This Chapter describes the alternatives developed by the ID Team to achieve the objectives identified in the Need statements in Chapter 1. In addition, a "No-Action" Alternative is presented to form a baseline for analysis. Project Design Features (PDFs), which apply the Best Management Practices as described in Appendix D of the RMP, are an essential part of proposed actions. The PDFs are included as features of action alternatives in the analysis of anticipated environmental impacts.

B. ALTERNATIVES ANALYZED IN DETAIL

1. Alternative 1 – No-Action

The No-Action Alternative describes a baseline against which the effects of the action alternatives can be compared. This alternative describes the existing conditions and the continuing trends, given the effects of other present actions and reasonably foreseeable actions identified. Under the No-Action Alternative, no vegetation management would be implemented; there would be no commercial cutting of trees, no roads would be constructed or improved, and there would be no pre-commercial thinning or fuels reduction. The analysis of the No-Action Alternative answers the question: What would occur to the resources of concern, if an action does not take place?

Only normal programmed road maintenance would be performed. Selection of the No-Action Alternative would not constitute a decision to reallocate these lands to non-commodity uses. The decision maker does not need to make a specific decision to select the "No-Action" Alternative. If that is the choice, the Rio Climax Project would simply be dropped and the decision process aborted. Future harvesting, other connected actions and road management in this area would not be precluded and could be analyzed under a subsequent NEPA document.

2. The Action Alternatives

This section describes the two action alternatives considered in detail. The narrative summary of each alternative is followed by a table of harvest units, a road use table, and a table detailing proposed new road construction. The tables of harvest units provide the following information for each unit: unit number, acreage, harvest prescription, harvest method, and association fuels or precommercial thinning treatments. The road use and road construction tables provide details for project roads (existing or proposed) by road number, approximate length, surface type, and seasonal restrictions. Components of the action alternatives that are common to both alternatives (i.e., project design features, silvicultural prescriptions, and fuels reduction treatments) are described in further detail under Subsection C., Components Common to the Action Alternatives.

a. Alternative 2

Alternative 2 was developed to achieve the needs described in Chapter 1 for the Rio Climax Forest Management Project. An estimated 948 acres of conifer forests would receive commercial forest thinning treatments; a summary of each prescription type proposed is described in detail under Subsection c., (1), Silvicultural Objectives and Prescriptions. An estimated 563 acres would be harvested using tractor yarding harvest method, 57 acres would be harvested using helicopter yarding, and the remaining 328 acres would be harvested using cable yarding.

Post-harvest fuels reduction would occur in commercial harvest units, as identified in Table 2-2, to treat small diameter fuels generated from harvest activities. Small diameter slash (generally 3 inches diameter and less) created from forest thinning (activity fuels) would be cut, handpiled, and covered with plastic following completion of timber harvest operations. Pile burning is usually completed within 6 months to 2 years of timber harvesting depending on the time of year the harvest occurred; slash needs a period of time to cure before burning can take place. Precommercial thinning (understory thinning) is also proposed on 445 of these 948 acres (Table 2-1 and 2-2). Another 187 acres (Table 2-9) would receive non-commercial fuels reduction treatments to reduce hazardous fuels.

An estimated 65 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards (Table 2-3). Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, and grading and shaping road surfaces. Temporary bridges would be utilized for two temporary channel crossings, one on road 37-1E-23 and one on the old county right-of-way in the northeast ¼ of section 26 (T. 37 S., R. 1 E.). Placement of portable bridges would not involve ground disturbance; they are hauled in and placed across the channel from the existing roadway during the dry season. BLM would renovate a road 37-2E-30.00 to facilitate access to harvest Units 25-1 and 25-3. Renovation of road 37-2E-30.00 would involve reshaping the road with a blade and restoring water drainage. Alternative 2 would construct approximately 2.75 miles of new road to provide access to proposed harvest units (Table 2-4); all new roads constructed would be closed following use (e.g. barricaded or gated), and monitored to ensure closure is maintained.

Three temporary operator spurs, each ranging from 50 to 300 feet in length (< 0.2 mile), would be constructed to facilitate improved access for yarding equipment in Units 17-8, 13-6E, and 9-1A. An existing spur 37-1E-11.05 would be cleared and may be extended slightly (<50 feet). Temporary operator spurs identified for the Rio Climax Project are not located or designed for general transportation uses. They would be constructed with a narrower clearing and road width, and would have no turnouts or culverts. Construction, log removal, waterbarring, seeding with native seed, mulching, and barricading would occur prior to the wet season of the year of construction.

Table 2-1 summarizes the Rio Climax Forest Management Project by silvicultural prescription type, timber harvest method, and associated non-commercial treatment type. Unit specific information, including fuels reduction treatments are displayed in Table 2-2 and Maps 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9.

Table 2-1. Summary of Acres for Alternative 2 by Silvicultural Prescription and Harvest Method

Silvicultural Prescriptions	Est. Acres
Maintain NSO Nesting, Roosting, and Foraging Habitat	321
Maintain NSO Dispersal Habitat	272
Density Management Units:	345
Dry Douglas-fir Thinning	189
Mixed Conifer Thinning	9
Pine Site Thinning	147
Disease Management	10
Total	948
Non-commercial Prescriptions	Est. Acres
Pre-commercial Thinning within Commercial Units	445
Pre-commercial thinning and fuels reduction outside Commercial Units	187
Timber Harvest Method	Est. Acres
Cable Yarding	328
Tractor Yarding	563
Helicopter Yarding	57

Table 2-2. Alternative 2 Units by Silvicultural Prescription, NSO Habitat, and Harvest Method

Unit No.	Acres	Silvicultural Prescription		Harvest Method	Associated Treatments (PCT, Fuels)
		Harvest Prescription	NSO Habitat Type		
3-1	11	DM/Pine Site	N/A	Tractor	PCT, Activity fuel
6-1 (A&B)	14	ST/NRF	NRF	Tractor	Activity fuel
7-1	3	ST/NRF	NRF	Tractor	PCT, Activity fuel
7-2	11	ST/NRF	NRF	Tractor	Activity fuel
8-3	19	ST/NRF	NRF	Cable	Activity fuel
8-4	8	ST/NRF	NRF	Cable	Activity fuel
8-5	18	ST/NRF	NRF	Cable	Activity fuel
9-1A	30	ST/NRF	NRF	Cable	Activity fuel
9-1B	2	DM/Mixed Conifer	N/A	Tractor	Activity fuel
9-2	7	DM/Mixed Conifer	N/A	Tractor	Activity fuel
9-3A-C	57	ST/NRF	NRF	Helicopter	Activity fuel
9-3D	9	ST/NRF	NRF	Cable	Activity fuel
9-4	2	ST/NRF	NRF	Tractor	Activity fuel
11-1*	10	ST/NRF	NRF	Cable	Activity fuel
11-2	17	DM/Dry Douglas-fir	NRF	Tractor	Activity fuel
11-3	54	DM/Dry Douglas-fir	NRF	Cable	Activity fuel
11-4	5	ST/NRF	NRF	Tractor	Activity fuel
11-5*	11	ST/NRF	NRF	Tractor	Activity fuel
11-6	8	DM/Dry Douglas-fir	NRF	Tractor	Activity fuel
13-1A	11	ST/NRF	NRF	Cable	PCT, Activity fuel
13-2	3	ST/NRF	NRF	Tractor	Activity fuel
13-3	5	ST/NRF	NRF	Tractor	PCT, Activity fuel
13-6A	8	DM/Dry Douglas-fir	NRF	Tractor	Activity fuel
13-6B	16	ST/NRF	NRF	Tractor	PCT, Activity fuel
13-6C	6	ST/NRF	NRF	Tractor	PCT, Activity fuel
13-6D	7	ST/NRF	NRF	Tractor	Activity fuel
13-6E	15	ST/NRF	NRF	Cable	Activity fuel
13-8	5	ST/DSP	Dispersal	Tractor	Activity fuel
14-1	19	DM/Dry Douglas-fir	NRF	Tractor	PCT, Activity fuel
17-1	4	DM/Pine Site	N/A	Cable	Activity fuel
17-2	12	DM/Pine Site	N/A	Tractor	Activity fuel
17-3	17	DM/Dry Douglas-fir	N/A	Tractor	Activity fuel

Unit No.	Acres	Silvicultural Prescription		Harvest Method	Associated Treatments (PCT, Fuels)
		Harvest Prescription	NSO Habitat Type		
17-4	15	DM/Dry Douglas-fir	N/A	Cable	Activity fuel
17-6A	35	DM/Pine Site	N/A	Tractor	Activity fuel
17-6B	7	DM/Pine Site	N/A	Tractor	Activity fuel
17-6C	33	ST/NRF	NRF	Tractor	Activity fuel
17-7A	19	DM/Dry Douglas-fir	N/A	Tractor	Activity fuel
17-7B	2	DM/Dry Douglas-fir	N/A	Tractor	Activity fuel
17-8	15	DM/Dry Douglas-fir	N/A	Cable	Activity fuel
17-9*	7	DM/Pine Site	N/A	Tractor	PCT, Activity fuel
17-10*	16	DM/Pine Site	N/A	Tractor	PCT, Activity fuel
17-11*	11	DM/Pine Site	N/A	Tractor	PCT, Activity fuel
19-1*	10	DM/Pine Site	N/A	Tractor	PCT, Activity fuel
19-2*	34	DM/Pine Site	N/A	Tractor	PCT, Activity fuel
19-4A*	18	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
19-4D*	6	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
20-1*	13	ST/NRF	NRF	Tractor	PCT, Activity fuel
25-1	9	DM/Dry Douglas-fir	NRF	Cable	Activity fuel
25-2	6	DM/Dry Douglas-fir	NRF	Tractor	PCT, Activity fuel
25-3	3	ST/DSP	Dispersal	Tractor	Activity fuel
25-5	17	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
27-1A	13	ST/NRF	NRF	Tractor	PCT, Activity fuel
27-1C	2	ST/NRF	NRF	Tractor	Activity fuel
29-1	29	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-2*	76	ST/DSP	Dispersal	Cable	PCT, Activity fuel
29-3	13	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-4*	27	ST/DSP	Dispersal	Cable	PCT, Activity fuel
29-6A	10	STS/Disease Mgmt.	Dispersal	Tractor	PCT, Activity Fuel
29-6B	3	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-6C	9	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-6D	5	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-6E	4	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-8*	19	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
29-9*	2	ST/DSP	Dispersal	Cable	PCT, Activity fuel
32-1	6	ST/DSP	Dispersal	Cable	PCT, Activity fuel
35-2	17	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
35-7	7	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
35-8	6	ST/DSP	Dispersal	Tractor	PCT, Activity fuel
Total	948				

Abbreviations:

NSO = Northern Spotted Owl
NRF = Nesting, Roosting, Foraging
DSP = Dispersal
N/A = Outside of NSO Home Range
ST = Selective Thinning
DM = Density Management

Table 2-3 provides a detailed road-by-road listing of proposed road use and Table 2-4 provides details for road construction proposed under Alternative 2.

Table 2-3. Alternative 2 Road Use Table – Existing Roads

Road Number	Approx. Length (miles)	Existing Surface:	Control	Seasonal Restriction (for log hauling)
37-1E-20.00 A	0.31	NAT	PVT	1
37-1E-20.00 B	1.00	NAT	BLM	1
37-1E-21.00 B	0.13	NAT	PVT	1
37-1E-21.01	1.00	NAT	PVT	1
37-1E-22.02 A	0.44	NAT	PVT	1
37-1E-22.02 B	0.23	NAT	BLM	1
37-1E-23.00 A	0.42	ASC	BLM	1
37-1E-23.00 B	1.85	ASC	PVT	1
37-1E-23.00 D	0.55	NAT	PVT	1
37-1E-26.00 A-C	2.43	ASC	BLM	1
37-1E-35.00	0.20	NAT	BLM	1
37-1E-36.00 A	0.60	NAT	PVT	1
37-1E-36.00 B	0.30	NAT	BLM	1
37-2E-07.02 A-C	5.04	ASC	BLM	1
37-2E-07.02 H	1.18	ASC	BLM	1
37-2E-07.01 A-C	2.92	ASC	BLM	1
37-1E-11.03	0.19	ASC	BLM	1
37-1E-11.05	0.07	NAT	BLM	1
37-1E-13.00 A-B2	2.37	ASC	BLM	1
37-1E-13.02	0.42	ASC	BLM	1
37-1E-13.03	0.65	ASC	BLM	1
37-2E-18.00	0.80	NAT	PVT	1
37-2E-19.01	0.20	NAT	BLM	1
37-2E-19.02	0.12	NAT	BLM	1
37-2E-29.00 A1-A2	0.93	ASC	BLM	1
37-2E-29.00 B	0.15	ASC	PVT	1
37-2E-29.00 C	1.61	ASC	BLM	1
37-2E-29.01 A1-A2	1.09	ASC	BLM	1
37-2E-29.01 B	0.09	NAT	BLM	1
37-2E-29.02	1.08	ASC	BLM	1
37-2E-29.03 A-B	1.59	ASC	BLM	1
37-2E-29.04	0.34	ASC	BLM	1
37-2E-29.05	0.39	ASC	BLM	1
37-2E-29.07	0.40	ASC	BLM	1
38-2E-03.03	0.40	ASC	BLM	1
38-2E-03.04 A-C	1.36	ASC	BLM	1
38-2E-08.00	0.47	GRR	BLM	1
38-2E-08.01	0.78	ASC	BLM	1
38-2E-09.01	0.37	ASC	BLM	1
38-2E-09.02 A-B	1.67	BST	BLM	2
38-2E-09.02 C	0.38	GRR	BLM	1
38-2E-09.04 A1	0.30	ASC	BLM	1
38-2E-09.04 B	0.42	ASC	BLM	1
38-2E-09.06	0.67	ASC	BLM	1
38-2E-09.08	3.31	ASC	BLM	1
38-2E-09.09	0.30	NAT	BLM	1
38-2E-09.10	0.24	ASC	BLM	1
38-2E-09.11	0.15	ASC	BLM	1
38-2E-09.12	0.09	NAT	BLM	1
38-2E-27.00 A-C1	4.59	BST	BLM	2

Road Number	Approx. Length (miles)	Existing Surface:	Control	Seasonal Restriction (for log hauling)
County Roads, Non-BST	16.81	ASC, PRR, NAT	CNTY	
Subtotal	63.4			
Existing Roads in the project area-Renovation Needed				
Road Number	Approx. Length (miles)	Existing Surface:	Control	Seasonal Restriction (for log hauling)
37-1E-25.00	0.61	NAT	PVT	1
37-2E-30.01	0.22	NAT	PVT	1
Subtotal	0.83			
Total mileage	64.23			

Abbreviations:

Existing Surface: NAT = natural, GRR = Grid Rolled Rock, PRR = Pit Run Rock, ASC = Aggregate Surface Course, BST = Bituminous Surface Treatment

Control: BLM = Bureau of Land Management, PVT = Private

Seasonal Restrictions: (for log hauling)
0 = no restrictions;
1 = hauling restricted between 10/15 and 6/1
2 = hauling restricted between 11/15 and 5/15
Note: If Purchaser furnishes and places additional rock. Seasonal restrictions could be modified as approved by the Authorized Officer

Table 2-4. Alternative 2 – Proposed Road Construction

Road Number	Approx. Length (miles)	Surface Type:	Control	Seasonal Restriction (for log hauling)
37-1E-17.00	1.00	NAT	BLM	1
37-1E-17.01	0.50	NAT	BLM	1
37-1E-25.01	0.50	NAT	BLM	1
37-1E-23.00 C2	0.20	NAT	BLM	1
37-1E-23.00 C3	0.20	NAT	BLM	1
38-2E-09.10	0.35	NAT	BLM	1
Total mileage:	2.75			

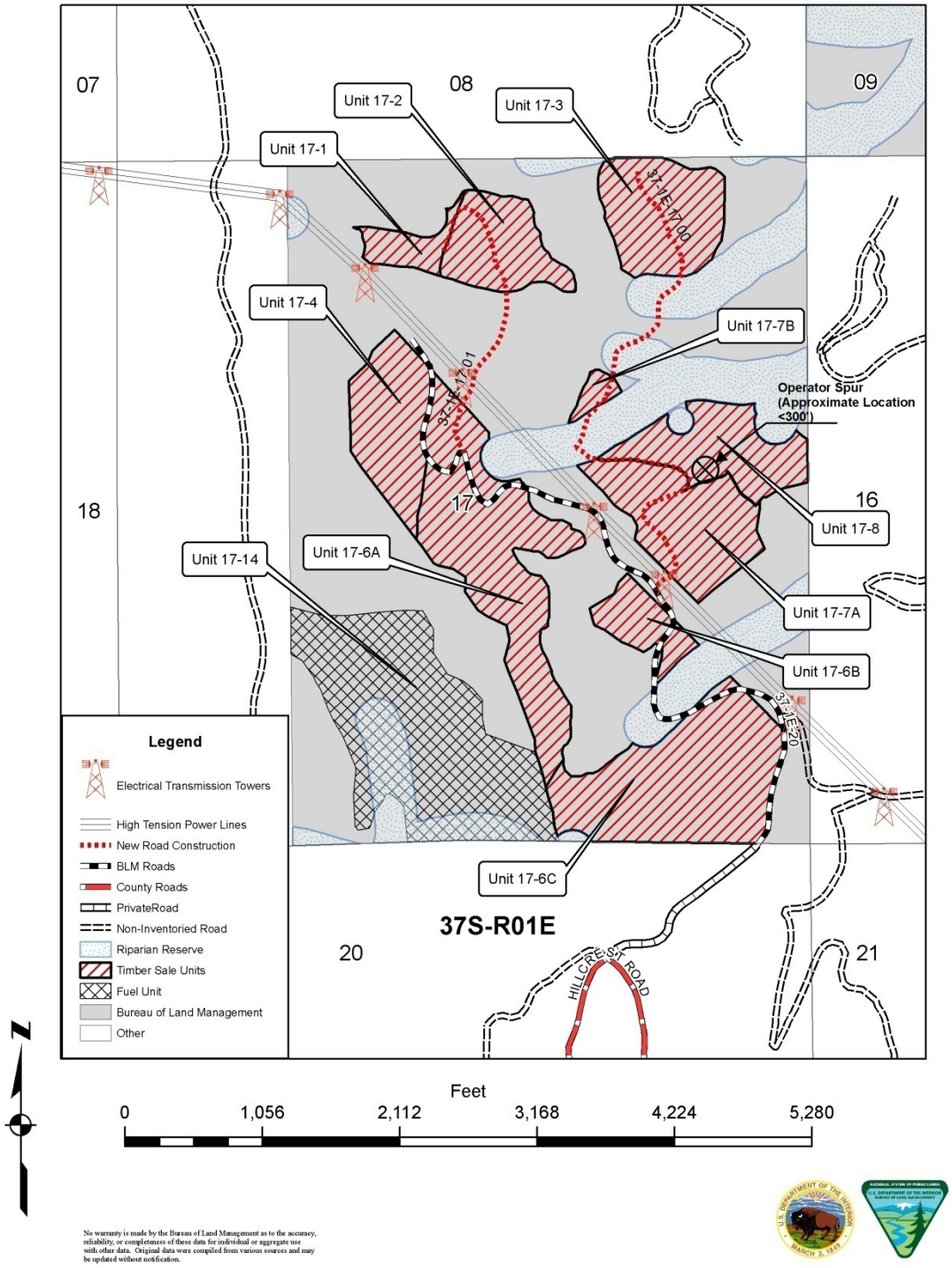
Abbreviations:

Existing Surface: NAT = natural, GRR = Grid Rolled Rock, PRR = Pit Run Rock, ASC = Aggregate Surface Course, BST = Bituminous Surface Treatment

Control: BLM = Bureau of Land Management, PVT = Private

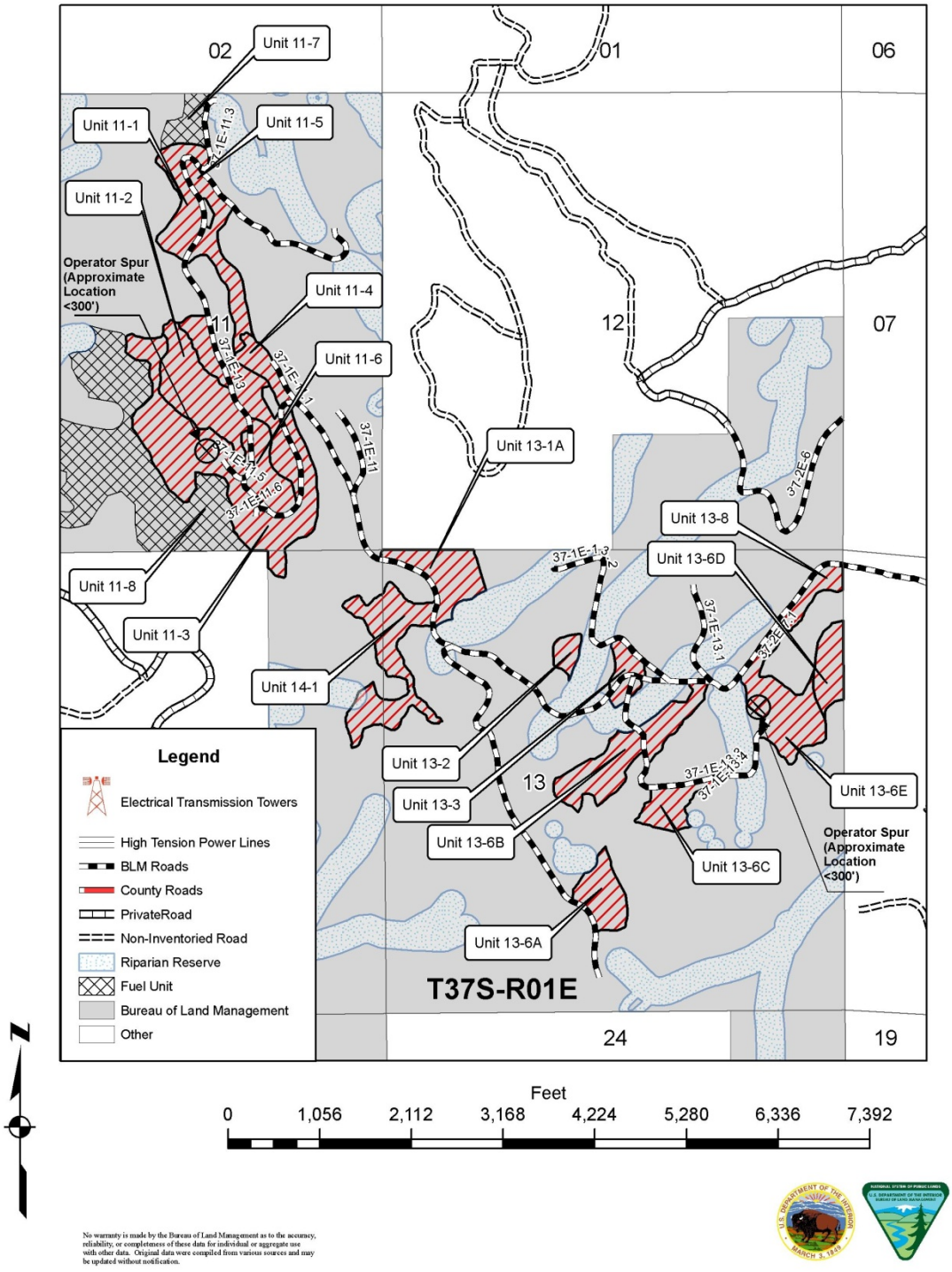
Seasonal Restrictions: (for log hauling)
0 = no restrictions;
1 = hauling restricted between 10/15 and 6/1
2 = hauling restricted between 11/15 and 5/15
Note: If Purchaser furnishes and places additional rock. Seasonal restrictions could be modified as approved by the Authorized Officer

Map 2-1. Rio Climax Project Alternative 2



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Map 2-2. Rio Climax Project Alternative 2



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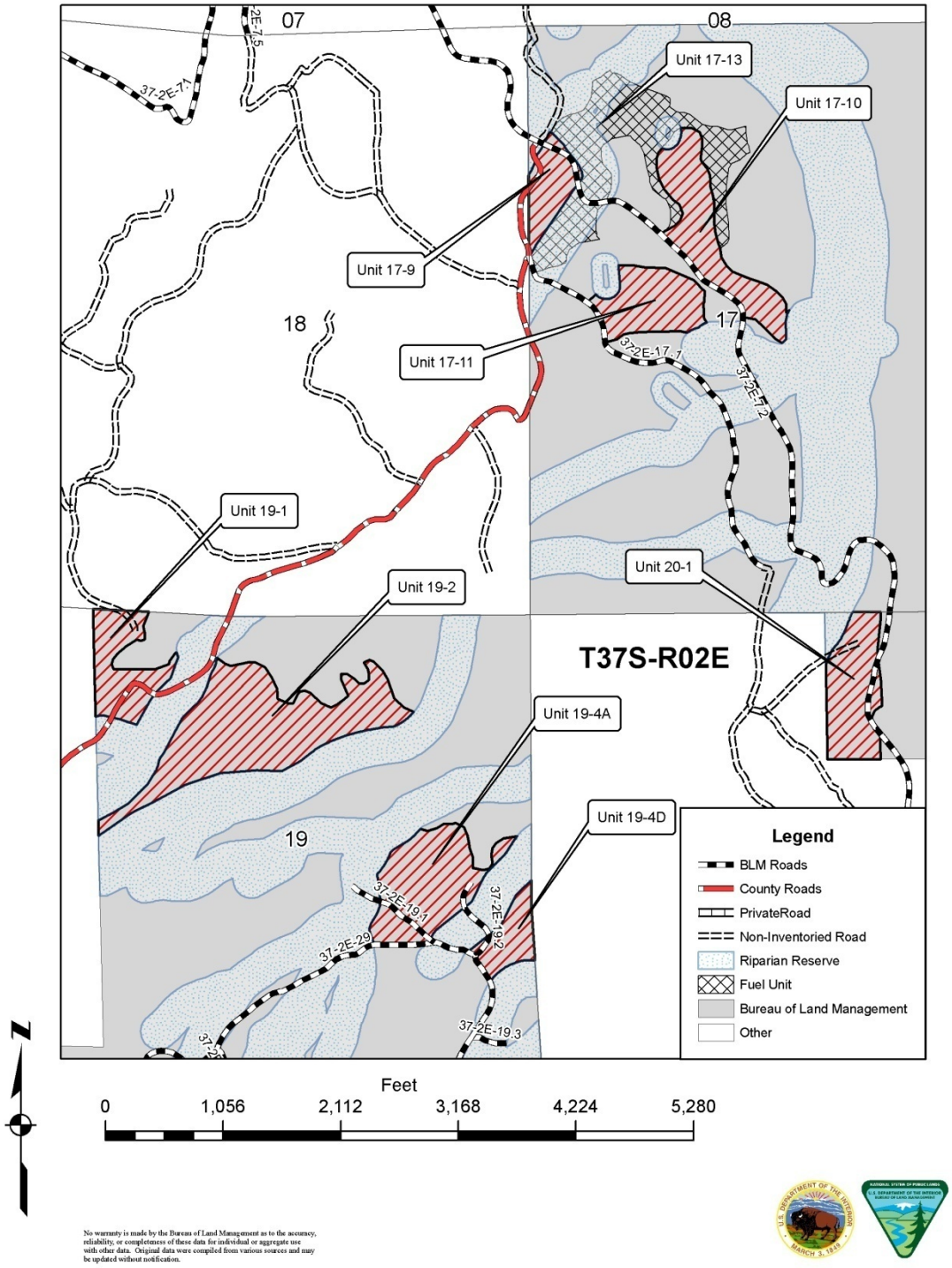
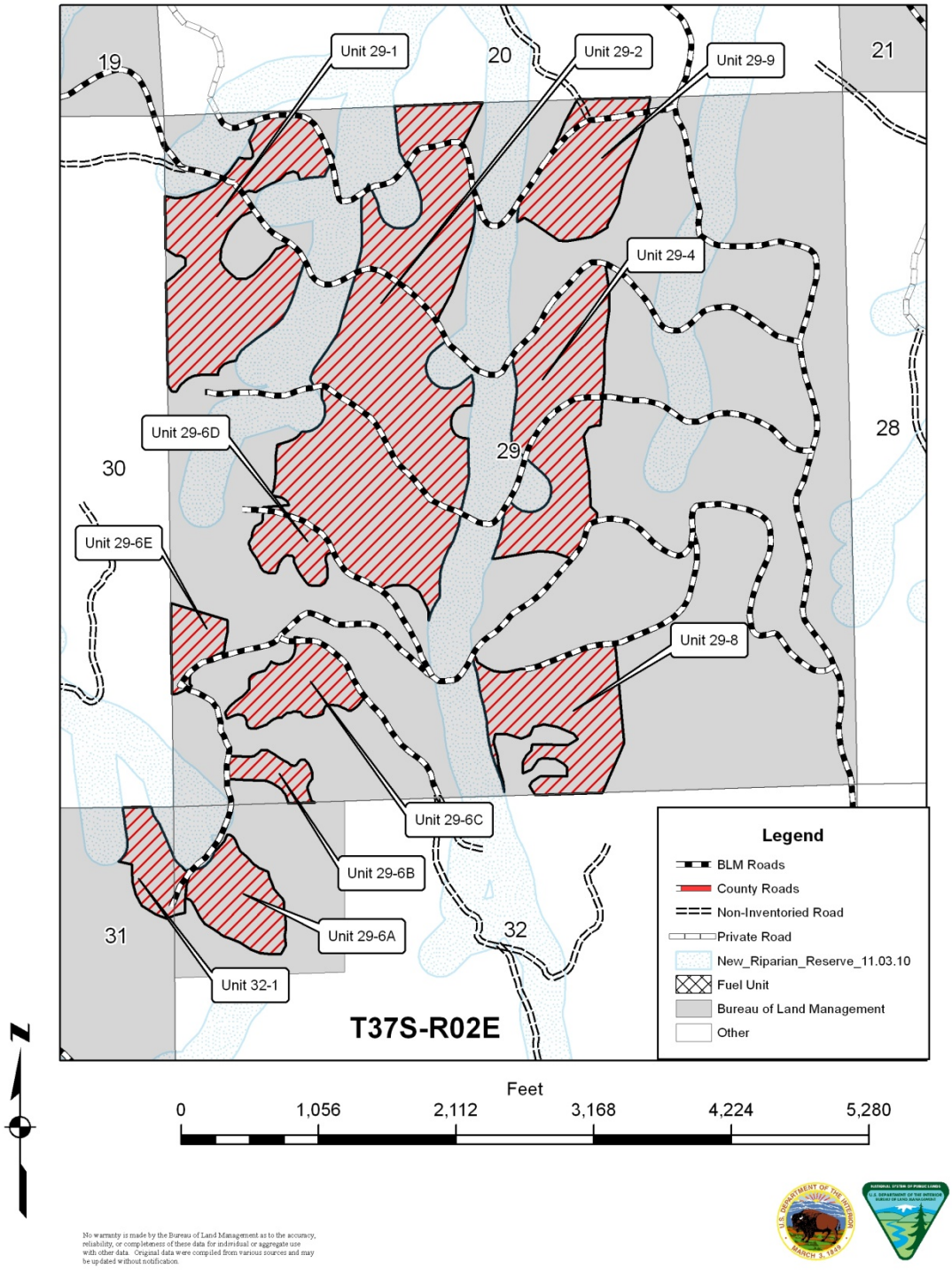
Map 2-3. Rio Climax Project Alternative 2



Map 2-4. Rio Climax Project Alternative 2



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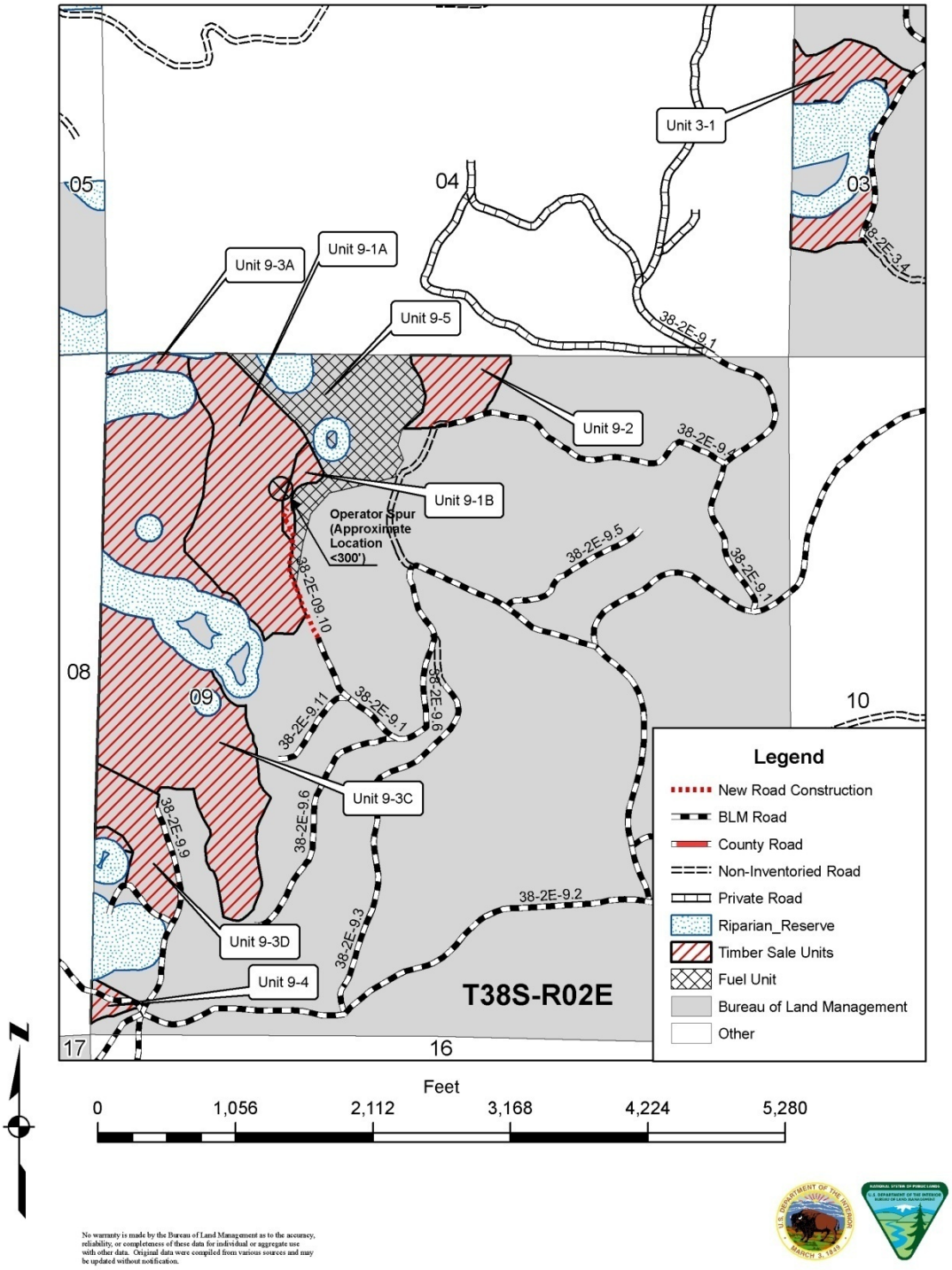
Map 2-5. Rio Climax Project Alternative 2



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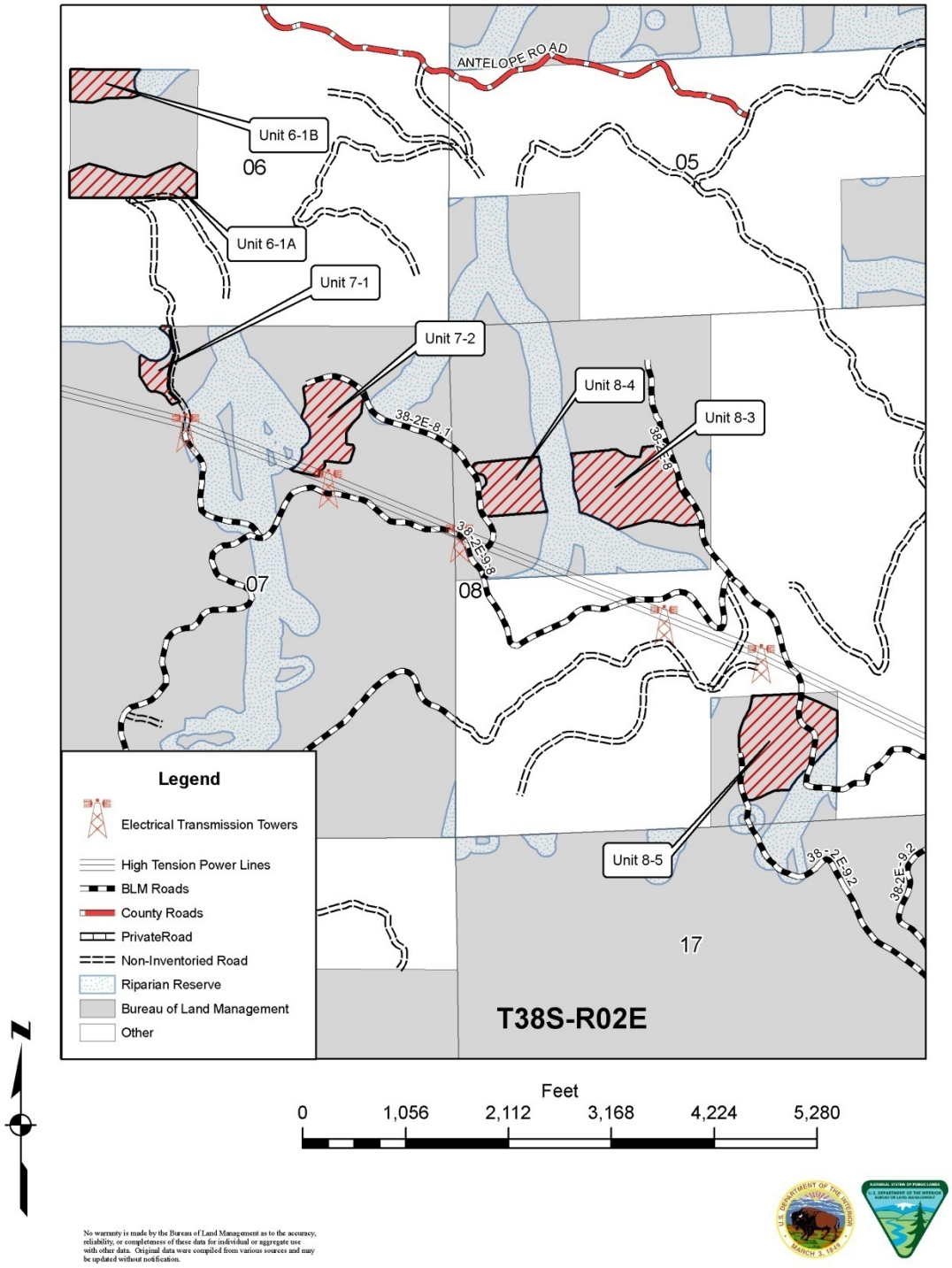
Map 2-6. Rio Climax Project Alternative 2



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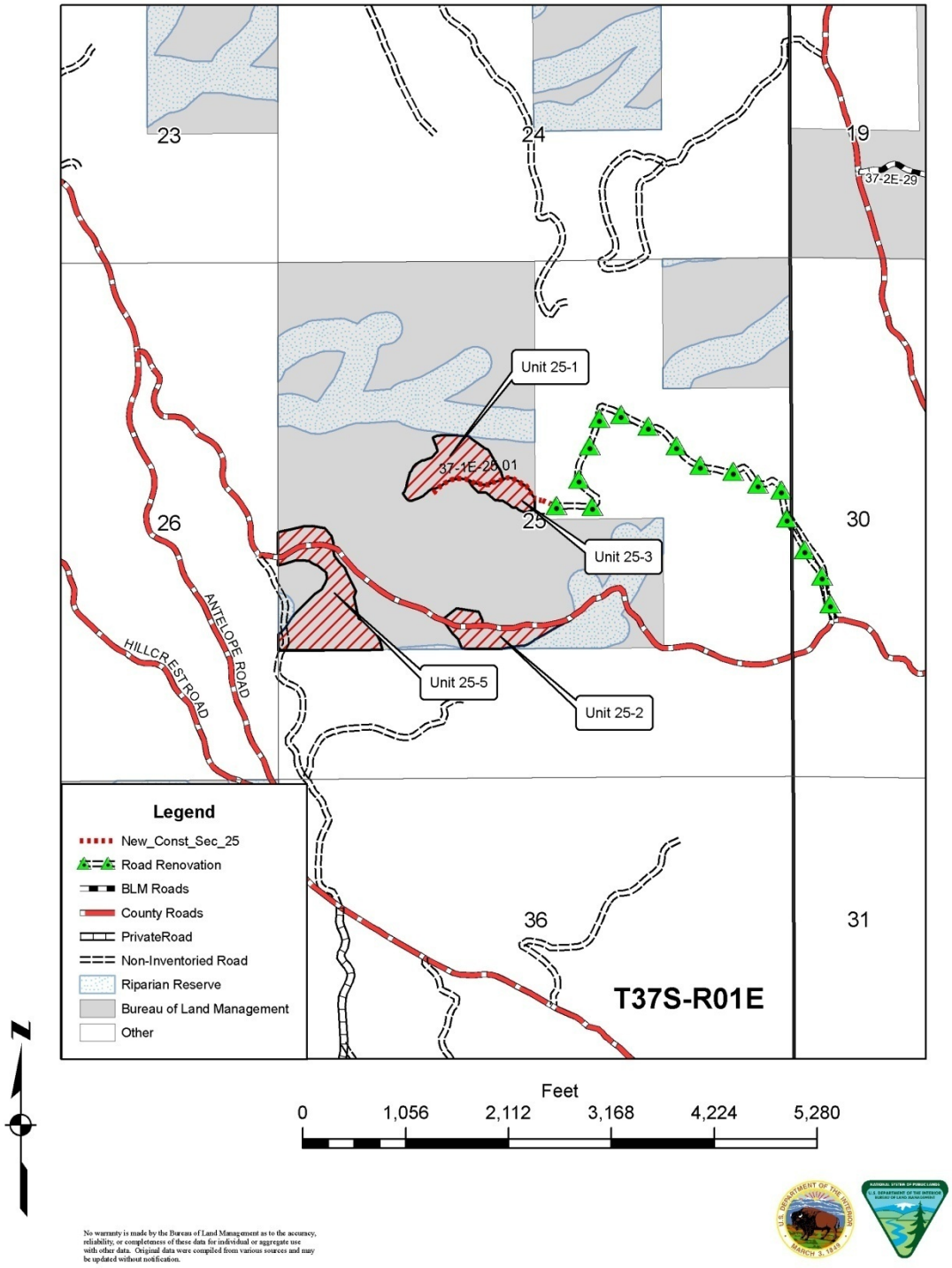
Map 2-7. Rio Climax Project Alternative 2



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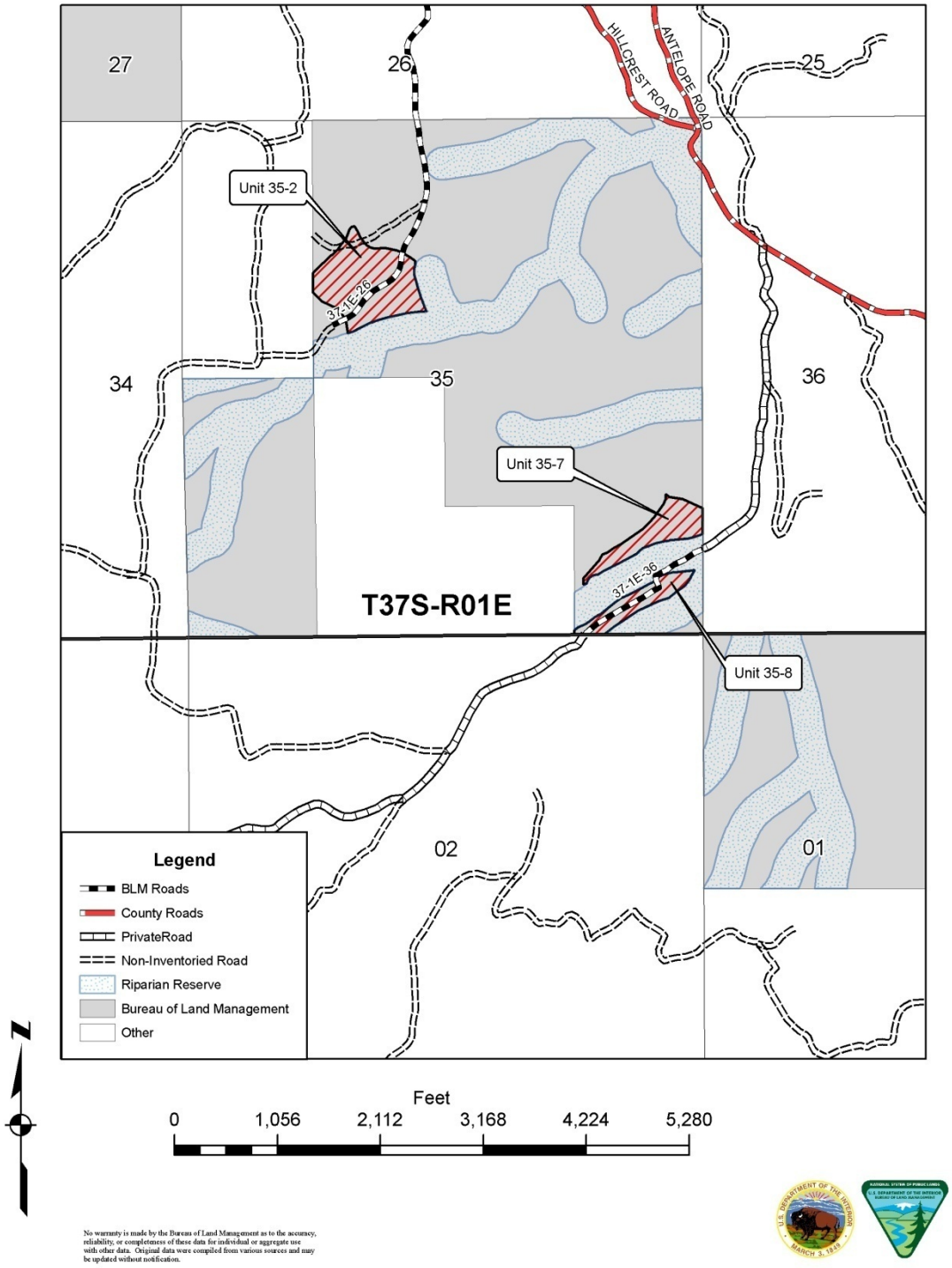
Map 2-8. Rio Climax Project Alternative 2



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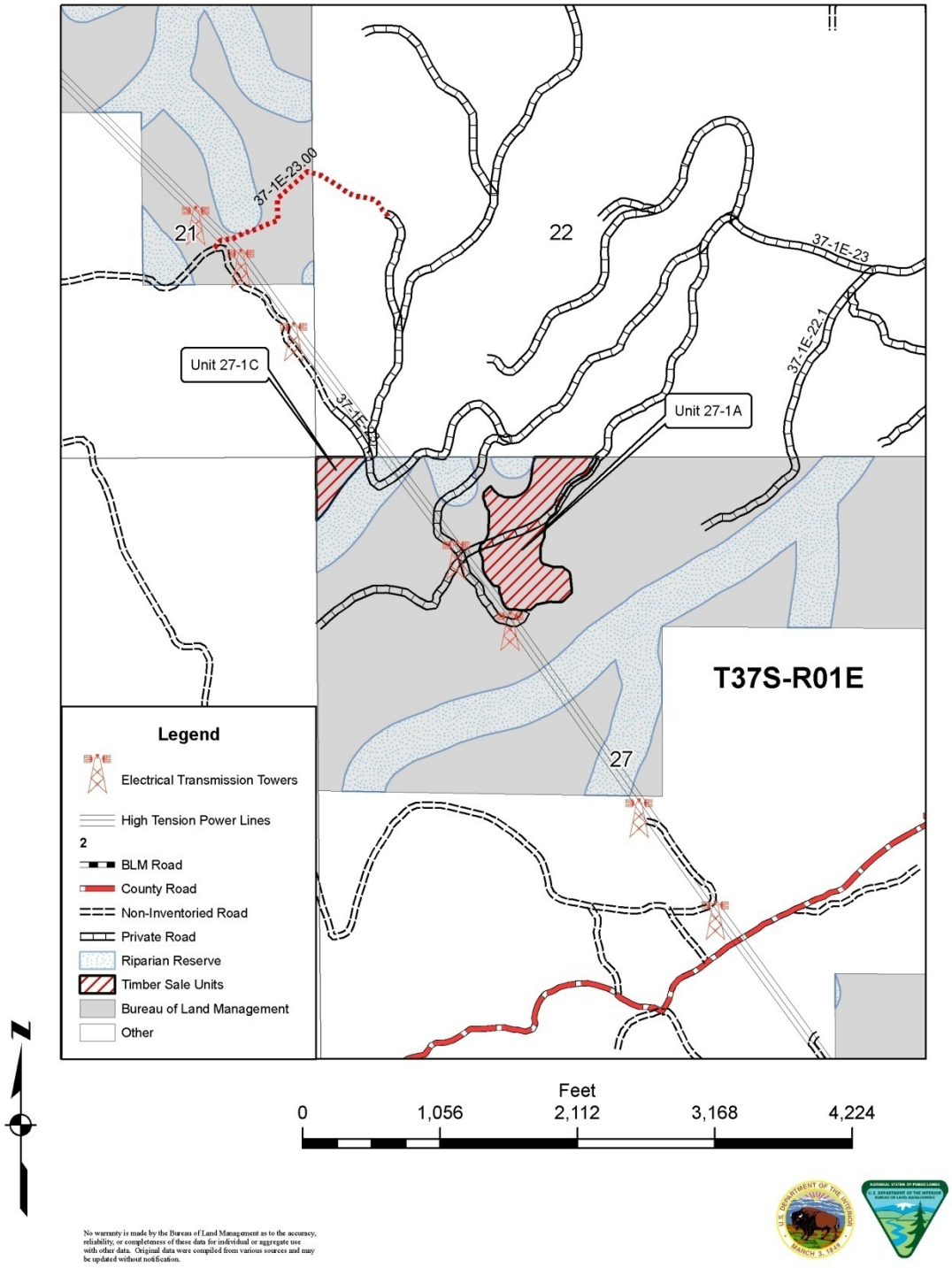
Map 2-9. Rio Climax Project Alternative 2



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b. Alternative 3

Alternative 3 is designed to achieve the needs described in Chapter 1 for the Rio Climax Forest Management Project while avoiding downgrading northern spotted owl habitat and reducing road construction needs. An estimated 801 acres of conifer forests would receive commercial forest thinning treatments; a summary of each prescription type proposed is described in detail under Subsection c., (1), Silvicultural Objectives and Prescriptions. An estimated 450 acres would be harvested using tractor yarding harvest method, 57 acres would be harvested using helicopter yarding, and the remaining 294acres would be harvested using cable yarding. Precommercial thinning (understory thinning) is also proposed on 434 of these 801 acres. Another 187 acres (Table 2-5) would receive non-commercial fuels reduction treatments to reduce hazardous fuels.

An estimated 61.3 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards. Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, and grading and shaping road surfaces. Temporary bridges would be utilized for two temporary channel crossings, one on road 37-1E-23 and one on the old county right-of-way in the northeast ¼ of section 26 (T. 37 S., R. 1 E.). Placement of portable bridges would not involve ground disturbance; they are hauled in and placed across the channel from the existing roadway during the dry season. BLM would renovate a road 37-2E-30.00 on private land to facilitate access to harvest Units 25-1 and 25-3. Renovation of road 37-2E-30.00 would involve reshaping the road with a blade and restoring water drainage. Alternative 3 would construct approximately 1.25 miles of new road to provide access to proposed harvest units; roads would be closed following use (e.g. gated or barricaded), and monitored to ensure closure is maintained. Table 2-7 provides a detailed road-by-road listing of proposed road use, and Table 2-8 provides details for road construction proposed under Alternative 3.

Two temporary operator spurs, each ranging from 50 to 300 feet in length (< 0.2 mile), would be constructed to facilitate improved access for yarding equipment in Units 17-8, 13-6E, and 9-1A. An existing spur 37-1E-11.05 would be cleared and may be extended slightly (<50 feet). Temporary operator spurs identified for the Rio Climax Project are not located or designed for general transportation uses. They would be constructed with a narrower clearing and road width, and would have no turnouts or culverts. Construction, log removal, waterbarring, seeding with native seed, mulching, and barricading would occur prior to the wet season of the year of construction.

Table 2-5 summarizes the Rio Climax Forest Management Project by silvicultural prescription type, timber harvest method, and associated non-commercial treatment types. Unit specific information, including fuels reduction treatments are displayed in Table 2-6 and Maps 2-10, 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-17, and 2-18.

Table 2-5. Summary of Acres for Alternative 3 by Silvicultural Prescription and Harvest Method

Silvicultural Prescriptions	Est. Acres
Maintain NSO Nesting, Roosting, and Foraging Habitat	488
Maintain NSO Dispersal Habitat	313
Total	801
Non-commercial Prescriptions	Est. Acres
Pre-commercial Thinning within Commercial Units	434
Pre-commercial thinning and fuels reduction outside Commercial Units	187
Timber Harvest Method	Est. Acres
Cable Yarding	294
Tractor Yarding	450
Helicopter Yarding	57

Table 2-6. Alternative 3 Units by Silvicultural Prescription, NSO Habitat, and Harvest Method

Unit No.	Acres	Silvicultural Prescription		Harvest Method	Associated Treatments (PCT, Fuels)
		Harvest Prescription	NSO Habitat Type		
6-1 (A&B)	14	ST/NRF	NRF/Salvage	Tractor	Activity fuel
7-1	3	ST/NRF	NRF	Tractor	PCT, Activity fuel
7-2	11	ST/NRF	NRF	Tractor	Activity fuel
8-3	19	ST/NRF	NRF	Cable	Activity fuel
8-4	8	ST/NRF	NRF	Cable	Activity fuel
8-5	18	ST/NRF	NRF	Cable	Activity fuel
9-1A	30	ST/NRF	NRF	Cable	Activity fuel
9-1B	2	ST/NRF	NRF	Tractor	Activity fuel
9-2	7	ST/NRF	NRF	Tractor	Activity fuel
9-3A-C	57	ST/NRF	NRF	Helicopter	Activity fuel
9-3D	9	ST/NRF	NRF	Cable	Activity fuel
9-4	2	ST/NRF	NRF	Tractor	Activity fuel
11-1*	10	ST/NRF	NRF	Cable	Activity fuel
11-2	17	ST/NRF	NRF	Tractor	Activity fuel
11-3	54	ST/NRF	NRF	Cable	Activity fuel
11-4	5	ST/NRF	NRF	Tractor	Activity fuel
11-5*	11	ST/NRF	NRF	Tractor	Activity fuel
11-6	8	ST/NRF	NRF	Tractor	Activity fuel
13-1A	11	ST/NRF	NRF	Cable	PCT, Activity fuel
13-2	3	ST/NRF	NRF	Tractor	Activity fuel
13-3	5	ST/NRF	NRF	Tractor	PCT, Activity fuel
13-6A	8	ST/NRF	NRF	Tractor	Activity fuel
13-6B	16	ST/NRF	NRF	Tractor	PCT, Activity fuel
13-6C	6	ST/NRF	NRF	Tractor	PCT, Activity fuel
13-6D	7	ST/NRF	NRF	Tractor	Activity fuel
13-6E	15	ST/NRF	NRF	Cable	Activity fuel
13-8	5	ST/Dispersal	Dispersal	Tractor	Activity fuel
14-1	19	ST/NRF	NRF	Tractor	PCT, Activity fuel
17-6C	33	ST/NRF	NRF	Tractor	Activity fuel
17-9*	7	ST/NRF	NRF	Tractor	PCT, Activity fuel
17-10*	16	ST/NRF	NRF	Tractor	PCT, Activity fuel
17-11*	11	ST/NRF	NRF	Tractor	PCT, Activity fuel
19-1*	10	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
19-2*	34	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
19-4A*	18	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
19-4D*	6	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
20-1*	13	ST/NRF	NRF	Tractor	PCT, Activity fuel
25-1	9	ST/NRF	NRF	Cable	Activity fuel
25-2	6	ST/NRF	NRF	Tractor	PCT, Activity fuel
25-3	3	ST/NRF	Dispersal	Tractor	Activity fuel
25-5	17	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel

Unit No.	Acres	Silvicultural Prescription		Harvest Method	Associated Treatments (PCT, Fuels)
		Harvest Prescription	NSO Habitat Type		
27-1A	13	ST/NRF	NRF	Tractor	PCT, Activity fuel
27-1C	2	ST/NRF	NRF	Tractor	Activity fuel
29-1	29	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-2*	76	ST/Dispersal	Dispersal	Cable	PCT, Activity fuel
29-3	13	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-4*	27	ST/Dispersal	Dispersal	Cable	PCT, Activity fuel
29-6B	3	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-6C	9	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-6D	5	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-6E	4	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-8*	19	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
29-9*	2	ST/Dispersal	Dispersal	Cable	PCT, Activity fuel
32-1	6	ST/Dispersal	Dispersal	Cable	PCT, Activity fuel
35-2	17	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
35-7	7	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
35-8	6	ST/Dispersal	Dispersal	Tractor	PCT, Activity fuel
Total	801				

Abbreviations:
NSO = Northern Spotted Owl NRF = Nesting, Roosting, Foraging
N/A = Outside of NSO critical habitat ST = Selective Thinning DM = Density Management

Table 2-7. Alternative 3 Road Use Table – Existing Roads

Road Number	Approx. Length (miles)	Existing Surface:	Control	Seasonal Restriction (for log hauling)
37-1E-20.00 A	0.31	NAT	PVT	1
37-1E-20.00 B	1.00	NAT	BLM	1
37-1E-21.00 B	0.13	NAT	PVT	1
37-1E-21.01	1.00	NAT	PVT	1
37-1E-22.02 A	0.44	NAT	PVT	1
37-1E-22.02 B	0.23	NAT	BLM	1
37-1E-23.00 A	0.42	ASC	BLM	1
37-1E-23.00 B	1.85	ASC	PVT	1
37-1E-23.00 D	0.55	NAT	PVT	1
37-1E-26.00 A-C	2.43	ASC	BLM	1
37-1E-35.00	0.20	NAT	BLM	1
37-1E-36.00 A	0.60	NAT	PVT	1
37-1E-36.00 B	0.30	NAT	BLM	1
37-2E-07.02 A-C	5.04	ASC	BLM	1
37-2E-07.01 A-C	2.92	ASC	BLM	1
37-1E-11.03	0.19	ASC	BLM	1
37-1E-11.05	0.07	NAT	BLM	1
37-1E-13.00 A-B2	2.37	ASC	BLM	1
37-1E-13.02	0.42	ASC	BLM	1
37-1E-13.03	0.65	ASC	BLM	1
37-2E-18.00	0.80	NAT	PVT	1
37-2E-19.01	0.20	NAT	BLM	1
37-2E-19.02	0.12	NAT	BLM	1
37-2E-29.00 A1-A2	0.93	ASC	BLM	1

Road Number	Approx. Length (miles)	Existing Surface:	Control	Seasonal Restriction (for log hauling)
37-2E-29.00 B	0.15	ASC	PVT	1
37-2E-29.00 C	1.61	ASC	BLM	1
37-2E-29.01 A1-A2	1.09	ASC	BLM	1
37-2E-29.01 B	0.09	NAT	BLM	1
37-2E-29.02	1.08	ASC	BLM	1
37-2E-29.03 A-B	1.59	ASC	BLM	1
37-2E-29.04	0.34	ASC	BLM	1
37-2E-29.05	0.39	ASC	BLM	1
37-2E-29.07	0.40	ASC	BLM	1
38-2E-08.00	0.47	GRR	BLM	1
38-2E-08.01	0.78	ASC	BLM	1
38-2E-09.01	0.37	ASC	BLM	1
38-2E-09.02 A-B	1.67	BST	BLM	2
38-2E-09.02 C	0.38	GRR	BLM	1
38-2E-09.04 A1	0.30	ASC	BLM	1
38-2E-09.04 B	0.42	ASC	BLM	1
38-2E-09.06	0.67	ASC	BLM	1
38-2E-09.08	3.31	ASC	BLM	1
38-2E-09.09	0.30	NAT	BLM	1
38-2E-09.10	0.24	ASC	BLM	1
38-2E-09.11	0.15	ASC	BLM	1
38-2E-09.12	0.09	NAT	BLM	1
38-2E-27.00 A-C1	4.59	BST	BLM	2
County Roads, Non-BST	16.81	ASC, PRR, NAT	CNTY	
Subtotal	60.46			
Existing Roads in the Project Area-Renovation Needed				
Road Number	Approx. Length (miles)	Existing Surface:	Control	Seasonal Restriction (for log hauling)
37-1E-25.00	0.61	NAT	PVT	1
37-2E-30.01	0.22	NAT	PVT	1
Subtotal	0.83			
Total mileage	61.29			

Abbreviations:

Existing Surface: NAT = natural, GRR = Grid Rolled Rock, PRR = Pit Run Rock, ASC = Aggregate Surface Course, BST = Bituminous Surface Treatment

Control: BLM = Bureau of Land Management, PVT = Private

Seasonal Restrictions: (for log hauling)
0 = no restrictions;
1 = hauling restricted between 10/15 and 6/1
2 = hauling restricted between 11/15 and 5/15
Note: If Purchaser furnishes and places additional rock. Seasonal restrictions could be modified as approved by the Authorized Officer

Table 2-8. Alternative 3 Proposed New Road Construction

Road Number	Approx. Length (miles)	Proposed Surface:	Control	Seasonal Restriction (for log hauling)
37-1E-25.01	0.50	NAT	BLM	1
37-1E-23.00	0.40	NAT	BLM	1
38-2E-09.10	0.35	NAT	BLM	1
Total mileage:	1.25			-

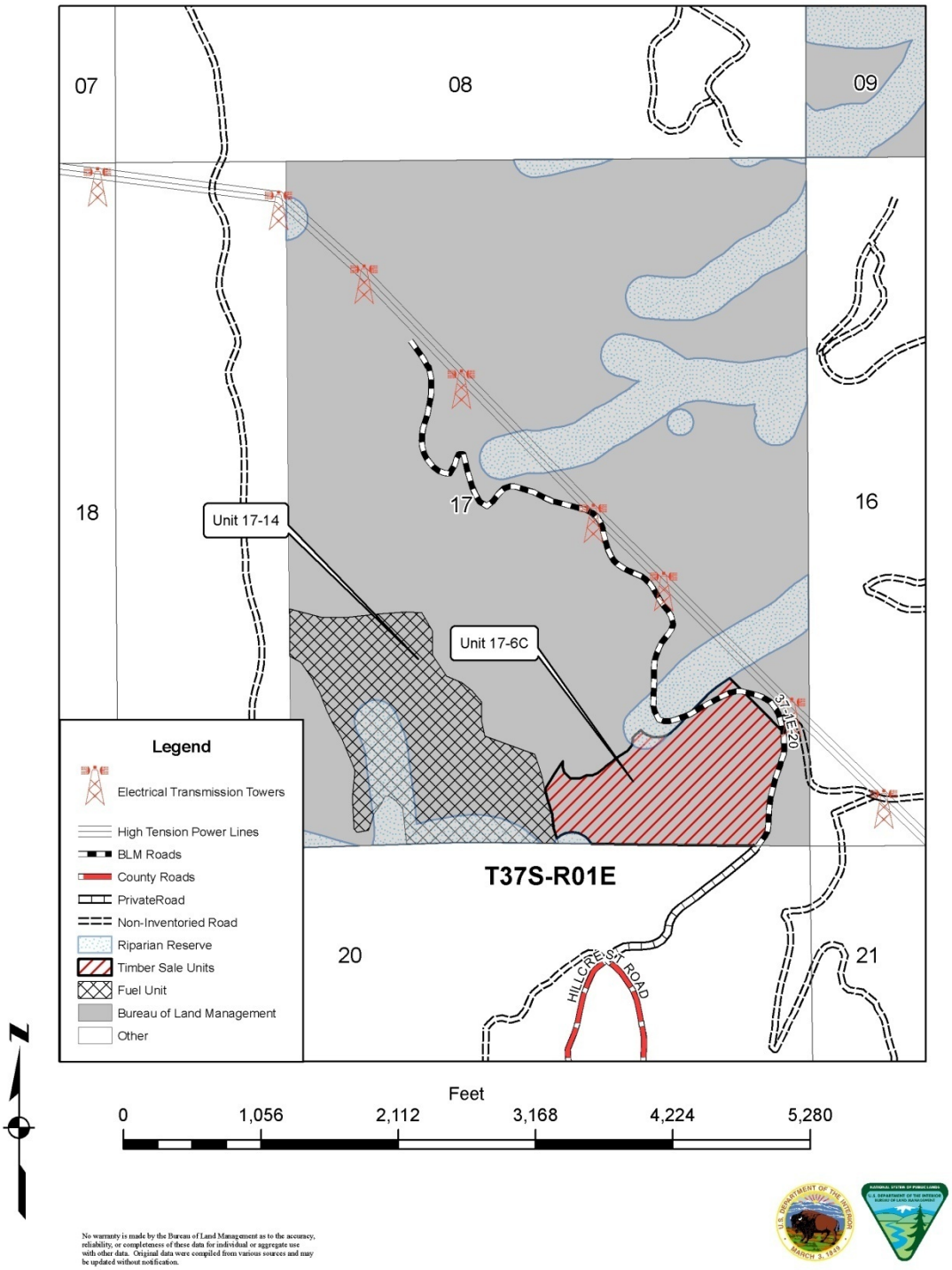
Abbreviations:

Existing Surface: NAT = natural, GRR = Grid Rolled Rock, PRR = Pit Run Rock, ASC = Aggregate Surface Course, BST = Bituminous Surface Treatment

Control: BLM = Bureau of Land Management, PVT = Private

Seasonal Restrictions: (for log hauling)
0 = no restrictions;
1 = hauling restricted between 10/15 and 6/1
2 = hauling restricted between 11/15 and 5/15
Note: If Purchaser furnishes and places additional rock. Seasonal restrictions could be modified as approved by the Authorized Officer

Map 2-10. Rio Climax Project Alternative 3



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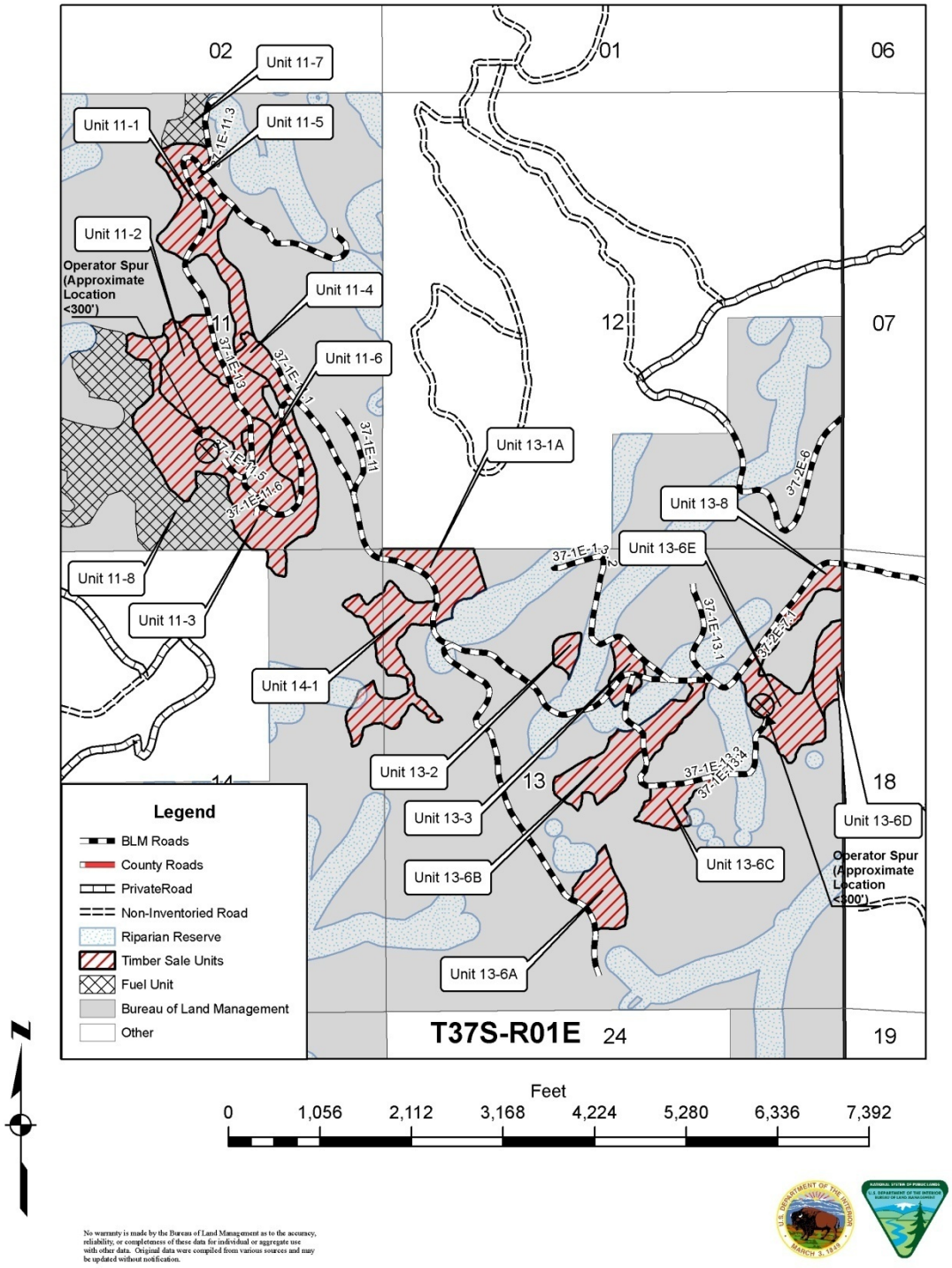
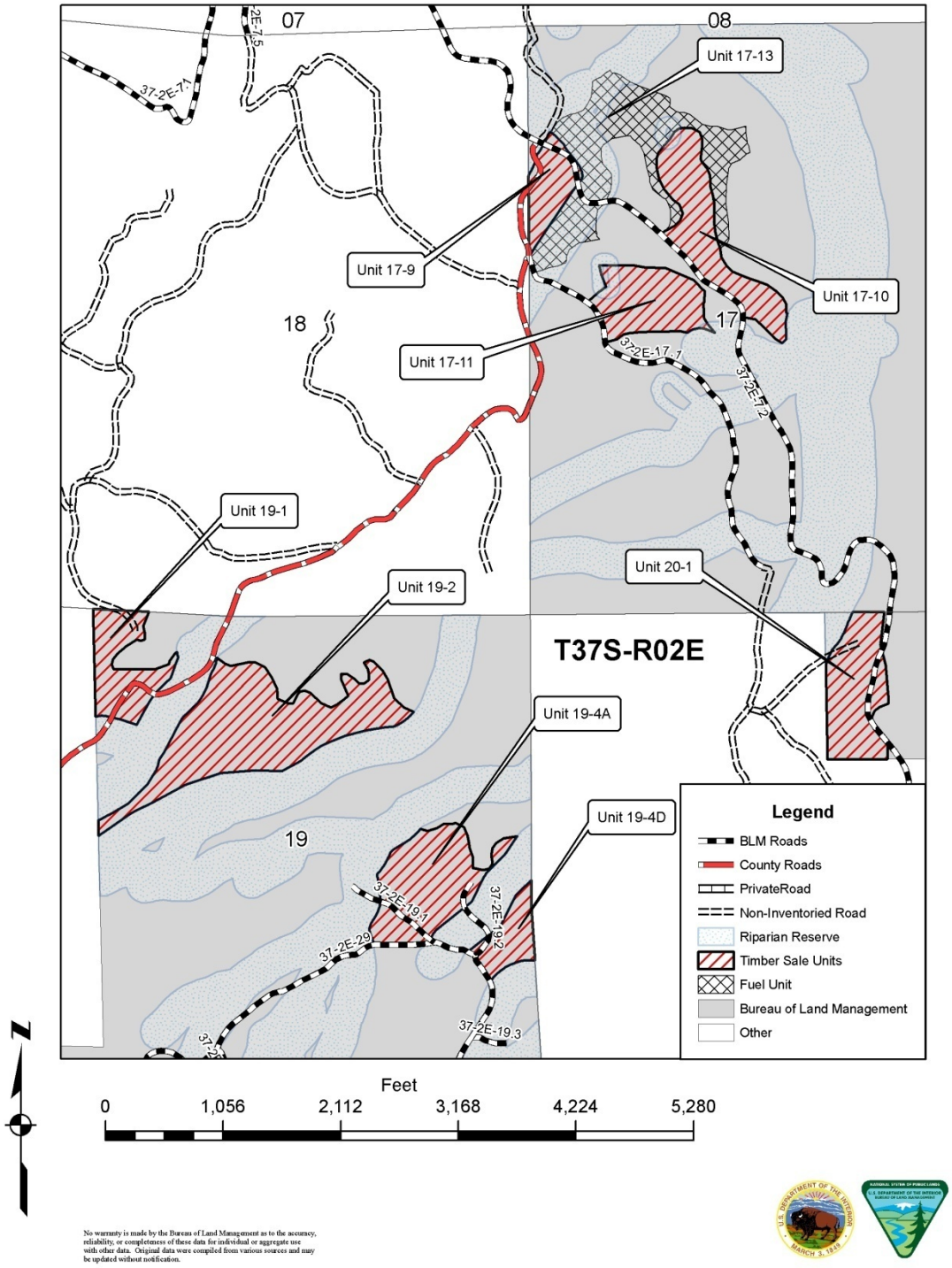
Map 2-11. Rio Climax Project Alternative 3



Map 2-12. Rio Climax Project Alternative 3



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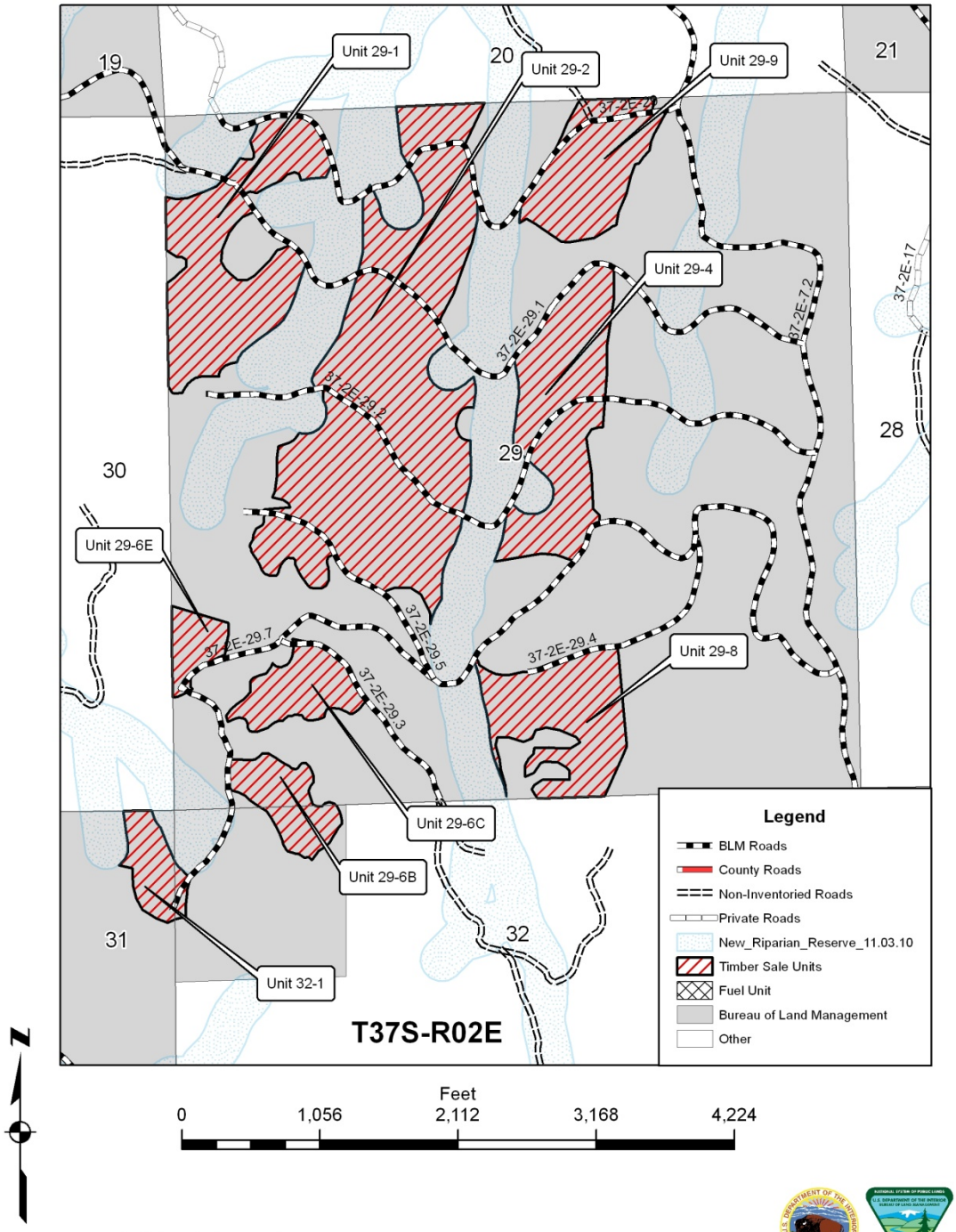
Map 2-13. Rio Climax Project Alternative 3



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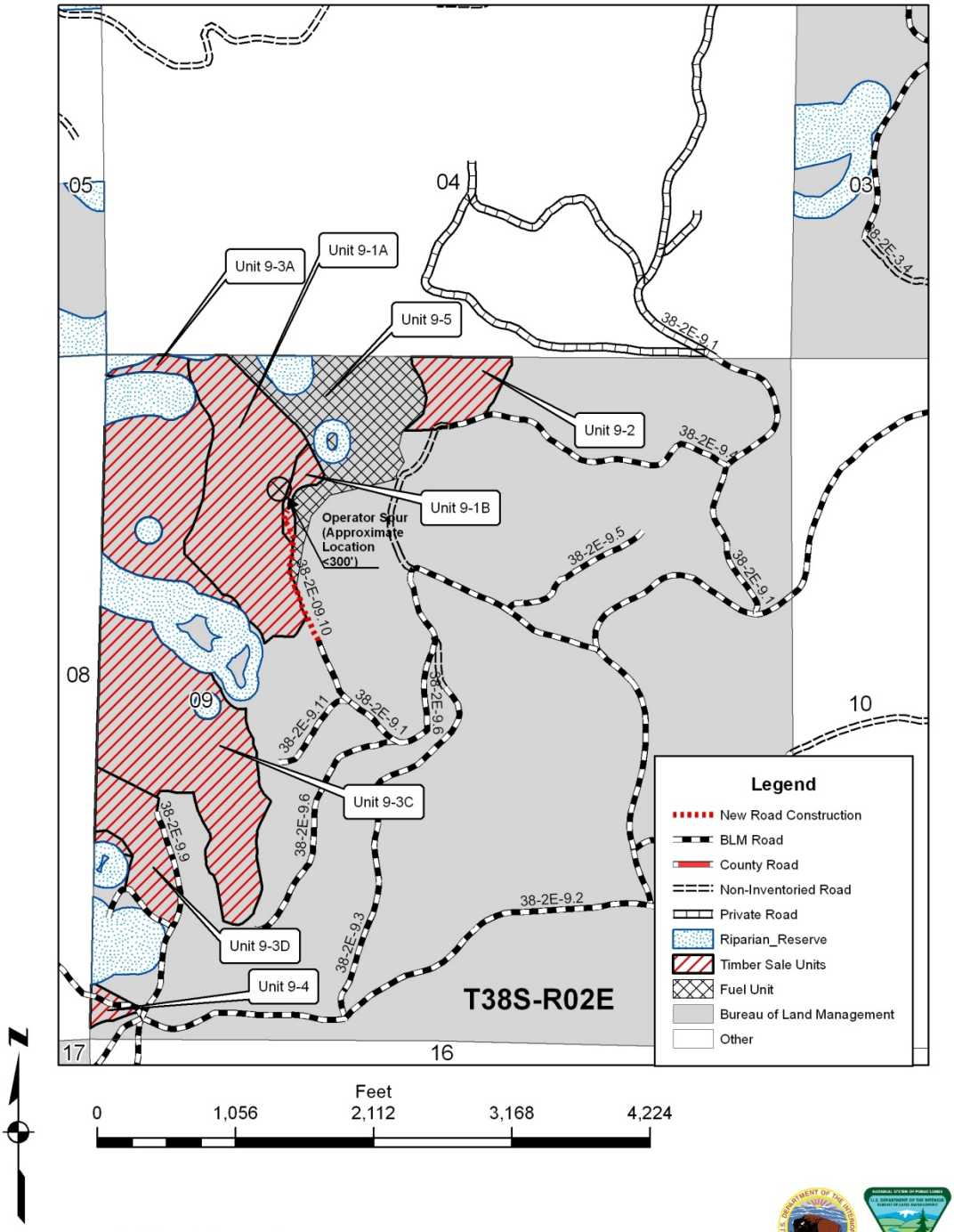
Map 2-14. Rio Climax Project Alternative 3



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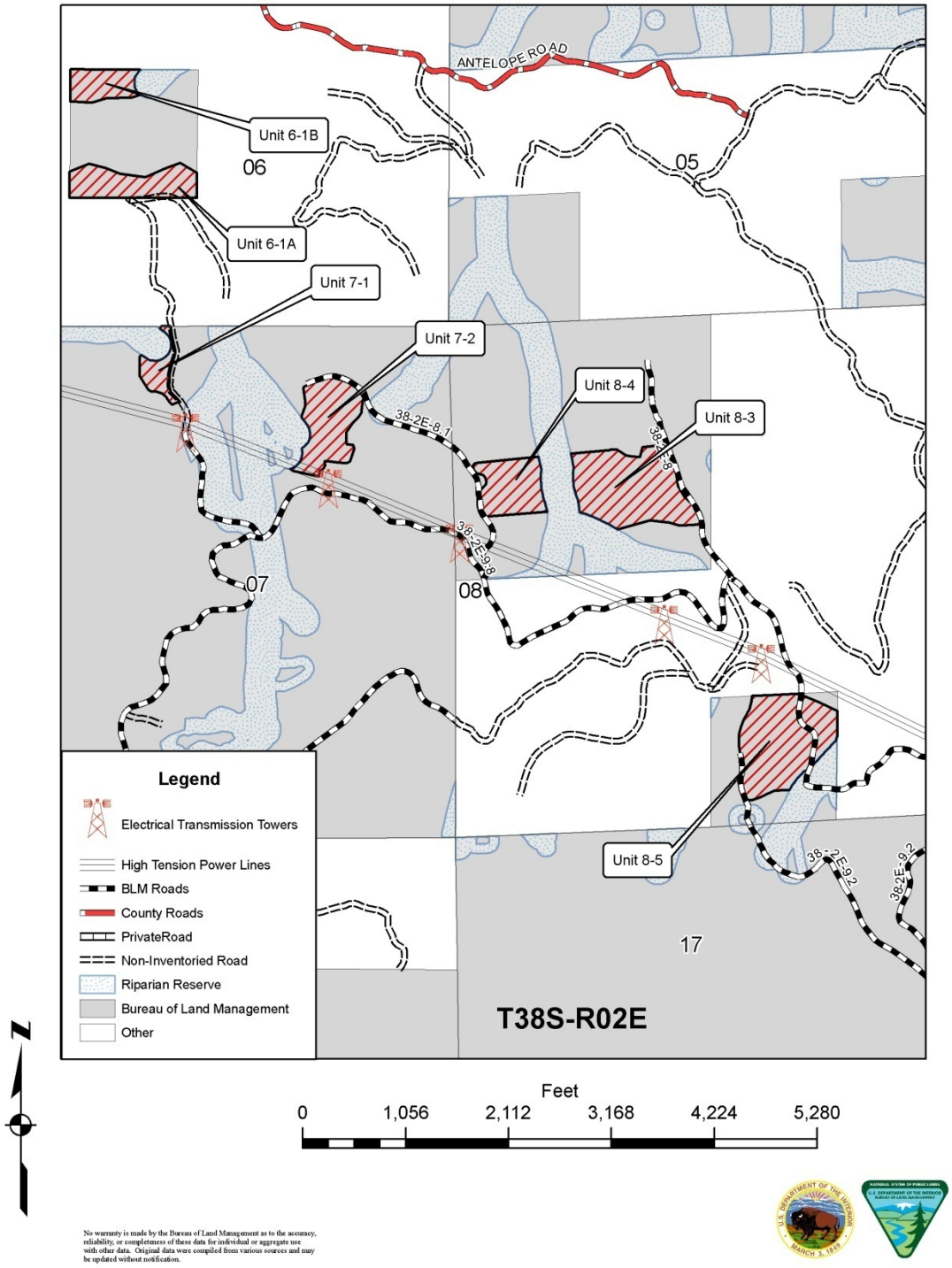
Map 2-15. Rio Climax Project Alternative 3



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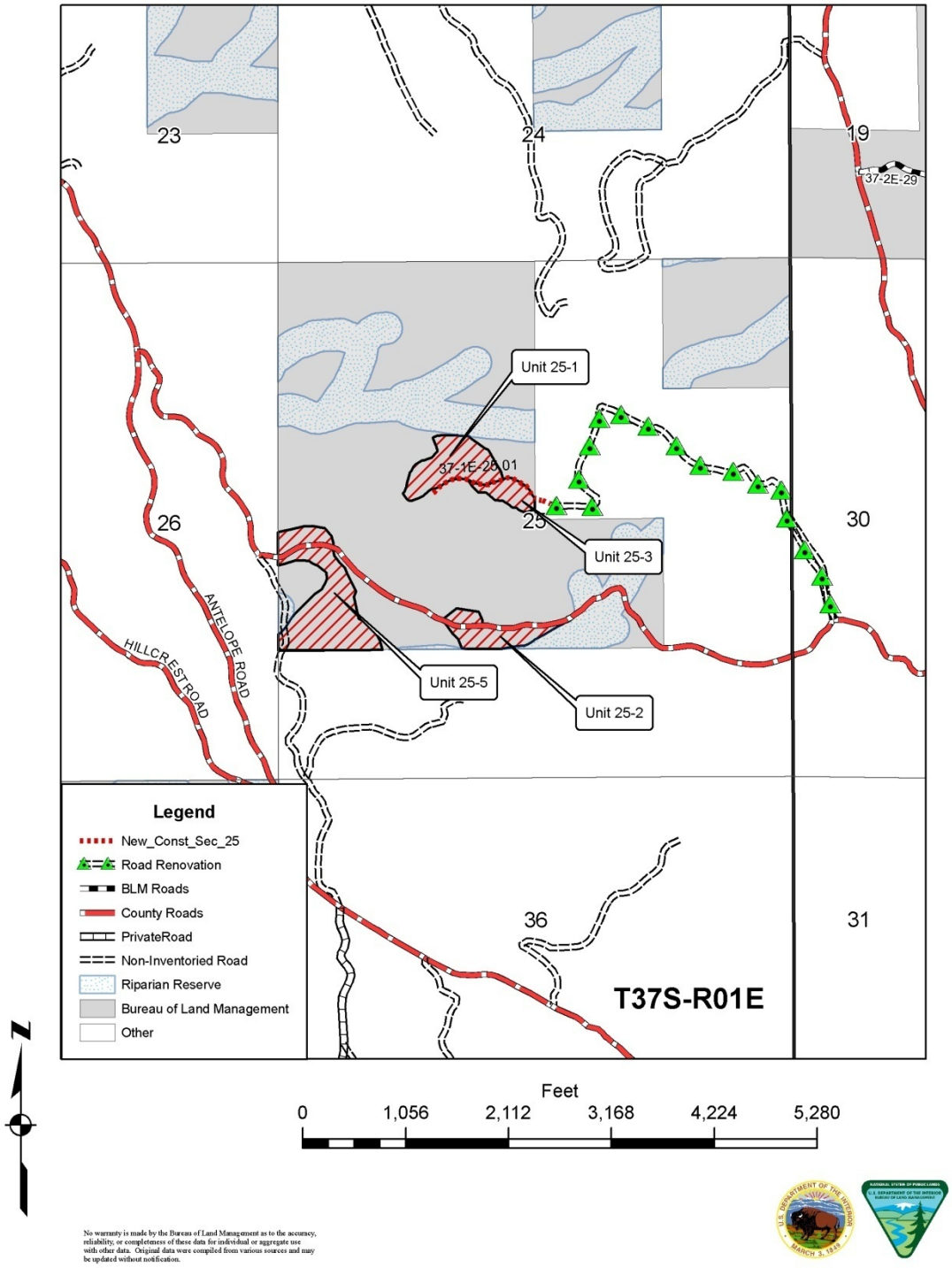
Map 2-16. Rio Climax Project Alternative 3



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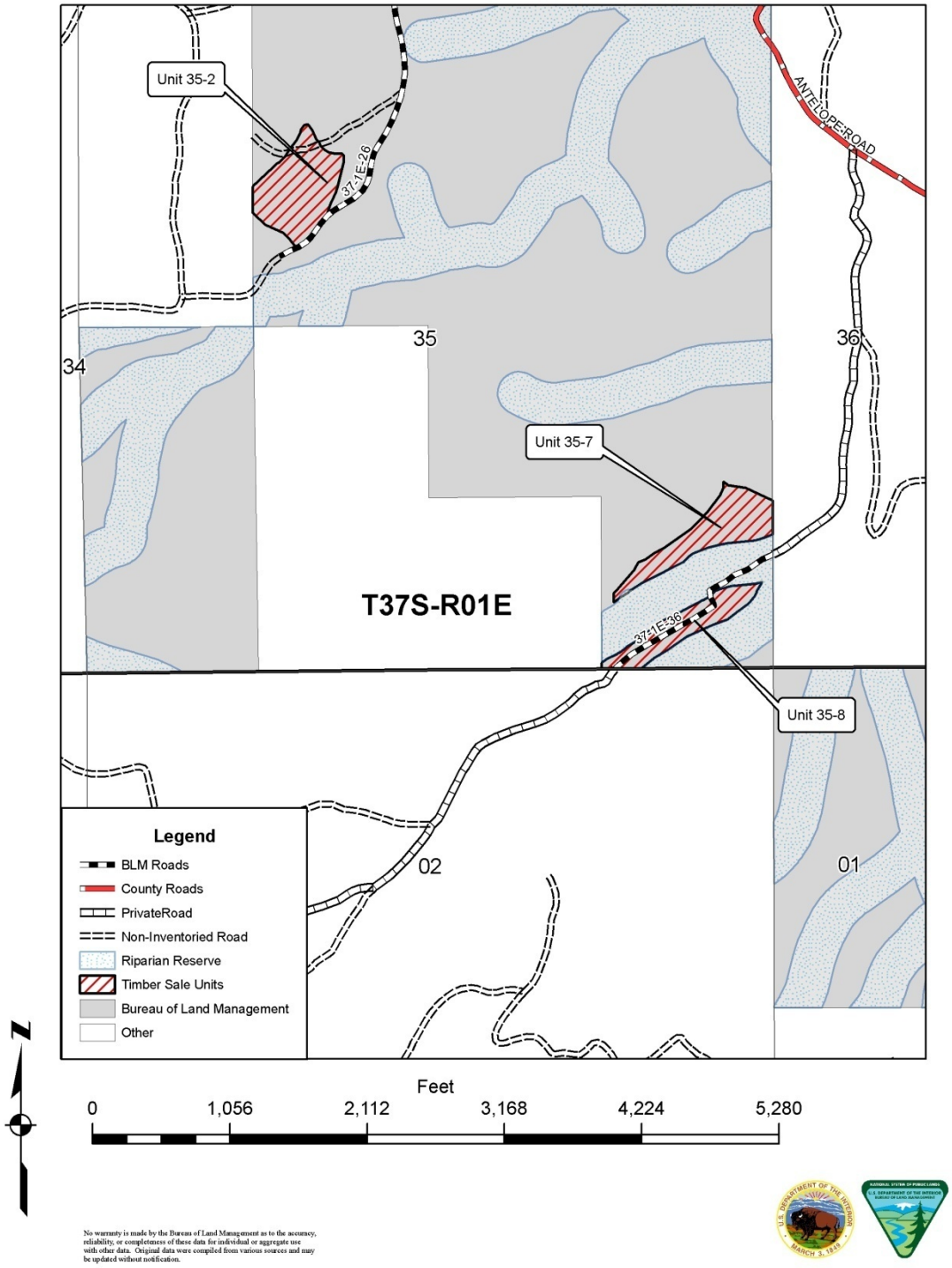
Map 2-17. Rio Climax Project Alternative 3



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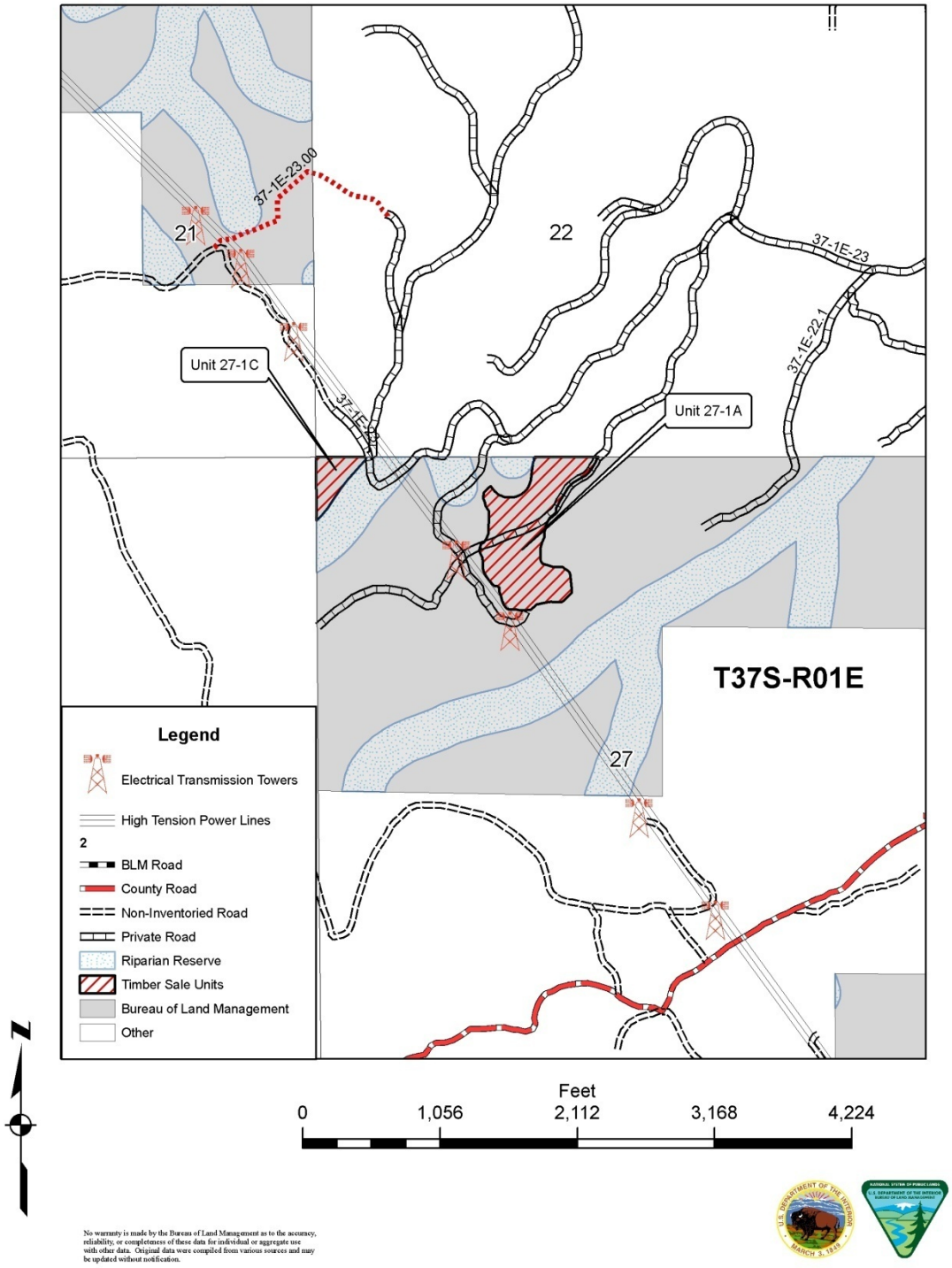
Map 2-18. Rio Climax Project Alternative 3



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C. COMPONENTS COMMON TO THE ACTION ALTERNATIVES

1. Silvicultural Objectives and Prescriptions

The silvicultural objectives for harvest are as follows: 1) Reduce stand density to increase tree growth, quality, and vigor of the remaining trees; 2) Create diversified stand structure (height, age, and diameter classes) and old-growth stand characteristics; 3) Increase growing space and decrease competition for large or legacy pine, oak, and cedar. (preserve existing genotypes which are physiologically better adapted to fire disturbance); 4) maintaining existing owl habitat in selected forest stands (Tables 2-2 and 2-6).

Trees would be marked for thinning within proposed treatment units by BLM personnel, with oversight from the Ashland Resource Area's silviculturist and wildlife biologist, to ensure that treatment units are marked according to the silvicultural prescriptions.

Selective Thinning (ST):
Maintain Northern Spotted Owl Nesting, Roosting, Foraging Habitat (NRF)
Selected forest stands that are currently providing for northern spotted owl nesting, roosting, and foraging habitat would be thinned to maintain NRF habitat function. The complex forest structure that forms NRF habitat consists of dead down wood, snags, dense canopy, multi-storied stands, or mid-canopy habitat. However, southwest Oregon NRF habitat varies greatly and one or more of these habitat components might be lacking or even absent. Vegetative features of NRF habitat in southwest Oregon are typified by mixed-conifer habitat, recurrent fire history, and patchy habitat components. The silvicultural strategy here includes the use of selective thinning.

Selective thinning in NRF habitat is designed to accelerate the growth of large trees while maintaining a minimum of 60 percent canopy cover at the stand level. Canopy cover is the proportion of the forest floor covered by the vertical projection of tree crowns. Canopy cover is usually estimated with devices like the moosehorn, aerial photography, or remote imagery. Spacing of the residual (leave) trees would involve crown spacing off the healthiest dominant and co-dominant trees to achieve an average crown spacing range of 1-6 ft. (dripline to dripline) at the stand level. Trees targeted for removal should include those with crown ratios less than 30%, exhibit crown decline, narrow crown widths, and contribute least to the canopy layer. Trees would be individually selected for removal that demonstrate these characteristics, unless it compromises the required minimum canopy cover of 60%. Spacing of the residual trees would use the crown widths of the healthiest dominant and co-dominant trees to achieve an average relative density range of 0.35 to 0.55 (35 to 55%). Relative density is the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume.

Selective Thinning (ST): Maintain Northern Spotted Owl Dispersal Habitat (DSP)
Selected forest stands that are currently providing for northern spotted owl dispersal only habitat would be thinned to retain approximately 40 percent canopy cover to maintain dispersal habitat. Dispersal habitat is described as forested habitat greater than 40 years old with an average tree diameter of 11 inches, a canopy cover of about 40 percent or more, and flying space for owls in the understory.

Stands in dispersal habitat that meet the above criteria would be selectively thinned to accelerate the growth of large trees while maintaining approximately 40 percent canopy cover at the stand level. Spacing of the residual (leave) trees would involve crown spacing off the healthiest dominant and co-dominant trees to achieve an average crown spacing range of 3-15 ft. (dripline to dripline)at the stand level. Trees targeted for removal should include those with crown ratios less than 30%, exhibit crown decline, narrow crown widths, and contribute least to the canopy layer. Trees would be individually selected for removal that demonstrate these characteristics, unless it compromises the required minimum canopy cover of 40%. Spacing of the residual trees would use the crown widths of the healthiest dominant and co-dominant trees to achieve an average relative density range of 0.25 to 0.45 (25 to 45%).

Figure 2-1. Photographs illustrating >60% canopy cover (on left) and about 40% canopy cover (on right).

Density Management

The primary objective of thinning in units identified for density management is to improve tree vigor and growth for long-term forest production and to reduce the impacts of forest disease. Silvicultural prescriptions are based on site conditions that dictate forest types such as pine site, dry Douglas-fir, and mixed conifer. The silvicultural strategy here includes the use of density management.

This prescription is typically prescribed for uneven-aged stands for the primary purpose of widening the spacing of residual trees in order to promote the growth and structural development of the remaining stand. Many of these stands developed in conjunction with disturbance (fire, insects, harvest, etc.) and have several layers containing multiple species. Spacing of the residual trees would use the basal area of the healthiest dominant and co-dominant trees to achieve an average relative density of 0.25 to 0.45 (25 to 45%).

***Pine Site Thinning*:** These stands may have developed a substantial component of Douglas-fir as a result of fire exclusion and stands have become overstocked with all condition classes of vegetation. These are areas with southerly or easterly aspects and shallow soils where pine species are best adapted. They are typically small in size and found on dry ridges and low elevations with Douglas-fir mortality occurring. The goal on these sites is the retention of existing large ponderosa pine and the subsequent development of young pine. The treatments would leave the best, healthiest pine and remove the majority of Douglas-fir trees to allow the pine to once again dominate the site.

- Leave 60-100 ft^2 basal area per acre of the largest healthiest trees. [1]
- Reduce competing vegetation from around healthy pines, oak, and incense cedar to ensure their survival.
- Protect hardwoods: oak trees 10 inches dbh and larger and madrone trees 16 inches dbh and larger with full live crown ratios of 30 percent or greater.
- Leave all codominant and dominant pine, cedar, and oak; suppressed individuals can be cut.

***Dry Douglas-fir Thinning*:** Dry Douglas-fir stands are typically found on west, southwest, east, and southeast aspects in Douglas-fir plant associations. Douglas-fir is the predominant conifer species and ponderosa pine is often present in the stands. Treatments proposed for these sites would be thinned to a basal area range of 80 to 120 ft^2 (average 100) per acre. The larger healthier trees would be favored as leave trees. On dry ridges and sites in the "Douglas-fir - Poison oak" plant association, especially where manzanita is found, trees would be thinned to retain no more than 80 ft^2 basal area per acre.

[1] Basal Area - a) Of a tree: the cross-sectional area, expressed in square feet, of a tree stem measured at breast height. b) Of a forest stand: the total cross-sectional area of all the trees in a stand, measured at breast height, expressed in square feet per acre. Measurement of how much of a site is occupied by trees; directly related to stand density.

***Mixed Conifer Thinning*:** These stands are comprised of a mix of tree species including Douglas fir, ponderosa pine, sugar pine, incense cedar, and white fir. Thinning objectives for mixed conifer stands are to improve tree vigor and growth, maintain a larger proportion of Douglas-fir species while maintaining the highest diversity of mixed conifer species for the stand. Treatments proposed for these sites would be thinned to a basal area range of 100 to140 ft^2 (average 120) per acre. Species composition of the forest must be considered as well as individual tree physiology. A minimum of 20 percent early seral species should be maintained in the mixed conifer forest stands as described by Franklin and Dyrness (1973). Therefore, selection of treatment trees would be based on 1) species; 2) tree dominance; 3) age class or diameter; and 4) individual tree characteristics. Suitable sugar pine, Douglas-fir, incense cedar, and ponderosa pine (disease free, non-chlorotic, sugar pine, Douglas-fir, incense cedar, and ponderosa pine with crown ratios ≥ 30%) would be favored for leave over white fir.

General Guidance Applicable to all Silvicultural Prescriptions

Strive to create diverse vertical and horizontal stand structure by leaving trees of all crown classes with crown ratios of ≥ 30 percent. Strive for stand diversity in regard to diameter classes, species compostion, tree heights (crown classes), trees per acre, and the vigor of individual trees. Some diseased, forked-top trees, and dying and dead trees should remainas prescribed to meet wildlife objectives (see below and Project Design Features, Provide Wildlife Trees & Habitat for Cavity Dependent Species).

Do not harvest of old-growth trees. Old-growth trees are defined to have the following characteristics:

- Larger and older than the second growth trees in the current stand; an indication that the tree maybe one of the seed trees of the present day stand. These trees have a bottle-brush shape (non-symmetrical crown).
- Large diameter limbs indicating that the tree was once open grown and had a large crown. Limbs (live or dead) are usually heavy and gnarled, are covered with mosses and lichens, and are close to the ground.
- Douglas-fir will have thick bark with deep fissures and have a chocolate brown color. Second growth trees have more gray color in the bark. Ponderosa pines will have thick bark, plate-like and yellow orange in color.

To encourage the maintenance and establishment of fire resilient species, favor leaving sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir, respectively.

Trees with bird nests, wildlife cavities, wide forks with flat nesting spots, or loose bark (bat roosts) would not be removed.

Strive to retain snags of various size and decay classes. Favor large deformed or unique green trees in the stand for future snag recruitment. When available, leave green trees (any diameter) immediately adjacent to snags that are greater than 20 inches DBH. These trees would provide additional structural and habitat diversity.

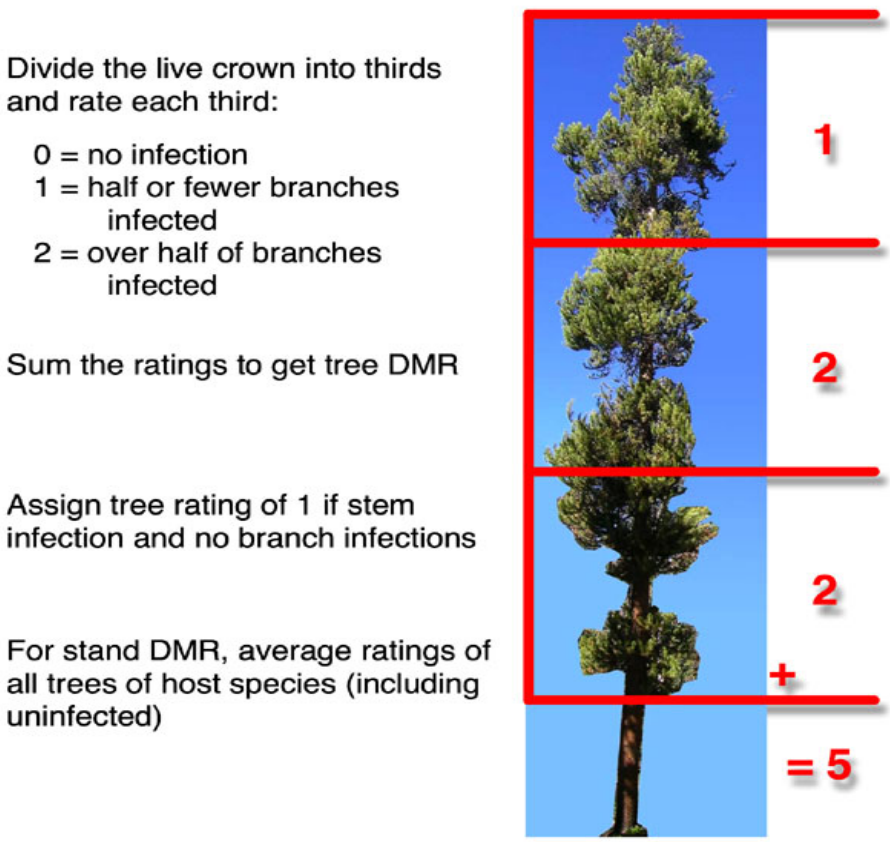
When available, leave green trees (any diameter) immediately surrounding large (greater than 20 inches DBH and 8 feet in length) pieces of coarse woody debris. Retention of green trees would minimize coarse woody debris disturbance and maintain the functional integrity of the coarse woody debris.

Do not mark large hardwoods >16 inches DBH for cut. Leave large hardwoods for stand diversity. Do not mark a conifer with its crown entangled in a hardwood tree.

Thin around large (>20” dbh) and old-growth pine, oak and cedar trees. Protect these tree species by increasing growing space and decreasing competition around these trees. Mark all competing conifers around the leave or center tree twice the distance of the trees dripline (distance from tree bole to dripline). Leave all trees in a group if they exhibit old-growth characteristics. Trees that exhibit old-growth characteristics should be preferred over tree size when selecting an individual or group to protect. Trees that are associated with old-growth trees and create a unique type of stand structure or wildlife habitat would not be marked.

Where mistletoe is encountered, target heavily infected trees for removal first, focus on leaving resistant species (sugar pine, ponderosa pine, incense cedar, and white fir), followed by uninfected or the least infected Douglas-fir trees with infections confined to the lower third of the tree (Douglas-fir Mistletoe Rating [DMR] Ratings 1-2, Figure 2-2). Dwarf mistletoe infected trees may be marked for treatment if prescribed canopy cover retention for the stand is not compromised.

Figure 2-2. Douglas-fir Dwarf Mistletoe Rating (DMR) System



Source: The American Phytopathological Society, 2006

2. Commercial Harvest Methods

Trees designated for removal as a result of application of the forest stand prescriptions described above would be moved from forest stands to landing areas using a combination of helicopter, cable, and tractor yarding methods.

(a) **Helicopter Yarding:** lifts trees bunched together by a cable, moving the trees from the treatment unit to a landing area near a road. Helicopter yarding allows for full suspension of the trees from the treatment unit to the landing area and does not create skid trails or corridors. Trees posing safety hazards would be removed when operationally required.

(b) **Cable Yarding:**trees are end-lined to the corridor then in-hauled up the slope to a landing area on or near a road with one end suspended, and one end on the ground. Corridors would be generally less than 15 feet wide, depending on the size of trees to be removed and the terrain; locations are approved by the BLM. Landings would be a minimum of 150 feet apart as operationally feasible. Guyline trees (approximately 3 per landing area), corridor trees and trees posing safety hazards would be removed when operationally required.

(c) **Tractor Skidding:** utilizes tractors to drag trees to landing locations. Tractor skidding only occurs on lands with less than 35 percent slopes. This method requires narrow skid trails (about 9 to 12 feet wide). Skid trail locations are approximately 150 feet apart, and vary depending on the site-specific terrain, and are pre-designated by the purchaser and approved by the BLM sale administrator. Pre-located skid trails minimize the area of ground a tractor operates on, thus, minimizing soil disturbance. Trees posing safety hazards would be removed, and trees in skid trails and landing areas may be removed when operationally required.

3. Fuels Reduction Treatments

Fuels reduction treatments involves cutting small trees (generally less than 8 inches diameter) and vegetation with chainsaws and disposing of the material by handpiling and burning. Follow-up prescribed fire would be used as a maintenance treatment after the initial treatments have reduced the density of hazardous fuels. Follow-up Maintenance Underburning would involve the controlled application of fire to understory vegetation and downed woody material when fuel moisture, soil moisture, and weather and atmospheric conditions allow for the fire to be confined to a predetermined area at a prescribed intensity to achieve the planned resource objectives. Maintenance burning usually occurs within 5 years of initial treatments. Prescribed underburning usually occurs during late winter to spring when soil and duff moisture conditions are sufficient to retain the required amounts of duff, large woody material, and to reduce soil heating. Occasionally, these conditions can be met during the fall season.

To meet State air quality requirements, prescribed underburning would be implemented during periods of atmospheric instability (when weather disturbances are moving into or through the area) and air is not trapped by inversions on the valley floor. This allows smoke to be lofted up and away from the Rogue Valley. These atmospheric conditions are more frequent in late winter to spring.

Prescribed Fire Plans, also referred to as Burn Plans, must be completed prior to a planned fire ignition and approved by the Field Manager. Prescribed Fire Plans guide the implementation based on site-specific unit conditions (including fuel moisture and weather conditions) at the time of planned ignition, and provide for pre- and post-burn evaluation to monitor if the burn was carried out as planned and its effectiveness at meeting resource objectives. The Prescribed Fire Plan is an important tool for ensuring that project goals and objectives are met in a safe and carefully controlled manner.

Table 2-9. Proposed Fuels Treatment common to all Alternatives

Unit #	Township Range	Section	Stand Type	Fuels Treatment	Acres
17-14	37S-1E	17	Pine Site	slash, pile burn, possible broadcast	49
11-7	37S-1E	11	Dry DF	slash, pile burn, possible broadcast	5
35-11	37S-1E	35	Pine Site	slash, pile burn, possible broadcast	15
17-13	37S-2E	17	Pine Site	slash, pile burn, possible broadcast	27
9-5	38S-2E	9	Mixed Conifer	slash, pile burn, possible broadcast	24
11-8	37S-1E	67	Pine Site	slash, pile burn, possible broadcast	67
Total					187

4. Project Design Features

Project Design Features **(**PDFs) are an integral part of the Proposed Action (Alternative 2). PDFs include seasonal restrictions on many activities in order to minimize erosion and reduce disturbance to wildlife. PDFs also outline protective buffers for sensitive species, mandate the retention of snags, and delineate many measures for protecting Riparian Reserves throughout the project. Most PDFs reflect Best Management Practices and standard operating procedures.

The PDFs with an asterisk (*) are Best Management Practices (BMPs) to reduce nonpoint source pollution to the maximum extent practicable. BMPs are considered the primary mechanisms to achieve Oregon Water Quality standards. Implementation of PDFs in addition to establishment of Riparian Reserves would equal or exceed Oregon State Forest Practice Rules. A review of forest management impacts on water quality concluded that the use of BMPs in forest operations was generally effective in avoiding significant water quality problems, however the report noted that proper implementation of BMPs was essential to minimizing non-point source pollution (Kattelmann 1996). BMPs would be monitored and, where necessary, modified to ensure compliance with Oregon Water Quality Standards. The PDFs listed below apply to the Proposed Action (Alternative 2) and Alternative 3.

a. Riparian Reserves

Northwest Forest Plan (NWFP) Riparian Reserves, as incorporated by the Medford District RMP, are located on federal lands throughout the planning area. A BLM stream survey crew conducted surveys within the Rio Climax project area in order to ensure that all areas needing Riparian Reserve protection were identified. The survey crew assessed stream conditions, documented the location of wetland and unstable areas, and determined whether stream channels were perennial, intermittent, or dry draws (USDA and USDI 1994:C30-C31). Stream maps were updated with the new information. Riparian Reserves are excluded from commercial treatment units by clearly marking unit boundaries on the ground.

Riparian Reserve widths were determined site-specifically using the NWFP Standards and Guidelines (USDA and USDI 1994: C-30-31) and the *Little Butte Creek Watershed Analysis* (USDI and USDA 1997:181, 195). See Maps 2-1 to 2-18 for Riparian Reserve locations for the Rio Climax Project Area. Site specific widths for each Riparian Reserve have been mapped in GIS and would be implemented under the action alternatives. Riparian Reserve widths in the Rio Climax project area are as follows:

(1) Fish streams: 330 distance on each side of the stream.

(2) Perennial nonfish-bearing streams: 165 feet slope distance on each side of the stream.

(3) Intermittent nonfish-bearing streams: 165 slope distance on each side of the stream. Intermittent streams have a defined channel, annual scour and deposition, and are further described as short duration or long duration:
   - ***Short Duration Intermittent***: A stream that flows only during storm or heavy precipitation events. These streams can also be described as ephemeral streams.
   - ***Long-duration intermittent stream***: A stream that flows seasonally, usually drying up during the summer.

(4) Unstable and potentially unstable ground: the extent of the unstable and potentially unstable ground.

(5) Springs, seeps and other non-stream wetlands less than one acre in size, the wetland and the area from the edges of the wetland to the outer edges of the riparian vegetation. For this project, a buffer of 100 feet is being implemented to meet this requirement.

(6) Constructed ponds and reservoirs, wetlands greater than one acre in size – Riparian Reserves consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or the extent of the seasonally saturated soil, or the extent of unstable or potentially unstable areas, or to a distance equal to the height of one site potential tree, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is the greatest. For this project, a buffer of 165feet, the height of one site potential tree, is being implemented to meet this requirement.

b. Harvest and Yarding

Objective 1: Protect Riparian Reserves

(1) No commercial harvest or pre-commercial thinning in Riparian Reserves. *
(2) No use of skid trails in Riparian Reserves. *
(3) Trees would be directionally felled away from Riparian Reserves. *
(4) No logging slash would be piled within Riparian Reserves.

Objective 2: Prevent Offsite Soil Erosion and Soil Productivity Loss

(1) When operationally feasible, all units would be yarded in such a way that the coarse woody material remaining after logging would be maintained at or greater than current levels in order to protect the soil surface and maintain soil productivity. *
(2) Wherever trees are cut to be removed, directional felling away from dry draws and irrigation ditches would be practiced. Trees would be felled to the lead in relation to skid trails.
(3) All tractor skid trail locations would be approved by the BLM Contract Administrator. Maximum area in skid trails used would be less than 12% of the harvest unit. Existing skid trails would be utilized when possible. Tractors would be equipped with integral arches to obtain one end log suspension during log skidding. Skid trail locations would avoid ground with slopes over 35 percent and areas with high water tables, although tractor operations on short pitches exceeding 35% would be permitted. The intent is to minimize areas affected by tractors and other mechanical equipment (disturbance, particle displacement, deflection, and compaction) and thus minimize soil productivity loss. *
(4) All skid trails would be waterbarred according to BLM standards. Main tractor skid trails where they intersect haul roads and at landings would be blocked with an approved barricade and/or slash scattered to preclude OHV use. The intent is to minimize erosion and routing of overland flow to streams by decreasing disturbance (e.g., unauthorized use by OHVs). *
(5) Tractor yarding on designated skid trails would occur between June 1 to October 15 or on approval by the Contract Administrator. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions. Operations using a harvester-forwarder would not be limited to 12% designated yarding trails and would be limited to soil moisture conditions less than 20% by weight at a three inch depth. Units 25-3 would have main skid trails designated to facilitate yarding during all types of harvesting except during snow conditions. In most cases the skid trail designation would facilitate adverse skidding across the contour of the slope. The intent is to minimize compaction and off-site erosion and sedimentation to local waterways.
(6) Tractor yarding or harvester-forwarder operations would be allowed on snow only when the snowpack is sufficient to protect the soil. Tractor yarding or harvester-forwarder operations would be allowed to start when there is a minimum of eighteen (18) inches of snow. No logging would be allowed once the snow depth deteriorates below eighteen inches of snow to protect soil from compaction (RMP p. 166)*. Skid trail spacing and soil moisture requirements would be waived if tractor yarding on snow occurs.
(7) The BLM would immediately shut down all timber harvest and yarding operations if excessive soil damage would occur due to weather or soil moisture conditions.

c. Manual Pre-Commercial Thinning

Objective 1: Prevent Offsite Soil Erosion and Soil Productivity Loss

(1) Vegetation would be thinned using manual techniques. Slash created by the project would be hand piled or lopped and scattered.
(2) Old skid trails would not be opened or driven on without the approval of the authorized officer. Cut material would be placed on the running surface of old skid trails or jeep roads that are authorized to be used. *
(3) Old skid roads would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access.
(4) Crossings through dry draws would be limited and approved by authorized officer; vehicles or equipment would not drive up the draw bottoms. *

d. Prescribed Fire

Objective1: Prevent Offsite Soil Erosion and Soil Productivity Loss

(1) Underburns would be conducted only when a light to moderate burn can be achieved (spring-like conditions when soil and duff are moist).
(2) Firelines for underburns would be constructed manually on all slopes greater than 35 percent.
(3) Waterbars on tractor and hand firelines would be constructed according to District guidelines (USDI 1995:167).
(4) Piles would be dispersed across treatment areas. Piles would be burned when soil and duff moisture are high.
(5) Any containment lines constructed for fuels projects shall be sufficiently blocked along their entire length to preclude use by OHVs. This would include such measures as placing logs and slash, falling trees less than 8" dbh (excluding riparian reserves) or other actions as necessary.

e. Roads and Landings

Objective 1: Protect Riparian Reserves

(1) No construction of new landings or expansion of old landings would be allowed in Riparian Reserves. *
(2) Dewatering will be required for any in-channel construction where surface water is present. Generally, this would require conveying clean water around the site and capturing and pumping any turbid water generated at the construction site.

Objective 2: Prevent Offsite Soil Erosion

(1) Road and Landing construction and road maintenance would not occur during the wet season (October 15th to June 1) when the potential for soil erosion and water quality degradation exists. This restriction could be waived under dry conditions and a specific erosion control plan (e.g., rocking, waterbarring, seeding, mulching, barricading). All construction activities would be stopped during a rain event of 0.2 inches or more within a 24-hour period or if determined by the administrative officer that resource damage would occur if construction is not halted. If on-site information is inadequate, measurements from the nearest Remote Automated Weather Station would be used. Construction activities would not occur for at least 48 hours after rainfall has stopped and on approval by the Contract Administrator. *
(2) Bare soil due to road and landing construction/renovation would be protected and stabilized prior to fall rains to reduce soil erosion and sediment potential. Methods used would be dependent on site conditions and may include: mulch and seed with native grasses or other approved seed; surface with durable rock material; or leave "as is" where natural rock occurs or where vegetation/topography prevents movement of sediment. *
(3) Fill slopes on all new roads and landings would be seeded with native or approved seed.

(4) Slash would be windrowed at the base of newly-constructed fill slopes to catch sediment. *
(5) Temporary routes, also referred to as short operator spurs (100 to 500 feet), would be obliterated at the completion of log haul and within the same season as constructed/opened. Obliteration shall consist of placing logs, slash, boulders, berms, and other material so the entrance is camouflaged and vehicle use is precluded throughout its length.
(6) Work would be done between June 1 to October 15th. *
(7) All natural surface roads would be closed during the wet season. *
(8) Previously closed roads that have been identified and analyzed for use and all newly constructed native surface roads shall be adequately blocked at the entrance and if applicable along its length to preclude vehicle use.

Objective 3: Protect Natural Discharge Patterns

(1) Where possible, rolling grades and outsloping would be used on road grades that are less than 8%. These design features would be used to reduce concentration of flows and minimize accumulation of water from road drainage.
(2) Cross drain structures (culverts, water dips, waterbars) would be installed at intervals not greater than the spacing distances identified in the RMP (USDI 1995:177) for soil erosion class and road gradient.
(3) Armored splash pads (e.g. rock material) would serve as energy dissipaters at cross drain outlets or drain dips where water is discharged onto loose material, erodible soil.

f. Applicable Culvert Installation/Replacement and Ford Installation

Objective 1: Protecting Stream Banks and Stream Channel Integrity

(1) New road approaches at all new stream crossings would be as near a right angle to the stream as possible to minimize disturbance to streambanks and riparian habitat. *

Objective 2: Reducing or Eliminating Surface Soil Erosion

(1) Fill material over stream crossing structures would be stabilized as soon as possible after construction/decommissioning has been completed, before October 15. Exposed soils would be seeded and mulched with native materials or weed free straw. Work would be temporarily suspended if rain saturates soils to the extent that there is potential for environmental damage, including movement of sediment from the road to the stream. *
(2) Waste stockpile and borrow sites would not be located within Riparian Reserves. *
(3) Where surface water is present, sediment and erosion controls would be used during construction to minimize stream sedimentation. Sediment control techniques may include, but are not limited to, settling ponds, silt fences, straw wattles, straw bales, or geotextile fabric or coconut fiber bales. Sediment and erosion controls would be placed immediately (within 10 feet) downstream of the instream work to reduce sediment movement downstream from the project site. *

g. Hauling

Objective 1: Prevent Offsite Soil Erosion

(1) No hauling would occur on natural surfaced roads during the wet season (October 15th to June 1). This would protect the road from damage and decrease the potential for off-site sediment movement. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions of the roads.
(2) Hauling would be allowed between May 15th and November 15th on roads surfaced with at least 6 inches of pit-run rock or 8 inches of crushed rock.
(3) Dust abatement would include water or lignin.

h. Quarries

Objective 1: Protect Riparian Reserves

(1) No quarry development or expansion would occur within Riparian Reserves.

Objective 2: Prevent Offsite Soil Erosion

(1) Rock used to stabilize selected roads and landings and minimize erosion would be obtained from existing quarries or purchased.

i. Oil and Hazardous Materials & Emergency Response

During operations described in action alternatives, the operator would be required to have a BLM-approved spill plan or other applicable contingency plan. In the event of any release of oil or hazardous substance, as defined in Oregon Administrative Rules (OAR) 340-142-0005 (9)(d) and (15), into the soil, water, or air, the operator would immediately implement the site's plan. As part of the plan, the operator would be required to have spill containment kits present on the site during operations. The operator would be required to be in compliance with OAR 629-605-0130 of the Forest Practices Act, Compliance with the Rules and Regulations of the Department of Environmental Quality. Notification, removal, transport, and disposal of oil, hazardous substances, and hazardous wastes would be accomplished in accordance with OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements, contained in Oregon Department of Environmental Quality regulations.

j. Silviculture

Objective 1: Protect Residual Leave Trees

(1) In pine site forests, logging slash should be handpiled outside of the driplines of individual pine trees and burned.
(2) Prescribed burns should be performed when moisture conditions are high enough and prescription windows are at a level so that no more than 50% of the mound depth/duff layer around pine trees is consumed during burning.
(3) During underburing operations, no more than 25% of the pine tree live crown should be scorched for trees 8 inches DBH and larger.
(4) Implement prescribed underburning when soil and duff moisture and weather conditions allow for low intensity burning in order to minimize tree stress and adverse effects on tree roots and foliage.

Objective 2: Maintain vigorously growing conifer forest for permanent forest production

(1) After timber harvest, non-merchantable trees with undesirable silvicultural characteristics should be slashed to reduce hazardous fuels and overall stand density. When thinning understory conifers, select leave trees based on the following criteria to meet silvicultural objectives:
    (a) Minimum 4-inch terminal leader with at least the top 40 % of the tree containing live limbs.
    (b) Non-chlorotic, light or dark green with very little or no yellowish tint.
    (c) Undamaged top.
    (d) Free of visible disease, cankers, fire damage, or blister rust.
    (e) Demonstrates good form and vigor.
    (f) No multiple tops or ramiforms.
    (g) In the absence of conifers that meet the above definition for an acceptable crop tree, include any live conifer seedling that is at least three (3) feet tall that falls within the spacing guidelines.
    (h) In the absence of conifer trees, hardwoods will be considered acceptable crop trees. The order of preference will be bigleaf maple, Oregon ash, willow species, any oak species, and Pacific madrone.

(2) Throughout the entire project area, all saplings through pole (7 inch DBH and smaller trees) sized trees should be slashed within the dripline of the old-growth trees.
(3) To reduce the probability of mechanical damage to white fir leave trees, avoid leaving white fir along haul routes, designated skid roads, or adjacent to major landings where mechanical injury can occur during harvest operations.

k. Terrestrial Wildlife

Objective 1: Protect Northern Spotted Owl Nest Reserves

(1) Reserve from harvest the designated 100-acre core area for northern spotted owl sites designated as known sites on January 1, 1994.

Objective 2: Reduce Disturbance (noise & habitat) Impacts to Northern Spotted Owl

(1) Work activities that produce loud noises above ambient levels would not occur within specified distances (Table 2-10) of any documented or generated owl site during the critical early nesting period, March 1 and June 30, or until two weeks after the fledging period. This seasonal restriction may be waived if protocol surveys have determined the activity center is not occupied, owls are non-nesting, or owls failed in their nesting attempt. The distances listed in Table 2-10 may be shortened with Level 1 concurrence if substantial topographical breaks or blast blankets (or other devices) would muffle sound between the work location and nest sites.
(2) The Resource Area Biologist may extend the restricted season until September 30 during the year of harvest, based on site-specific knowledge (such as a late or 2nd nesting attempt).
(3) Burning would not take place within 0.25 miles of spotted owl sites (documented or projected) from March 1 through June 30, or until two weeks after the fledging period, unless substantial smoke would not drift into the nest patch.

Table 2-10. Mandatory Spotted Owl Restriction Distances

Activity	Zone of Restricted Operation
Heavy Equipment (including nonblasting quarry operations)	105 feet
Chain saws	195 feet
Impact pile driver, jackhammer, rock drill	195 feet
Small helicopter or plane	360 feet*
Type 1 or Type 2 helicopter	0.25 miles*
Blasting; 2 pounds of explosive or less	360 feet
Blasting; more than 2 pounds of explosives	1 mile
* If less than 1,500 feet above ground level.	

Objective 3: Provide Wildlife Trees & Habitat for Cavity Dependent Species

(1) Reserve from harvest a minimum of 3 snags per acre greater than 17 inches dbh, where available. Retention of snags greater than 17 inches dbh within the interior of the stands would mitigate impacts to cavity-dependent species.
(2) Retain and protect where possible (if not jeopardizing public or worker safety)large, broken-top trees and large snags with loose bark.

Objective 4: Protect Special Status Wildlife Species

(1) Northern Goshawks are known to inhabit forested habitat of the type found within the Rio Climax Project Area. No known nest sites occur within the Project Area. Any nest sites located prior to or during harvest activity would be protected with a 30-acre buffer.

(2) The Mardon skipper butterfly, a Federal Candidate for listing and a Bureau Sensitive species, may occur in meadow areas within the project area. Natural meadows are identified as special habitats and receive protection from disturbance as directed in the RMP (p. 45).
(3) Golden Eagles are known to inhabit forested habitat within the Rio Climax Project Area. Known nest locations would be protected with a 30-acre buffer.

Objective 5: Manage Wildlife Species Protected as Survey and Manage Species

(1) Known great gray owl nests would be protected with a ¼ mile protection buffer (approx. 100 acres).
(2) Known locations of Survey and Manage and Bureau Sensitive snails, *Monadenia chaceana and Helminthoglypta hertleini*, *Monadenia fidelis celeuthia*, *Vespericola sierranus* would be protected through the application of a no treatment buffer.
(3) Suitable habitat for *Pristilomaarcticumcrateris* snail species would be protected through no-treatment in Riparian Reserves (which includes suitable habitat within 30 feet on each side of the channel).

l. Botanical Resources

Objective 1: Minimize the spread of noxious weeds

(1) Vehicle and equipment use off existing roads in the project area would be limited to the dry or snow-covered season.
(2) Mechanical equipment (e.g., skidders, yarders, etc.) would be power washed and cleaned of all soil and vegetative material before entering the project area. Equipment moving from a weed infested work site to or through a non-infested area will be field washed before moving. Field washing station would include a system to contain all weed waste for subsequent landfill disposal.
(3) Seeding of native grasses and/or an approved seed mix on highly disturbed soil (e.g., landings, temporary spur roads, etc.) would occur as prescribed by BLM watershed specialists.
(4) Roadside noxious weed populations along haul routes and work areas would be treated prior to timber sale activity with subsequent treatments as necessary and as funding is available.
(5) Noxious weed populations in existing quarries or stockpiles used for road rocking would be treated prior to ground disturbance.

Objective 2: Minimize or avoid impacts to Special Status and Survey and Manage plant species (Table 2-11)

(1) Federal Endangered, State Threatened, Bureau Sensitive and Assessment plant species populations would be protected by one, or a combination of, a) no treatment buffered areas, b) seasonal restrictions, c) method of treatment specification (e.g. manual treatment only), d) and other restrictions (e.g. slashing but no piling).
(2) In commercial units no timber harvest would occur within botanical buffer areas and trees would be directionally felled away from buffered areas.

Table 2-11. Protection Measures for Special Status and Survey & Manage Plant Species

T_R_S	SPECIES CODE	SITE NO.	PROPOSED TREATMENT	PROTECTION	RATIONALE FOR PROTECTION
T37S R01E S11	CHFE7	13635	Dry DF/NRF	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R01E S11	CHFE7	13632	Dry DF/NRF	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R01E S11	LETE13	13633	Dry DF/NRF	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R01E S13	CASE2	13636	Road	Limit dust abatement on road 37-2E-7.1; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Effects of magnesium chloride unknown on species.
T37S R01E S13	LIFLB	3906	Dry DF/NRF	None	Protected by distance from unit and project activity.
T37S R01E S13	LIFLB	4621	Dry DF/NRF	None	Protected by distance from unit and project activity.
T37S R01E S13	LIFLB	4620	Dry DF/NRF , Road	Limit dust abatement on road 37-1E-13.3; no magnesium chloride.	Effects of magnesium chloride unknown on species.
T37S R01E S13	LIFLB	4618	Dry DF/NRF , Road	Road: Limit dust abatement on road 37-1E-13.3; no magnesium chloride.	Road: Effects of magnesium chloride unknown on species. Large population located outside of unit areas, but occurs alongside of road proposed for hauling.
T37S R01E S13	LIFLB	3905	Dry DF/NRF	None	Protected by distance from unit and project activity.
T37S R01E S13	CYMO2	5083	Dry DF/NRF, New Road Construction	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R01E S17	CHFE7	13640	Dry DF/NRF, New Road Construction	Buffer	Maintain moisture regime, canopy closure and microhabitat. Buffer installed on 7/12/2010 by BH.
T37S R01E S17	LIFLB	13639	Pine Site	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Buffer installed on 7/12/2010 by BH.
T37S R01E S17	LIFLB	13638	Pine Site , Road	Buffer, Road: Limit dust abatement: BLM road no. 37-1E-20 dust abatement limited to water or lignin.	Buffer installed on 7/12/2010 by BH.
T37S R01E S25	CHIIN	13900	Dry DF/NRF	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Buffer installed on 7/14/2010 by BH.

T_R_S	SPECIES CODE	SITE NO.	PROPOSED TREATMENT	PROTECTION	RATIONALE FOR PROTECTION
T37S R01E S25	LETE13	13901	Dry DF/NRF	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Buffer installed on 7/14/2010 by BH.
T37S R02E S29	NECA	13890	Pine Site/Dispersal	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R02E S29	NECA	13891	Pine Site/Dispersal	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R02E S29	LETE13	13924	Pine Site/Dispersal	None	Located within riparian reserve.
T37S R02E S29	LETE13	13892	Pine Site/Dispersal	None	Located within riparian reserve.
T37S R02E S29	LETE13	13893	Pine Site/Dispersal	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T37S R02E S29	DEIN12	13894	Dry DF/Dispersal	Buffer	Maintenance of canopy closure in area surrounding site for moisture and habitat retention.
T38S R02E S07	CYMO2	8188	Road	Limit dust abatement on road 38-2E-9.6; no magnesium chloride.	Effects of magnesium chloride unknown on species.
T38S R02E S08	ILLA2	13895	Mixed Conifer/NRF	Road: Limit dust abatement on road 38-2E-9.2; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Effects of magnesium chloride unknown on species.
T38S R02E S09	CIEL	13545	Road	Road: Limit dust abatement on road 38-2E-9.4; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T38S R02E S09	CIEL	13898	Mixed Conifer/NRF	Seasonal Restriction	Seasonal restriction to avoid direct damage when actively growing; thinning is considered beneficial to the species.
T38S R02E S09	CIEL	13899	NRF	Seasonal Restriction	Seasonal restriction to avoid direct damage when actively growing; thinning is considered beneficial to the species.

m. Recreation

Objective 1 .Maintain public safety for visitors to the Grizzly Peak Trail Head

(1) When logging or hauling activities occur, place sign(s) on road 38-2E-9.2 at the intersection with Shale City Road alerting the public of possible interactions with logging trucks and associated equipment. Signing would comply with the Manual of Uniform Traffic Control Devices.
(2) At Grizzly Peak Trail Head and Parking Area, instruct log truck operators and those associated with the logging operation to be alert to the possibility of there being foot traffic across the road and to slow down and restrict speeds to 10 mph or less near the trailhead.. Place sign(s) on road alerting the public of possible interactions with logging trucks and associated equipment. Signing would comply with the Manual of Uniform Traffic Control Devices. The parking area would be designated and clearly defined to provide for clear and safe passage of log trucks

Objective 2 . Minimize Impacts to Recreational User Experience

(1) When logging or hauling activities occur, apply dust abatement to road 38-2E-9.2 near the trailhead where the road is not chip sealed to reduce dust created by hauling activities.
(2) Hauling will not be permitted on holidays or weekends to reduce recreation user impacts on the trail and at the trail head.

n. Rangeland Resources/Grazing

Objective 1. Protect Rangeland Improvements

(1) During logging operations use of techniques such as directional falling will be used to prevent damage to fences, cattle guards, livestock watering troughs and other improvements.
(2) If damage to range improvements does occur the BLM shall be notified and proper repair* or replacement will occur within 2 weeks of the completion of logging activities. *Proper repair of fences and gates includes keeping wire properly attached to posts, splicing or replacing broken wire in kind, repairing structures such as corners or gates, and any other work necessary to keep improvements functional. Repair of structures such as stress or corner panels and gates requires pre-approval by BLM staff.

Objective 2. Prevent Livestock Trespass

(1) During logging activities, operators will keep all gates closed and all livestock containment systems functional to keep livestock in authorized areas.

o. Cultural Resources

Objective 1. Protect Cultural Resources

(1) Cultural sites recorded in the project area would be buffered according to archeologist instructions prior to project implementation. No treatments will occur within these buffers.
(2) No fire line construction, prescribed burning, or hand piling/burning would occur within the flagged boundaries of the recorded cultural resources.
(3) Timber would be felled away from cultural resource site buffers.
(4) If previously unrecorded cultural resources are found during project implementation, the project may be redesigned to protect the cultural resource values present, or evaluation and mitigation procedures would be implemented based on recommendations from the resource area archaeologist and concurrence by the Ashland Field Manager and State Historic Preservation Office.

5. Implementation Monitoring

The majority of actions described under the alternatives are implemented through a timber sale, service, or stewardship contract. Implementation monitoring is accomplished through BLMs contract administration process. Project design features included in the project description are carried forward into contracts as required contract specifications. BLM contract administrators and inspectors monitor the daily operations of contractors to ensure that contract specifications are implemented as designed. If work is not being implemented according to contract specifications, contractors are ordered to correct any deficiencies. Timber sale contract work could be shut down if infractions of the contract are severe. The contract violations would need to be corrected before the contractor would be able to continue work or timber harvest. If contract violations are blatant, restitution could be of a monetary value of up to triple the amount of damage.

D. ACTIONS AND ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

NEPA requires that Federal agencies explore all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives that were explored but not developed in detail (40 CFR 1502.14 (a)). The following alternatives or actions have been considered but eliminated from detailed study for the reasons stated and/or because they would not meet the objectives and Needs for this project.

Treatment of Forest Stands Identified as RA-32

This action would have treated stands identified by resource area biologists as Recovery Action 32 forest stands. In 2008, the U.S. Fish and Wildlife Service issued a Recovery Plan for the Northern Spotted Owl (NSO). The Recovery Plan includes Recovery Actions, which are recommendations to guide activities that would help to further the recovery objectives for the northern spotted owl. Recovery Action 32 (RA 32) recommends maintaining "substantially all of the older and more structurally complex multi-layered conifer forests on Federal lands outside of Managed Owl Conservation Areas. The purpose of Recovery Action 32 is to provide refugia for northern spotted owls as they adapt to competitive pressures from an increasing population of barred owls.

Rationale for Elimination: The Ashland Resource Area BLM decided to defer forest management in stands identified as RA 32 stands at this time. Using the Draft RA 32 Habitat Evaluation Methodology (version 1.3) developed jointly by the Medford Bureau of Land Management, Rogue River-Siskiyou National Forest, and the Roseburg Office of the US Fish and Wildlife Service, BLM wildlife biologists identified areas within the Rio Climax Forest Management Project that met the intent of Recovery Action 32. Stands identified as RA 32 forest stands were removed from consideration for timber harvest and detailed analysis under the Proposed Action.

No New Road Construction

This alternative would have eliminated all new road construction needed to improve vehicle access for the purpose of managing forest stands.

Rationale for Elimination: The RMP directs that all silvicultural systems (forest thinning strategies) applied to achieve forest stand objectives would be economically practical (ROD/RMP p. 180; PRMP/EIS p. 2-62). The economic feasibility of forest management actions is affected by the ease of access from the forest road system. An alternative that would eliminate all new road construction would have made it uneconomical to manage units accessed by proposed new road construction.

An economic comparison for units accessed by new road construction in Sections 9, 17, and 25 was prepared to compare the cost of tractor and cable logging with road construction vs. helicopter logging without road construction. Current prices and costs were used for this comparison. The economic comparison showed that tractor and cable logging with road construction would cost approximately $185,000 while helicopter logging without road construction would cost approximately $395,000. The difference in logging cost is appropriately $210,000. The value of the logs at the landing for both

methods would be approximately $300,000. Tractor and cable logging with road construction would result in net gain of approximately $115,000. Helicopter logging without road construction would result in a net loss of approximately $95,000. This comparison only includes the cost of the first treatment or entry. For subsequent treatments tractor and cable logging would have an greater savings then helicopter logging since the proposed roads would exist. The operation of helicopters on units in T37S, R1E, Section 17 would have increased safety concerns due to proximity of the units and landings to the high voltage power lines. Safety concerns of helicopter logging adjacent to high voltage power lines may negate the helicopter option for the units in section 17.

Diameter Limitation

Imposing an upper diameter limit for harvesting trees was suggested by the public. This alternative would have imposed an upper diameter limit on timber harvesting trees greater than 20 inches diameter breast height (dbh). This would mean no trees would be cut and removed if they were larger than the specified diameter limit.

Rationale for Elimination: Silvicultural systems prescribed for this project are based on the existing stand structure and species composition compared to the desired stand structure and species composition and the ability, based on site characteristics (soil characteristics, elevation, aspect, etc.) to achieve and maintain the desired conditions over time. The use of a diameter limit would arbitrarily limit the use of the silvicultural prescriptions to meet the prescribed objectives. Some examples of when the removal of trees greater than 20+ inches is necessary:

- ✓ *When a reduction in stand density is needed to improve the growth and resiliency of the remaining trees and where insufficient smaller trees are available to decrease density to necessary levels.* In other words, it may be necessary to harvest larger diameter classes, from below, to reach the level of density reduction required to induce the desired response.
- ✓ *Where the removal of a particular species is desirable in order to enhance the growth and survival of more desirable species.* For example, where Douglas-fir has encroached onto sites where ponderosa pine and sugar pine are more stable in their environment. An unrestricted ability to manipulate species composition is essential to meet silvicultural objectives for desired species composition.
- ✓ *Where the management objective is to recruit regeneration into the stand.* Openings, large enough to allow sunlight to reach the forest floor are required to promote a new generation of seedling establishment.
- ✓ *Where forest pathogens and insects are creating undesirable stand conditions.* Arbitrarily imposing a diameter limit could affect BLMs ability to meet treatment objectives designed to control, reduce, or inhibit the adverse impacts of forest insects and disease, such as dwarf mistletoe and bark beetle outbreaks.
- ✓ *Where over-stocking has weakened trees causing imminent mortality among those trees considered large.* Frequently, where density is high, drought and insects exacerbate forest decline in older stands, thus the removal of dead and dying trees is desirable. This also contributes to a reduction in surface fuel as dying limbs and tops are recruited onto the forest floor fuel bank.
- ✓ *Where young tree growth or the growth of shade intolerant species is being compromised by adjacent larger trees.* A reduction in stand density, that includes the harvesting of larger trees, is often necessary to promote growth of a younger stand cohort.

An arbitrary diameter limit would sacrifice the effectiveness of the treatment in achieving these objectives. That being said, the Rio Climax Forest Management Project, does primarily focus on the removal of small diameter trees to retain the larger healthier trees within a stand, although some larger trees may be removed as stated above to meet desired stand densities, species composition, and disease

management objectives (see Silvicultural Objectives and Prescriptions (above).

Road Decommissioning: This action would permanently remove roads from the road system by natural or mechanical decommissioning methods.

> ***Rationale for Elimination:*** The beneficial effects of road decommissioning are recognized; however, funding was not secured for decommissioning roads in the project area at this time. Road decommissioning opportunities are identified in Chapter 3, Water Resources Section. If funding becomes available, roads identified for decommissioning, or portions thereof, could be decommissioned in the near future.

Riparian Reserve Thinning: This action would have thinned conifer forests within Riparian Reserves rather than excluding Riparian Reserves from proposed treatments.

> ***Rational for Elimination:*** Many considerations go into deciding whether or not to propose commercial thinning in Riparian Reserves. Under the 1995 RMP, the plan under which the Rio Climax project was designed, requires that silvicultural activities in Riparian Reserves benefit the conditions and function of Riparian Reserves. The cost of surveys and analysis needed to inventory and analyze the conditions of reserves is one consideration that management must take into account when deciding whether or not to propose Riparian Reserve thinning. Riparian Reserve thinning was not proposed under the Rio Climax Forest Management Project primarily due to funding and time constraints. Future treatments in Riparian Reserves may be considered.

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This chapter describes the present conditions of each affected resource, followed by a comparison of the estimated environmental effects of implementing the No-Action Alternative and the action alternatives. The Environmental Effects portion of this chapter provides the analytical basis for the comparisons of the alternatives (40 CFR § 1502.16) and the reasonably foreseeable environmental consequences to the human environment that each alternative would have on the relevant resources. Impacts can be beneficial, neutral or detrimental. The affected environment is described to the level of detail needed to determine the significance of impacts to the environment of implementing the Proposed Action. The analysis of the direct, indirect, and cumulative effects are organized by resource and the analysis areas for actions proposed under this EA vary by resource. For all resources it includes the project area, which encompasses the areas where actions are proposed for the Rio Climax Forest Management Project.

1. Project Area and Analysis Area

The terms **project area** and **analysis areas** are used throughout this chapter. The following defines each term:

> The terms **project area,** or treatment area, are used interchangeably to describe where action is proposed, such as units where forest thinning is proposed and where road construction or road improvements are proposed.
>
> **Analysis areas** vary by resource and include those areas that could potentially be affected by the proposed action. In some cases the analysis area is confined to the project area and in others the analysis area extends beyond the project area.

2. Consideration of Past, Ongoing, & Reasonably Foreseeable Actions in Effects Analysis

The current condition of the lands affected by the proposed action is the result from a multitude of natural processes and human actions that have taken place over many decades. A catalogue and analysis, comparison, or description of all individual past actions and their effects which have contributed to the current environmental conditions would be practically impossible to compile and unduly costly to obtain. Ferreting out and cataloguing the effects of each of these individual past actions would be a time consuming and expensive task which will not add any clearer picture of the existing environmental conditions.

Instead of incurring these exorbitant costs in terms of time and money, it is possible to implement easier, more accurate, and less costly ways to obtain the information concerning the effects past actions, which is necessary for an analysis of the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions."(See definition of "cumulative impact" in 40 CFR § 1508.7.)

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

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

Effects analyses completed for resources potentially affected by the Rio Climax Forest Management Project describe indicators of importance along with the spatial (analysis area) and temporal scale of importance for determining the effects of multiple actions (past, current, and reasonably foreseeable) on affected resources. As discussed above, the current condition assessed for each affected resource inherently includes the effects of past actions.

The analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary. How each resource analysis uses information concerning other ongoing or reasonably foreseeable activities is, however, dependent on the geographic scale of concern and attributes considered during each resource analysis.

The BLM is beginning development of the Heppsie Project, late-summer to fall of 2011. Although the future project can be associated with a general geographic area, and would be designed to implement forest health a timber resource management actions/objectives of the Medford District RMP, the exact proposal is not known at this time. Once a project proposal has been developed, scoping would be initiated along with an environmental analysis process in compliance of the National Environmental Policy Act (NEPA). The cumulative effects analyses completed for this future project would consider past, present, and reasonable foreseeable actions at the time of the analysis, including this Rio Climax Forest Management Project. The resulting NEPA document would be subject to public and administrative review once completed.

B. SOIL RESOURCES

1. Affected Environment

The proposed timber sale units are located in the Antelope Creek and Lake Creek drainages (approximately 39,285 acres) of the Little Butte Creek Watershed, also referred to throughout this section as the analysis area. The dominant soils series identified in the project units are Bybee, Carney, McMullin, McNull, Medco, and Tatouche. The topography in the project area is main hillslopes ranging is slope between 8 and 65 percent slope.

The topography in the project area consists of slopes between 8 and 60 percent slope at elevation between 3,500 and 5,800 feet above mean sea level. The mean annual precipitation is 30 to 55 inches, the mean annual temperature is 40 to 45 degrees F, and the average frost-free period is less than 100 days.

a. Description of Soils Series

A table of the predominant soils identified in proposed harvest units is listed below followed by a general description of the soil series recognized by the Natural Resource Conservation Service. See the soils map (below) for the location of the soils on the landscape. There may be minor amounts of other soil series included within the proposed units.

Table 3-1. Soil Series and Characteristics

Map Unit #	Soil Series Name	Depth (in.)	Soil Texture	Soil Sensitivity Category
18, 19	Bybee	60+	Loam, clay loam, clay	3
27	Carney	20 - 40	Clay, cobbly clay	3
57	Farva		Very cobbly loam, cobbly loam	2
110, 111, 112	McMullin	< 20	Gravelly loam, gravelly clay loam	1
111, 114, 119	McNull	20 - 40	Loam, clay loam, cobbly clay	2
112, 119, 120	Medco	20 - 40	Cobbly clay loam, clay	3
19, 190	Tatouche	60+	Gravelly loam, gravelly clay loam, clay	2

Bybee Series

The Bybee soil is very deep and somewhat poorly drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface is covered with a layer of needles and twigs about ½ inch thick. The surface layer is very dark grayish brown loam about 4 inches thick. The next layer is very dark grayish brown clay loam about 6 inches thick. The upper 4 inches of the subsoil is brown clay. The lower 24 inches is light yellowish brown clay.

The substratum is light yellowish brown clay about 22 inches thick. The depth to bedrock is 60 inches or more. Permeability is very slow in the Bybee soil. Available water capacity is about 9 inches. The effective rooting depth is limited by a dense layer of clay at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The water table, which is perched above the layer of clay, is at a depth of 1 to 3 feet from December through May.

Carney Clay

This moderately deep, moderately well drained soil is on alluvial fans. It formed in alluvium derived dominantly from tuff and breccia. Typically, the surface layer is dark brown clay about 6 inches thick. The next layer also is dark brown clay about 6 inches thick. The subsoil is dark brown clay about 23 inches thick. Weathered bedrock is at a depth of about 35 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is cobbly or stony. Permeability is very slow in the Carney soil. Available water capacity is about 4 inches. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. Site index of this soil for Ponderosa pine is about 70 feet in 100 years. The water table fluctuates between depths of 3.0 and 3.5 feet from December through April.

Farva Series

The Farva soil series is moderately deep, well-drained soil on hillslopes. It formed in colluvium derived from andesite, basalt, and volcanic ash. Typically, the surface is covered with a layer of needles, leaves, and twigs about ½ inch thick. The surface layer is dark brown very cobbly loam about 12 inches thick. The subsoil is brown extremely cobbly loam about 15 inches thick. The substratum also is brown extremely cobbly loam. It is about 8 inches thick. Weathered bedrock is at a depth of about 35 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony. Permeability is moderately rapid in the Farva soil. Available water capacity is about 3 inches. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

McNull Series

The McNull soil series is moderately deep, well-drained soil on hillslopes. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown loam about 6 inches thick. The upper 6 inches of the subsoil is dark reddish brown clay loam. The lower 20 inches is dark reddish brown cobbly clay. Weathered bedrock is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony or cobbly. Permeability is slow in the McNull soil. Available water capacity is about 4 inches. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Medco Series
The Medco soil is moderately deep and moderately well drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface layer is very dark brown and very dark grayish brown cobbly clay loam about 7 inches thick. The next layer is very dark grayish brown cobbly clay loam about 5 inches thick. The subsoil is brown clay about 18 inches thick. Weathered bedrock is at a depth of about 30 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony. Permeability is very slow in the Medco soil. Available water capacity is about 4 inches. The effective rooting depth is limited by a dense layer of clay at a depth of 6 to 18 inches. Runoff is slow, and the hazard of water erosion is slight. The water table, which is perched above the layer of clay, is at a depth of 0.5 foot to 1.5 feet from December through March.

McMullin Series
The McMullin soil is shallow and well drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The subsoil is dark reddish brown gravelly clay loam about 10 inches thick. Bedrock is at a depth of about 17 inches. The depth to bedrock ranges from 12 to 20 inches. In some areas the surface layer is stony. Permeability is moderate in the McMullin soil. Available water capacity is about 2 inches. The effective rooting depth is 12 to 20 inches. Runoff is slow, and the hazard of water erosion is slight.

Tatouche Series
The Tatouche soil is very deep and well drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface is covered with a layer of needles and twigs about 2 inches thick. The surface layer is very dark brown gravelly loam about 11 inches thick. The upper 8 inches of the subsoil is dark brown gravelly clay loam. The lower 41 inches is dark brown clay. The substratum to a depth of 73 inches is strong brown clay loam. The depth to bedrock is 60 inches or more. In some areas the surface layer is stony or cobbly. Permeability is moderately slow in the Tatouche soil. Available water capacity is about 8 inches. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Swanson and Dyrness (1975) estimated the natural erosion rates for soils in the Western Cascade Range to be about 0.19 yd^3/ac/year and erosion rates increased in harvest areas to 0.7 yd^3/ac/yr (in Amaranthus, 1985, p.233). Erosion rates are highly dependent on the intensity and amount of rainfall that a particular site receives in a given time period. Other factors that affect erosion rates are steepness of slope, ground cover, soil particle cohesion and amount/degree of disturbance. The project area consists of slopes up to 40 percent with a very slight potential for landslides. For this reason it is anticipated that erosion rates in the project area to be much less than those reported by Swanson and should not be of concern.

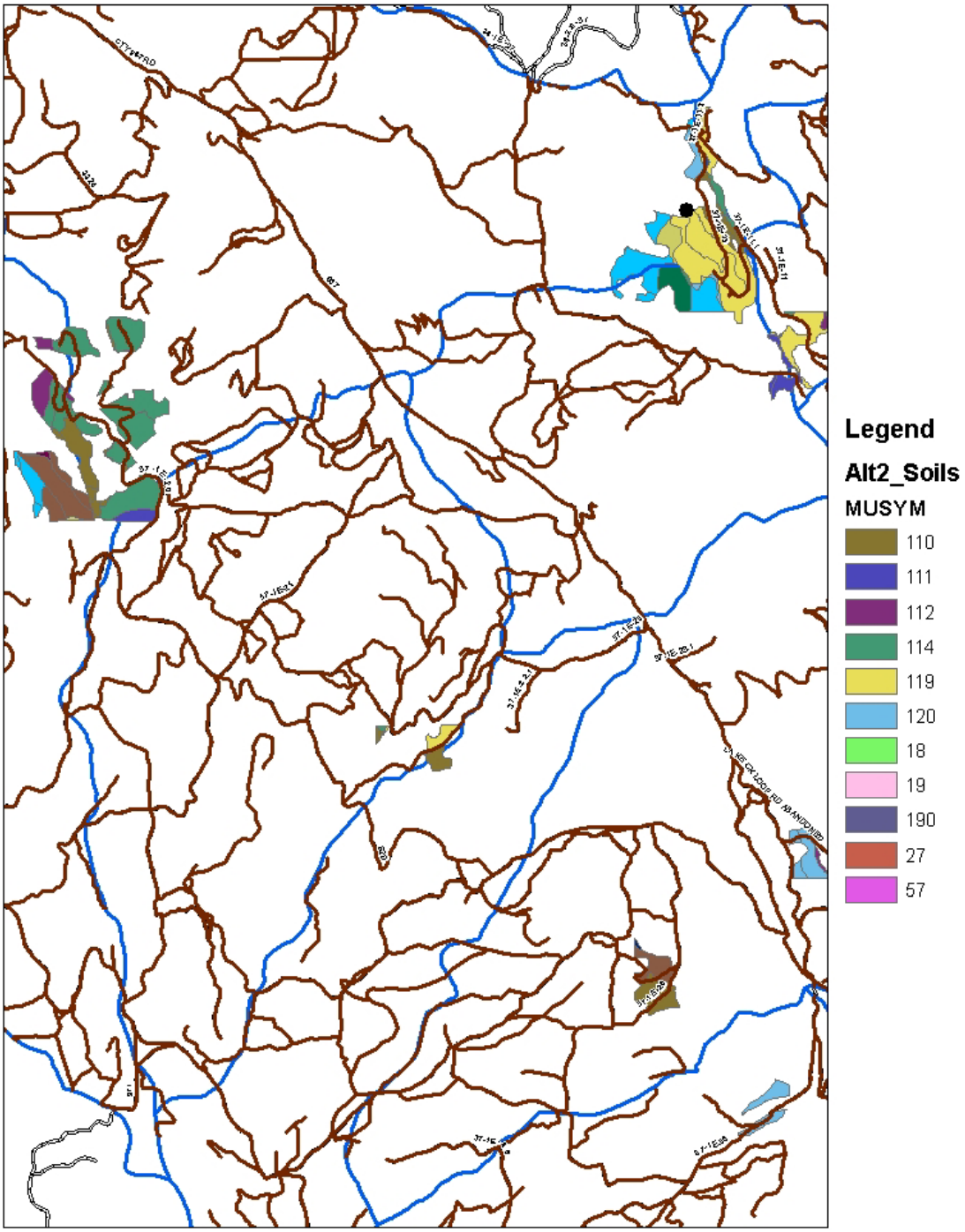
Maps showing the location of the soils in the proposed project units are displayed below.

b. Roads

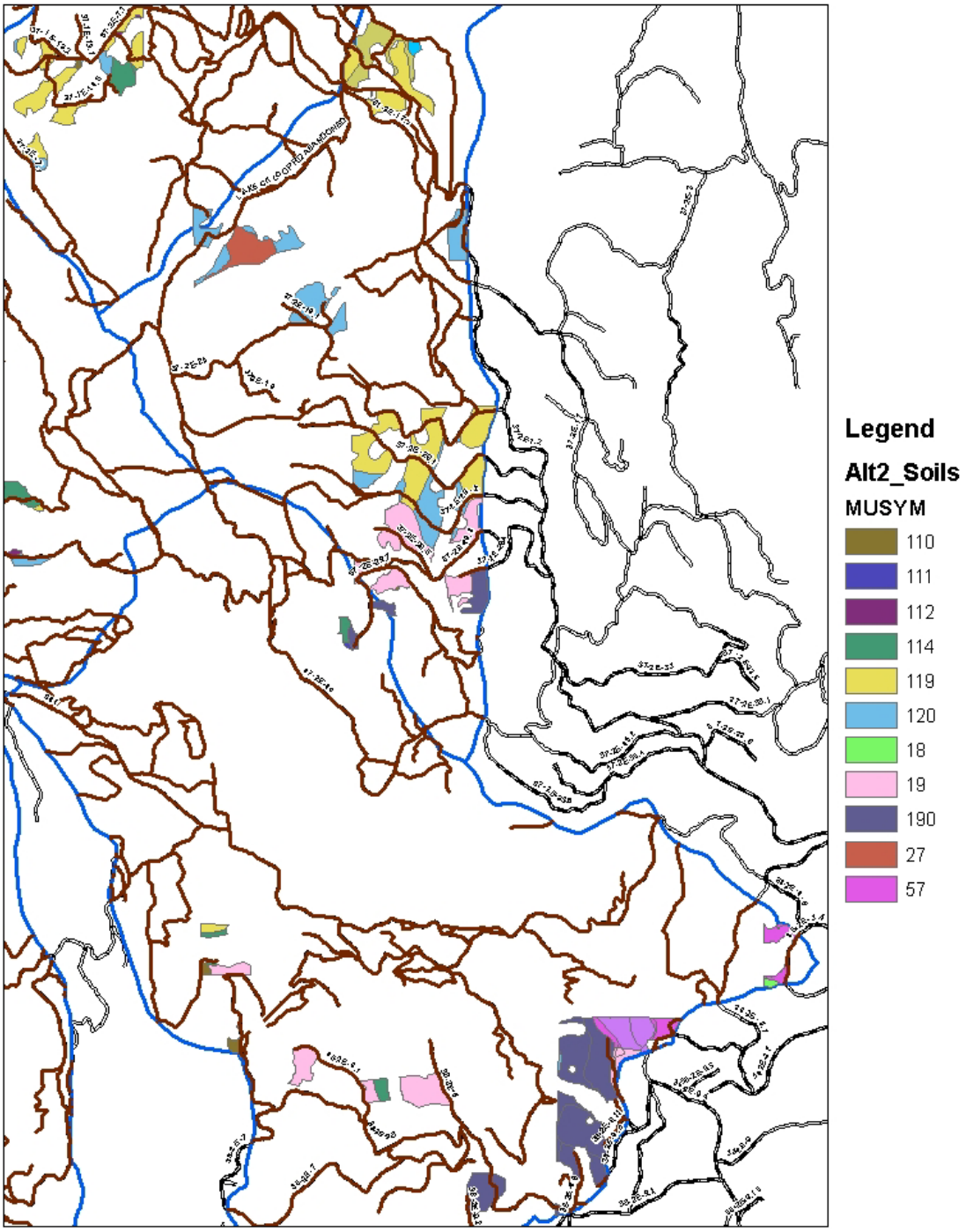
There are approximately 357 total miles of road in the 39,285-acre analysis area. Approximately 54 miles of the existing roads are confirmed paved or adequately surfaced with rock. The remaining roads are either natural surface, a jeep road, or information on the surface type is unknown (un-inventoried roads on private land). Many of the designed surfaced roads on private land appear to have been built over ten years ago and are in stable condition but surfacing is below optimum to minimize road related erosion particularly during winter use. Soil loss from a lightly graveled roadbed is about equivalent to loss from an ungraveled one. In contrast, soil loss from fully graveled roadbeds (6 to 8 inches thick) was only 3 to 8 percent of that from the bare soil roadbed of otherwise similar construction (Swift, 1988).

In the Swift study, erosion rates from the natural surfaced and minimal surfaced roads were about 1.4 tons/acre/inch rain while the adequately rocked roads yielded less than 0.1 ton/acre/inch rain. Although erosion rates vary depending on site hydrology, soil type, topography, climate, and engineering treatments, these figures provide an example of the relative amount of erosion that may occur.

Map 3-1. Rio Climax Soils



Map 3-2. Rio Climax Soils



c. Soil Productivity

Soil is a fundamental resource that controls the quantity and quality of such renewable forest resources as timber, wildlife habitat, forage, and water yield. Soil productivity is the inherent capacity or potential of a soil to produce vegetation and the fundamental measure of soil productivity is the site's carrying capacity for plant growth. The key properties directly affected by management are site organic matter (OM) and soil porosity. These two properties regulate critical site processes through their roles in microbial activity, soil aggregate stability, water and gas exchange, physical restrictions on rooting, and resource availability (Powers, 2004 p.194). Although other factors such as water regimes, soil biological types and populations, and soil loss can also affect long-term soil productivity, site organic matter and soil porosity are most important when measuring the effects of management.

A sustained flow of organic matter from primary producers to the forest floor and into the soil is vital to sustained site productivity through its influence on soil protection, the activity of beneficial soil organisms, soil water holding capacity, soil structure and aggregate stability, and nutrient supply. Organic matter influences the interception and retention of solar heat by the soil. It dissipates the energy of falling water (rain). Organic matter is the ultimate source of substances that bind soil particles together into stable aggregates that resist erosion. Through its carbon compounds, organic matter constitutes the energy source for soil fauna and microbes and is a concentrated reservoir of plant nutrients supplied to the soil.

In the project area, organic matter is abundant on all sites that are planned for treatment. Most of the organic matter is in the form of down wood, leaf litter and needle cast and was produced from trees, shrubs, grasses, and moss. Soil organic matter appears typical for the region with most of the sites having about ½ inch or less of litter (leaf and needles). Some sites with a mature forest canopy in sections 11 and 17 have a litter layer about 1 inch thick. Except for areas disturbed by roads and trails and sites with gravels and cobbles surfaces, the most of the soil in the proposed project area had at least a thin ground cover of organic material. On most sites, soil organic matter consumption appears normal with a very thin layer of decomposing matter at the soil and litter layer interface.

The reduction in soil porosity (compaction) results in the loss of soil aeration, moisture availability and increases the resistance of soil particles to root growth. Reduced soil porosity also can reduce water infiltration rates, thereby accelerating surface runoff and soil erosion. The size distribution of soil pores is also important for maintaining a productive site. Large pores and cracks are important for soil drainage, aeration, and root access; smaller pores store soil water and are the sites of nutrient retention and microbial activity. Both kinds of pores are required for productive soils.

Rapid gas exchange in soils is required for optimum microbial activity and growth of plant roots. Adequate supply of oxygen for root growth can be assured if there is a network of continuous, air-filled pores present in a soil. Soil water storage is very important because total site water use is generally positively correlated with growth, factors that decrease soil water storage are detrimental to productivity and those that increase it are beneficial (Childs et al. 1989).

d. Past Actions

An inventory of past actions with harvest dates and units of treatments was made for the analysis area using past harvest records and photo interpretation. Timber harvest records in combination with the operations inventory data were used on land managed by the BLM. A nearly complete harvest data record was available from about 1975 to present. An inventory of harvest activities prior to 1975 on BLM-administered land was estimated using operation inventory records and aerial photo interpretation.

The inventory of past harvest activities on private land was estimated using aerial photo interpretation. The aerial photos used were from 1966, 1975, 1980, 1985, 1991, 1996, 2001, and 2005. The past actions were digitized in Geographic Information Systems (GIS) layer and a corresponding database established.

The relevant part of analyzing past actions is determining what events or actions previously occurred, whether current proposals repeat those actions or events, and whether current proposals have similar or different anticipated effects. In addition, past events are manifested in current conditions, the starting point for the addition of cumulative effects. The lessons learned from past actions are that roads were historically poorly designed and located without regard to erosion and stream sedimentation impacts. Many of the roads have been poorly maintained and have been degraded as a result of use during the wet season. Clearcutting and broadcast burning in the 1980s created highly erosive conditions especially when ground-based yarding systems were used without much regard for the location and number of skid trails, and/or tractor-piling of slash was incorporated. These sites have been re-established with vegetation and, save for roads, erosion rates are near natural levels.

It is estimated that about 380 acres of the 948 acres proposed for harvest have had some type of timber harvest in the past. All past timber harvest in the proposed units were accomplished using tracked equipment. It is estimated that most of past tractor harvest occurred before 1980 and was not on designated skid roads. Most of the harvesting before the 1970s (360 acres) was in the form of single tree selection or group selection taking out the biggest and most valuable trees. During the 1970s through the 1980s clearcutting was implemented which was often followed by broadcast burning of the logging slash on the site. During the 1980s on BLM managed land, tractor harvesting was restricted to designated skid trails that would impact about twelve percent of the harvest area. It is estimated that unrestricted tractor logging resulted in about twenty-five percent of the area being compacted. There have been approximately 233 acres harvested on BLM-administered land within the analysis area since 1990 and approximately 4,630 acres on private land during that time period. Overall, it is estimated that approximately 40 percent of the land has had some sort of harvest entry in the past with most (approximately 15,000 acres) being partial cutting or single tree selection.

In the analysis area it is estimated that approximately 2,175 acres of land have been compacted to some extent as a result of timber harvesting since 1970. Of these acres, about 75 acres have been compacted on BLM-administered land and about 2,100 on private land. It is difficult to predict compaction's effects on soil productivity because of all the variables, but McNabb and Froelich (1983) estimate that stand growth losses can range from 5 to 13 percent and compaction's effects can last 30 years. Lucklow and Gullen, in a compaction study of Arkansas forest, found evidence that old disturbance areas have partially self-mitigated since the previous harvest entry. The old disturbance compaction observed in this study was caused from harvest equipment activities that occurred at least 15-20 years earlier. Old disturbance areas are composed of secondary or primary skid trails and areas that received 1-2 equipment passes. They estimate it would take from 50-80 years for skid trail soil density levels to recover to near natural density levels. This estimated recovery period is in line with other findings. Perry (1964) estimated a 40-year recovery period for reduced infiltration rates on old compacted woods roads to approach natural rates on a southern Arkansas soil.

2. Environmental Consequences

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management and events unrelated to the Rio Climax project.

Discussions for Alternative 2 and Alternative 3 reflect the direct and indirect impacts of these alternatives. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. The environmental consequences on the soil resource will be described in terms of the effect that a particular action would have on the soil characteristics or soil erosion processes.

It would be futile to try to predict specific quantitative values for erosion as there are too many variables to consider such as rainfall amount, duration and intensity during storm events. The effects of the proposed activities would be compared to natural rates.

The appropriate scale for measuring soil productivity criteria (compaction, erosion, etc.) is site specific or on a unit by unit basis. The appropriate scale for measuring erosion or compaction that may affect water resources would be the designated analysis area (see Water Resource section for analysis areas). Short-term impacts (or effects) are those being ten years or less and long-term more than ten years. Although studies (Rice et al., 1972) and local observations by BLM soil scientist reveal that vegetation recovery and erosion rates return to near normal levels within approximately 5 years, short-term effects of 10 years were used because broadcast burning within 5 years after harvest could occur.

a. Alternative 1

The effect of the No-Action Alternative on the soil resource would be the continuance of existing erosion rates coming from the current conditions throughout the analysis area. Erosion rates are near natural levels throughout the project area except for areas where roads and trails exist. The units that were harvested in the past have stabilized with vegetation and erosion rates back to near natural levels. There is no way to be certain that possible future actions will occur on private land but it is presumed that all private lands having timber of commercial value would be harvested in the near future (10 years). These actions would increase the amount of compacted acres in the drainages possibly affecting peak flows. A discussion of the effects that future harvest, compacted acres and roads has on sedimentation in local waterways is included in the Water Resources section.

The risk of catastrophic fire in the drainage is projected to increase (see Fire/Fuels Management section) if no action is taken to reduce the fuel loading. An active fuels management program over the past five years has offset some risk but almost a century of fire exclusion has occurred in this area and, consequently, "natural" fire conditions no longer exist. Fuel loadings in some areas are greater and duff/litter layers are often greater than would naturally occur. Given the natural fire frequency in this area, many low-severity fire events have likely been suppressed over the past century. Fire exclusion in mixed conifer forests has increased the risk of fire due to decades of fuel accumulation (Taylor, 2003 p.704). Consequently, the inevitable but unpredictable, uncontrolled natural burn (wildfire) could be of such intensity as to severely increase erosion and sedimentation, and severely set back the community of microorganisms. Following wildfire, erosion susceptibility is increased in response to increased soil moisture from decreased evapotranspiration (Silva et al., 2006), increased displacement of soil particles from decreased vegetative interception of rain (Anderson and Brooks 1975), and formation of a hydrophobic soil layer in some instances that decreases water infiltration into soil (Brady 2001). When compared to the proposed action alternative(s), there would be no increase in erosion rates short-term but long-term erosion from roads would increase due to lack of sufficient road maintenance and the risk of a catastrophic wildfire would increase as a result of the no action alternative.

b. Alternative 2

There is about 2.75 miles of road construction proposed under this alternative. Road construction would have the greatest impact on the soil resource as approximately 4 acres of land are disturbed and taken out of vegetation production for every one mile of road construction proposed. There would be a noticeable increase in soil erosion the first few significant rain events after construction. Erosion rates from roads and landings on the Cascade geomorphological unit (similar to that of the analysis area) were reported to be about 9.36 yd^3/ac/yr (Swanson and Dyrness (1975) in Amaranthus et al.,1985. p. 233). This total includes mass slope failures from roads and landings on unstable slopes in calculating the number. Because most of the newly proposed road construction would be located on stable slopes it is anticipated that, under average rainfall conditions, the erosion rates would be less than one-half of those reported by Swanson (<4 yd^3/ac/yr) the first few substantial storm events after construction and decrease down to about 3 times natural rates after 3 years. As 2.75 miles of new construction is proposed under the Rio Climax Forest Management Project, about 11 acres would be disturbed, which would result in approximately 6.6 yd^3/ac/yr of eroded soil three years after construction. This represents only a slight increase (<1 percent increase) when added to the amount of eroded material from existing roads across the analysis area.

Typically, newly constructed roads lose the most soil primarily during the short period before grass becomes established and the roadbed is graveled or compacted. Soil loss from fully graveled roadbeds was only 3 to 8 percent of that from the bare soil roadbed of otherwise similar construction (Swift, 1988. p.321).

The road renovation that would occur consists of roads that have had little use and or maintenance in the recent past and need more work than improvements. Renovation may include removing brush or trees from the running surface of the road. Soft spots would be fixed with filter fabric in conjunction to the spot rocking to restore the road surface. Ditches could need continuous cleaning rather than just spots. A portion of the renovation has a grass surface and erosion rates are currently near normal. Road renovation would increase erosion in the local area but the topography of the proposed renovation is very gentle and no off-site erosion is anticipated.

There is about 1,135 acres of land proposed for land management activities. There is approximately 948 acres proposed for some type of timber removal. Soil disturbance from timber harvesting may not be avoidable, but can be minimized. Preventative measures are more effective in minimizing impacts on soils than remedial mitigation because of the remedial expenses, loss of productivity until mitigation occurs, and the possibility that the original soil conditions may never be restored (Miller et al., 2004). The commercial timber harvest activities planned in this alternative would disturb, on average, about 15 percent of the ground in the proposed harvest units. As a result of implementing designated skid trails, the units tractor logged (550 acres) would result in approximately twelve percent or less of the area compacted (USDI, 1995. p.166). Designating skid trails would most likely minimize the area that would be deeply disturbed during tractor logging operations.

In a study on partially cutting using designated skid trails conducted by Oregon State University (Bradshaw, 1979), designated skid trails occupied only four percent of the area compared to 22 percent for conventional logging. In a study of thinnings and partial cutting by yarding systems, skidding logs caused soil disturbance on about 21 percent of the site resulting in 13 percent displacement and 8 percent compaction (Landsberg, 2003. p.29). Observations of the units proposed for harvest reveal very few old skid trails still apparent across the landscape. Tree and brush vegetation has re-established in most of the skid trails that were previously compaction from past harvesting.

The use of a harvester/forwarder system is proposed in some units instead of tractor yarding using designated skid roads. Implementing such equipment would occur only during very dry soil conditions or on a two foot snow pack and would result in minimal amount of detrimental compaction. Harvested trees would be processed in front of the harvester, so that the harvester trails are covered with slash. Slash is placed in front of the harvester to produce a slash mat for the harvester and forwarder to walk over. The forwarder, that carries the logs to the landing, should remain on trails approximately 150 feet apart to avoid impacting more than 12 percent of the harvest area.

Short-term erosion rate potential would increase moderately (15-50% over undisturbed rates) in the tractor units where slopes exceed 20 percent and where the skid trails are not on the contour. Most of the eroded particles would not reach waterways as a result of riparian reserves buffers, waterbars and the dispersal of yarding skid trails. The decrease in soil pore space, as a result of the compacted skid roads, causes a slower infiltration rate and larger amounts of sediment laden surface runoff. On slopes less than 20 percent and skid roads that follow the contour, runoff velocity tends to be reduced and soil particles transported only a short distance. Although erosion rates would increase in the harvested units, most soil particles would not reach local waterways under normal rainfall conditions and return to near normal rates usually within 5 years as vegetative cover is re-established. In most operations, a major portion of the harvest area would remain essentially undisturbed. Even logging systems that cause the most disturbances seldom bare more than 30 percent of the soil surface. Since surface erosion depends primarily on extent and continuity of bare areas, soil loss is usually slight (Rice, 1972).

Geppert (1984) concluded that cumulative surface erosion should result from the construction and existence of road networks, but that forest harvest and site preparation should not result in cumulative erosion, except when poorly applied on poor or harsh sites (in Beschta, n.d.). There are no harsh or poor sites being treated in this proposed alternative as such sites were screened through the Timber Productivity Capability Classification process (USDI, 1994, page 3-85) and taken out of the timber harvest base. It is estimated that there are approximately 357 miles of road that exist in the 39,285-acre project analysis area resulting in an average road density of 5.8 miles of road per square mile and about 700 acres of compacted area.

Prescribed burning planned under this alternative would be in the form of handpile burning or broadcast burning. As the broadcast burning planned in this project would be an underburn, the intensity of the burn would be light to moderate and have slight direct short-term effect on soil properties. A light surface fire will generally only char the litter, leaving most of the mineral soil at least partially covered. A moderate burn would result in the duff, rotten wood, or other woody debris partially consumed; mineral soil under the ash not appreciably changed in color. Most soil and ash movement occurs during the first rainy season after the slash is burned and quickly diminishes as vegetation cover re-establishes. A recent study concluded that prescribed restoration fires did not have a significant effect on soil solution and stream chemistry or stream sediment concentrations and that low-intensity, low-severity fires could be used effectively as a tool to restore vegetation structure and composition (Elliot, 2005. p. 5).

The increase in erosion rates over present levels would be less than 15 percent as a result of burning handpiles because the piles would be spaced throughout and occupy approximately 3 to 5 percent of the total area. The increased potential of soil particles reaching the local waterways as a result of the prescribed burning would be low because of prescribed riparian buffers and handpiling of slash would not occur near waterways. High soil temperatures generated by burning piles would severely and negatively affect soil properties in the 3 to 5 percent of the unit by physically changing soil structure and reducing nutrient content. In most pile burning operations, the duff and woody debris is completely consumed.

Duff and woody debris represent a storehouse of minerals and protection for the soil surface. Since Nitrogen losses are roughly proportional to the amount of duff consumed, burn prescriptions that allow greater retention of woody debris benefit long-term site productivity. Burning volatizes organic Nitrogen or changes it into a readily available form (for plant use). Large proportions of the total Nitrogen budget can be lost through volatilization in the sites where pile burning occurs. Total foliar Nitrogen content also is reduced (14% in moderate burns, 33% in intense burns), and the effects last at least 4 years (Atzet, 1987 p. 193). Overall, soil productivity would experience a slight (<15%), negative decrease short-term effects but potential long-term positive effects would be realized from the proposed actions as the risk of catastrophic fire is diminished.

In summary, there would be a net increase in compacted area in the tractor harvest units averaging about 12 percent which would slightly decrease soil productivity long-term. Based on research and past monitoring of operational activities, it is assumed there would be a 5 percent loss of productivity on all lands that would be tractor harvested using designated skid trails. The loss is accounted for in the (Medford District) non-declining timber harvest calculations (USDI 1994. p.4-13). Soil productivity would experience a slight (<15%), negative decrease short-term but potential long-term positive effects would be realized by thinning and prescribed fire. There would be a slight to moderate (15-50%) increase in erosion rates as a result of the combination of harvesting timber and fuel reduction activities (i.e., slashing, prescribed burning) which would last about three to five years. A slight cumulative long-term increase in erosion rates would occur as a result of road building.

Cumulatively, there is currently little direct evidence to indicate that harvest removals in themselves lead to soil depletion over several succeeding rotations (Beschta, n.d.). A crucial aspect that affects soil productivity is cutting intensity. Cutting intensity means the proportion of standing trees harvested, i.e., clearcutting vs. shelterwood vs. selection cutting. The less intense the cutting intensity results in lower effect on the soil.

Another critical aspect of a silvicultural regime is the rotation or cycle length. Rotation length determines the intervals at which the site is entered and disturbed and nutrients are removed, redistributed or lost. Rotation length is especially important from the point of view of cumulative effects since it determines the time periods allowed for recovery between harvests. Soil productivity decline should be least likely when low silvicultural intensity is combined with high inherent productivity and favorable conditions. Soil erosion may prove cumulative through time if periodic disturbances occur (that result in soil leaving the site) at intervals too short for the site to stabilize to bring about recovery. This should not be the case as a result of the Rio Climax project as soil disturbance would not result in a significant amount of soil leaving the site and erosion rates would return to near normal within about five years. Most past harvest activities that had a substantial effect on soil erosion rates occurred over twenty years ago and most sites have recovered from those events. Therefore, there is a low potential for adverse cumulative impacts to the soil resource as a result of the timber harvest if the soil resource is allowed enough time to recover from the disturbance of this project.

c. Alternative 3

This alternative proposes to harvest approximately 800 acres of trees. The cutting prescription proposed would maintain at least 40 percent tree canopy across the units. Logging systems planned for the proposed units would be the same as prescribed in Alternative 2. There is approximately 1.25 miles of newly constructed road proposed in this alternative. The fuels treatments proposed in Alternative 2 would be the same in this alternative.

This alternative would be less impacting to the soil resource as the planned harvest area would be about 150 acres less and 1.5 miles of road construction necessary to facilitate the tree harvest would be eliminated. The effects to the soil resource are the same as those described in Alternative 2 but less ground is disturbed and/or compacted. The elimination of approximately 1.5 miles of road makes the most difference in comparing Alternative 2 and Alternative 3. Approximately 6 acres of soil would be unaffected by road building and maintain erosion rates at natural levels. Cumulative impact would be just slightly less than those proposed in Alternative 2 mostly as a result of not building the 1.5 miles of road.

C. WATER RESOURCES

1. Affected Environment

A watershed analysis provides general water resources background information for the project area. This document is titled the *Little Butte Creek Watershed Analysis* (USDI 1997).

a. Analysis Area Description

The Rio Climax project area is located in the western portion of the Little Butte Creek Watershed, which is a tributary to the Rogue River. The project area is smaller than the analysis area and for purposes of analyzing the affected environment and the proposed project, specifically cumulative effects, the analysis area for water resources will consider portions of Upper and Lower Antelope Creek and Lake Creek.

These are called sub-watersheds and represent 6th field hydrologic unit codes or HUCs. These sub-watersheds are further subdivided into 7th field HUC's called drainages which range in size from 317 to 8,334 acres (Table 3-2). The total size of the analysis area is 39,285 acres or 61 square miles and consists of drainages where treatments are proposed. The size of a drainage is large enough to assess the cumulative effect of actions that, taken individually (site scale) may not be significant, but when combined with effects from everything else going on in the drainages, may have a potential impact ("cumulative effect"). The drainage areas are small enough to avoid "drowning out" evidence of adverse effects. As the size of the analysis area increases, there is an increasing possibility of the analysis indicating that there is "no problem" when in fact individual drainages may have issues of concern.

The analysis area is within Jackson County and is a mix of public and private land (Table 3-2 and Map 3-3). Private lands make up the majority of the analysis area. BLM parcels are scattered and somewhat discontinuous. The affected sub-watersheds are Upper and Lower Antelope Creeks and Lake Creek which are tributaries of Little Butte Creek. Little Butte Creek is considered a 5th field HUC or watershed and flows into the Rogue River. The analysis area is within the extreme eastern portion of "interior southwest Oregon". Elevations range between approximately 1,600 feet to over 5,900 feet at the top of Grizzly Peak. The headwater areas of these catchments are steep and forested. As they flow northwest, the steep mountains gradually transition to gentle foothills then lowland valleys where they eventually flow into Little Butte Creek.

The climate is characterized by mild wet winters and hot dry summers and has the highest average summertime temperatures and the lowest average precipitation within western Oregon and Washington. Average annual precipitation ranges from approximately 22 inches in the lower elevations to 44 inches at Grizzly Peak. Winter precipitation in the higher elevations usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. Rain predominates in the lower elevations with a mixture of rain and snow occurring between approximately 3,500 feet and 5,000 feet in what is referred to as the transient snow zone (TSZ). Rain-on-snow runoff events originate in this zone and when they occur can trigger landscape altering responses such as floods, debris torrents and landslides. Summer rainstorms occur occasionally and are usually of short duration and high intensity. These types of events are usually limited in coverage but can result in increased erosion and sediment deposition.

The geology of the analysis area is volcanic in origin and is part of the Western Cascades subprovince. The drainages are dominated by lava flows of basaltic andesite, basalt, and andesite. The landscape is deeply dissected and has a well-developed dendritic drainage pattern in response to landsliding. Within the analysis area there are landforms that indicate areas of geomorphic instability. The presence of hummocky terrain and sag features represent localized areas of instability resulting from earthflows. The majority of these features are dormant, however signs of recent activity were observed in isolated areas.

Private lands within the analysis area are generally used for ranching and residential parcels. There are scattered lands in the upland areas that are owned by private timber companies and managed for timber production. Public lands are almost entirely managed by the BLM and are primarily used for timber harvest, grazing and recreation, which in some areas is a significant use on public lands. Regional public issues reflect the dominant uses of the analysis area and include concerns with recreational activities such as off-highway vehicle (OHV) use; concerns with timber harvest and grazing on private and public lands; concerns about fish and water quality; concerns over water rights and allocations; and concerns over general degradation of the natural environment. As a result, the hydrology of the analysis area has been altered through irrigation withdrawals, roads, grazing, timber harvest, and other actions.

The effects on channel morphology and flows are particularly evident in the lower more developed portions of the sub-watersheds where the stream channels are characterized as depositional. In the upper portion of the sub-watersheds, the impacts are largely the same although the effects are somewhat different. There are numerous diversions and canals, particularly within Lake Creek which have altered stream hydrology, primarily by reducing flows during the spring and early summer. Streams in this area are considered transport channels, whereas sediment is routed through these reaches only to be deposited in lower gradient depositional reaches. Therefore, stream morphology may be less affected, although as in the lower reaches impacts to water quality and aquatic ecosystems still occur.

Other than water withdrawal, the major factors currently influencing both water quantity and quality within the analysis area where harvest is to occur include canopy cover, roads/trails, and riparian grazing impacts. Reduced canopy cover within the upper forested portion of the drainages that are less than historical can alter the amount and timing of streamflows. This may result in increased channel erosion and morphological changes to the stream channels.

Roads, trails, and clearcut logging, can accelerate erosional processes and result in increased turbidity and sedimentation. This can also result in adverse impacts to aquatic habitat and organisms, including fish. Grazing along streams and within meadows can elevate stream temperatures and accelerate erosion by reducing streamside shade and altering channel form and process.

Table 3-2. Analysis Areas and Ownership Associated with the Rio Climax Project Area

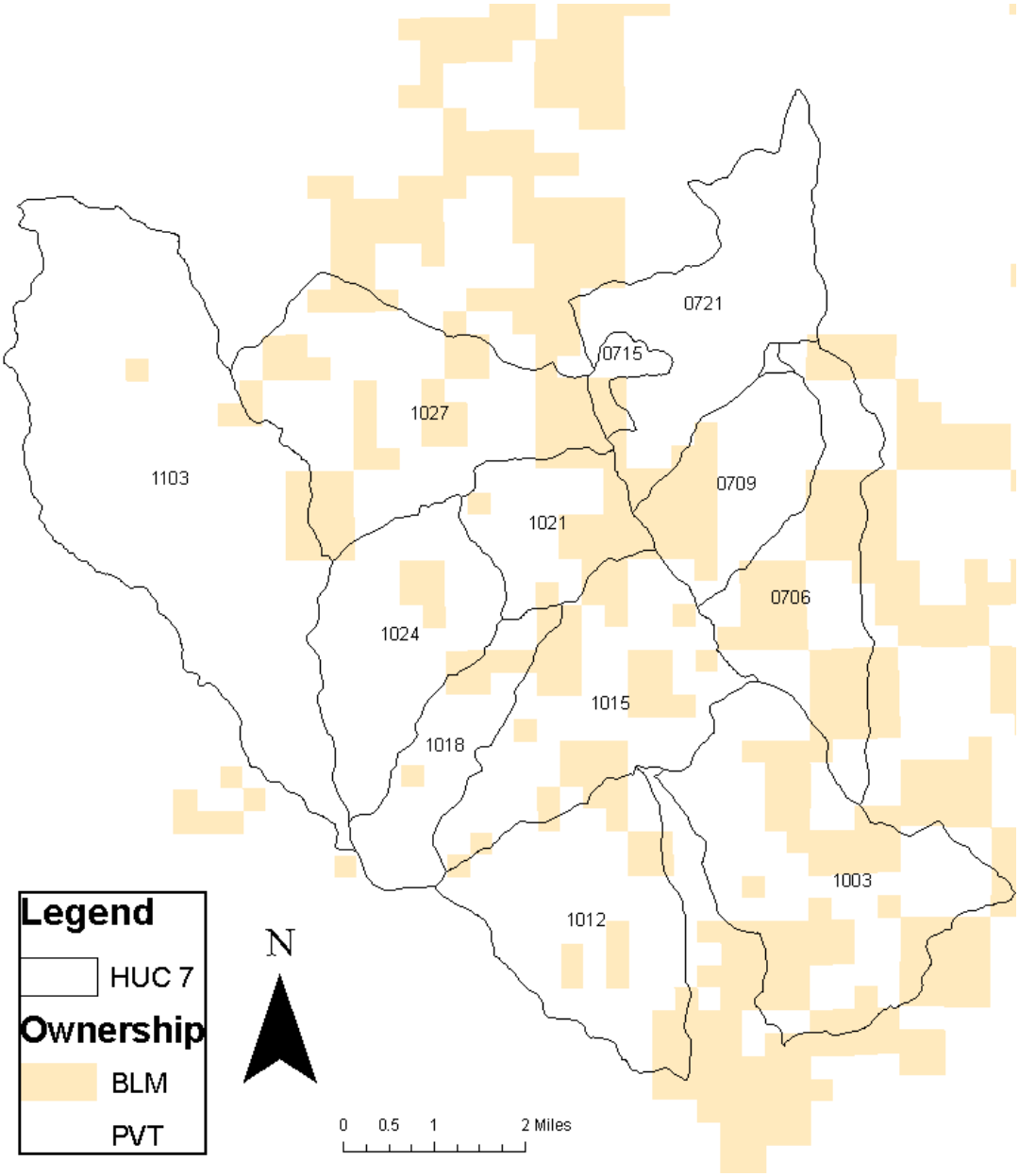
Sub-Watershed	HUC 7 (drainage)	Acres	BLM (percent)	Private (percent)
Lake Creek	0706	2,897	49	51
	0709	1,968	33	67
	0715	317	34	66
	0721	3,376	6	94
	Total	8,558	30	70
Upper Antelope	1003	4,851	38	62
	1012	3,490	20	80
	1015	3,599	31	69
	1018	1,632	17	83
	1021	1,648	36	64
	1024	2,851	9	91
	1027	4,322	38	62
	Total	22,393	27	73
Lower Antelope	1103	8,334	3	97
	Total (All)	39,285	26	74

b. Roads and Road Density

Recent research (Reid and Dunne, 1984: Luce and Black, 1999) supported by local and regional field evaluations have consistently found roads to be the primary source of accelerated erosion in wildland watersheds. Roads impact aquatic systems through both chronic and episodic erosion. Chronic erosion is where material is detached and transported to streams via the road surface and drainage structures such as cross drains and inboard ditches. This occurs in response to precipitation events throughout the year. Episodic erosion usually occurs as a result of intense rainfall and rain-on-snow events within the transitional snow zone. Large failures often occur as a result of culvert plugging, stream diversion and fillslope landslides. In addition, where road densities are high, concentration and routing of stormwater may result in increased peakflows. Both road density and the number of stream crossings are gross indicators of the level of road impacts in watersheds.

High road densities, greater than 4.0 miles per square mile (USDI and U.S. Dept. of Commerce, 2004) are found in all of the drainages within the analysis area (Table 3-3). Although road density is a useful indicator, it should be noted that not all roads impart similar effects. For instance, the magnitude of impacts from roads on steep slopes is different than those from roads located on flat terrain. Roads located near streams and road stream crossings are responsible for the majority of sediment delivered to channels. Within the analysis area, many roads are unsurfaced and located within Riparian Reserves. In addition, some native surface roads are open during the rainy season. This type of use can render drainage features ineffective and result in concentrated flow and increased erosion. Although all of the drainages have high road densities, of the two drainages (0709 and 1024) with the highest road densities, BLM managed lands account for 33 and 9 percent of total ownership, and out of a total of 1,024 road/stream crossings, 123 or 12 percent are located on BLM managed land.

Map 3-3. Analysis Area Displaying 7th Field HUC's and Ownership



Although some road work has been accomplished, many crossings are susceptible to failure through culvert plugging and stream diversion. Other road segments are unsurfaced, steep, lack adequate drainage, or are located within close proximity to streams. Lack of road maintenance or improper road maintenance by all jurisdictions within the analysis area has increased sediment production or the potential for sediment production. There is also an expanding network of OHV trails. These features often utilize old road beds or are established through repeated off-road travel, or illegally constructed by proponents. They exist on the landscape irrespective of sensitive soils, adequate drainage, or proximity to watercourses and are also responsible for increased sediment production.

Table 3-3. 7th Field Road Densities and Road Densities within Riparian Reserves

Catchments	HUC 7 (drainage)	Road Density (miles/square mile) [1]	Road Density within Riparian Reserves (miles/square mile) [1]
Lake Creek	0706	5.6	5.6
	0709	7.2	6.2
	0715	4.7	6.5
	0721	5.8	6.4
Upper Antelope	1003	5.3	5.4
	1012	6.3	5.6
	1015	5.4	6.5
	1018	5.3	7.1
	1021	4.5	5.5
	1024	7.1	5.8
	1027	4.8	4.7
Lower Antelope	1103	6.3	7.4

[1]Road densities were calculated using BLM corporate GIS data and includes all roads representing numerous jurisdictions, including urban or otherwise developed areas within the HUCs.

The major tributaries in the Lake and Upper and Lower Antelope Creek sub-watersheds, which comprise the 7th field HUCs analyzed, have steep gradients, usually greater than 10 percent. The channels are entrenched with steep sideslopes. Material is quickly moved through these reaches and deposited within the lower reaches as the gradient flattens. Evidence of relatively high levels of sediment has been observed in some stream reaches within the analysis area. Substrate measurements of Antelope Creek are unavailable, however measurements for five reaches in Lake Creek indicate the fine sediment composition was 29 percent, which is considered high (20-40 percent)(ODEQ 1996). This is likely higher than historical conditions and is a result of the level of disturbance in the watershed above this point. Not all streams have been surveyed for all parameters and based on recent field observations, conditions are highly variable and site specific. In addition, the most recent measurements were conducted in the early 1990s, prior to several large flood events.

c. Canopy Cover and Transient Snow Zone

Historically, geomorphic processes that shape landscape and channel geometry are triggered by large, infrequent storm events. In recent times, these events can be characterized by warm moist storms that result in high intensity, long duration rainfall. The results can be intensified when rainfall occurs on an established snowpack. The percent of a watershed in the transient snow zone (TSZ), for Rio Climax roughly an elevation band between 3,500 and 5,000 feet, can indicate elevated risk of adverse impacts. These impacts can be accelerated by modifications to forest canopy cover and as discussed, roads and other disturbance features. Drainages where TSZ compromises greater than 25 percent of the drainage area are of hydrologic concern, particularly where large openings such as clearcuts exist. The transient snow zone occupies 13 percent of the Lake Creek subwatershed, 30 percent of the Upper Antelope Creek drainage, and 4 percent of the Lower Antelope Creek drainage. Large areas of vegetation removal in the transient snow zone are of particular concern due to alterations of the streamflow regime and the potential for resultant increased peak flow magnitudes (Christner and Harr, 1982).

Table 3-4. 7th Field HUCs Percent Less Than 30% Canopy Cover (CC) and Percent Less Than 30% Canopy Cover within the TSZ

Subwatershed	HUC 7 (drainage)	Percent Forested Area Less Than 30% CC[1]	Percent Forested Area Less Than 30% CC within TSZ [1]
Lake Creek	0706	11	21
	0709	15	30
	0715	10	0
	0721	8	3
	Total	11	14
Upper Antelope	1003	18	14
	1012	11	10
	1015	22	9
	1018	33	2
	1021	52	4
	1024	21	4
	1027	34	0
	Total	27	6
Lower Antelope	1103	7	0
	Total	20	8

[1]Includes existing disturbance features such as roads and landings

Modifications of canopy cover that result in less than historical conditions either through fire or timber harvest, also may affect the timing and volume of streamflow. An assessment of percent canopy cover is also useful in determining potential cumulative effects of the proposed activities. In the analysis area, the Ecoregion Description (WPN 1999: Appendix A) lists historic canopy closure as greater than 30 percent, with the exception of the oak woodland, lowest elevations which historically had less than 30 percent canopy closure. An analysis of percent canopy cover of forested land at the 7th field HUC was conducted. This scale is where detectable changes in peakflows would likely occur. The previous table summarizes percent of forested acres within the drainages that are below 30 percent canopy cover and percent below within the TSZ. Three drainages (1018, 1021, and 1027), all within Upper Antelope Creek, exceed those criteria for the entire area. For the TSZ, one drainage (0709) within Lake Creek is currently at 30 percent; however, for the entire drainage the value is 15 percent.

Different levels of harvest in watersheds have demonstrated variable effects on peak flows (Wemple, Jones and Grant 1996; Harr 1979). When less than 25 percent of a watershed is harvested, no detectible change in peak flows have been observed (Stednick, 1996). It should be noted the majority of literature available regarding the relationship between harvest and flow have focused on clear cut harvesting, many in areas that removed close to 100 percent of the overstory canopy. For this analysis, any area where 30 percent or greater of the forested acres is less than 30 percent canopy cover is assumed to be hydrologically altered and responds similar to a clearcut. This is particularly true if a large percentage of the drainage is located within the TSZ. Although three of the drainages in Table 3-4 above have large percentages of reduced canopy cover, only one within the TSZ reflects a value that may alter timing and increase the potential for peakflows.

Recent research indicates that effects from peak flows, although of concern, should be confined to a relatively discrete portion of the network where channel gradients are less than approximately 2.0 percent and streambeds are composed of gravel and finer material. Furthermore, data supports the interpretation that if peak flow increases do occur, they can only be detected in flows of moderate frequency and magnitude. Beyond that, they are likely not detectable (Grant et al., 2008). What this suggests is that if increases in peak flows occur, they are unlikely to result in adverse effects to the higher gradient channels located within the analysis area. Also, that peak flows are only detectable in smaller storm events with return periods of 6 years or less, where channel forming processes are minor in effect.

d. Surface Water

Surface water in the Rio Climax analysis area includes streams, ditches, springs, wetlands, and reservoirs. Streams in the project area are classified as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. Streams categorized as perennial or intermittent on federal lands are required to have Riparian Reserves as defined in the Northwest Forest Plan (USDA and USDI 1994). Dry draws do not meet requirements for streams needing Riparian Reserves because they lack the combination of a defined channel and annual scour and deposition (USDI 1995:27). Streams on private forest lands are managed according to the Oregon Forest Practices Act. Stream types on BLM-managed lands were identified through site visits; USFS and non-federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent BLM-managed lands. Table 3-5 summarizes stream miles within each HUC. Mileages include perennial, intermittent, and ephemeral (or short duration intermittent).

Table 3-5. 7th Field HUC Stream Miles, BLM and Private

Subwatershed	HUC 7 (drainage)	Stream Miles		Total Miles
		BLM	Private	
Lake Creek	0706	13.5	11.5	25.0
	0709	7.0	10.0	17.0
	0715	0.7	0.8	1.5
	0721	1.6	36.0	37.6
	Total	22.8	58.3	81.1
Upper Antelope	1003	20.6	35.4	56.0
	1012	5.8	26.4	32.2
	1015	12.5	26.4	38.9
	1018	2.1	12.3	14.4
	1021	4.9	10.1	15.0
	1024	2.0	24.4	26.4
	1027	13.2	26.7	39.9
	Total	61.1	161.7	222.8
Lower Antelope	1103	1.1	70.8	71.9
	Total	85.0	290.8	375.8

Large numbers of cattle and sheep were introduced in the area in the mid-1800s and heavy livestock use continued until the early 1900s. They tended to concentrate along stream courses and likely caused streambank deterioration as they moved in and out of channels. Livestock grazing is currently occurring on both public and private lands in the analysis area. Logging and land clearing for agricultural use resulted in the removal of large woody material from stream channels in addition to removal of streamside trees. In some reaches, there continues to be an apparent lack of large wood available today. As a result, floods can be more destructive without sufficient instream structure to reduce stream energy. As more streambank erosion occurs and streams downcut, the channels become more entrenched. This also reduces channel diversity necessary for sustaining aquatic species.

Within the upper watersheds where harvest is proposed, the primary concerns are lack of riparian shade and large wood recruitment from grazing and past harvest activities. Also, as discussed previously, elevated sediment and turbidity levels are occurring as a result of an extensive road network and other disturbances such as OHV use. Summer water temperatures and E coli (bacteria) for mainstem Lake (mile 0-7.8) and Antelope Creeks (mile 0-19.7) exceed the State criteria and it is currently designated as water quality limited and on the Oregon 303(d) list. Lake Creek is also designated as water quality limited (303 (d)) for sediment.

Most of the warming can be attributed to channel alterations, loss of riparian shade, water withdrawals, and irrigation return flows in the lower watershed. Within the upper watershed, impacts affecting temperature are from past logging and grazing. Stream temperatures on Federal lands are expected to improve as Riparian Reserves promote the maintenance and improvement of streamside vegetation on BLM administered lands.

e. Fuel Loading

Within the forested portions of the watersheds, fuel loading beyond historical conditions has increased the potential for high intensity wildfire. Although humidity's are generally higher, given the right conditions some riparian areas are susceptible as well. High intensity fires can burn off the canopy and duff layers that protect soils from erosive and gravitational forces. A high intensity wildfire along the steep, stream-adjacent sideslopes would increase the potential for debris torrents and surface erosion. These impacts are often severe and may persist for long periods of time.

f. Groundwater

Groundwater supplies in the analysis area are limited due to the low permeability of the volcanic rocks found in the majority of the analysis area. In the lower portions, sand and gravel materials are more permeable; however, these materials are too small in extent to be major groundwater sources. Well water quality problems are prevalent throughout the Rogue Basin, arising from natural sources such as arsenic, boron, and fluoride. Surface contaminants such as nitrate and fecal matter may enter ground water through improperly constructed wells. Increasing demand from rural population density increases and years with below-normal precipitation have been identified as factors affecting ground water supplies in Jackson County (USDI 1994:3-13). The Medford District PRMP/EIS identified that an increase in rural population density has been accompanied by an increase in ground water diversion, and this trend is expected to continue (USDI 1994:3-13). None of the proposed Rio Climax analysis area has been identified as a critical groundwater area by the Oregon Water Resources Department (OWRD 1989).

2. Environmental Consequences

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management and events unrelated to the Rio Climax project. Discussion for Alternative 2 and 3 reflect the direct and indirect impacts of the proposed actions. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting ten years or less and long-term effects last more than ten years (USDI 1994:4-4).

As part of an assessment of cumulative effects, a discussion of reasonably foreseeable future activities combined with those of the action alternatives is included. Below is a summary of those actions that may occur with reasonable certainty. The affected environment section summarizes present conditions and effects.

Future timber harvest on private lands would likely occur within the analysis area and assumes that it will continue at a similar rate as has occurred in the past. Private lands are governed under state forestry regulations, and as such receive a different level of protection than federal lands. Analysis of effects from private timber harvest generally considers the worst case scenario (i.e., all suitable forested lands would be logged at ~ 60 year tree-growing rotations) with regeneration harvest and road building as the predominate effects.

Currently, approximately 8,309acres of private timberland within the analysis area is predominantly 60 years old or older and available for harvest. The drainages with the highest number of those acres are 1003 and 1012 which contain 1,713 and 1,758 acres respectively. Of those, a small amount of timber harvest on Federal land (BLM) is planned for HUC 1012 with more extensive harvest planned for HUC 1003.

HUC 1003 is currently at 18 percent canopy cover less than 30 percent and 14 percent within the TSZ. These numbers are considered relatively low, and as a result increased harvest on private land could be accommodated without approaching the 30 percent threshold that may increase risk. However, if new road construction is initiated this could elevate already high road densities and result in an increased risk of adverse effects.

The Shale City Salvage project proposes to harvest dead and dying trees on 39 acres within the analysis area. All activities would occur within drainage (HUC) 1003. There will be no new road construction and it is not expected that canopy cover would be reduced below 30 percent.

Also, there are fuels treatment units that were analyzed under the Ashland Fuels Environmental Assessment planned within the analysis area. Approximately 466 acres would be treated within drainage (HUC) 1027 and 57 acres within drainage 1103. All treatments are by hand and there will be no new roads and only small diameter live and dead fuels would be thinned. There are no additional impacts or cumulative effects anticipated as a result of these two projects.

a. Alternative 1

There are no actions proposed under Alternative 1 (the No Action Alternative); therefore, direct and indirect effects are the current conditions in the analysis area which are the result of past actions not related to the Rio Climax Project. All current conditions and trends would continue as specified in affected environment. Namely roads with poor drainage and lack of maintenance, or improper maintenance, would continue to deliver water and sediment to streams. Likewise, in certain stream reaches, channel processes would maintain poor habitat conditions due to a lack of large instream wood.

On BLM managed lands, over time, vegetation recovery within Riparian Reserves would moderate steam temperatures and provide for increased wood recruitment to stream channels. There would be no changes in percent of area in non-recovered (less than 30 percent canopy cover) openings, areas of compacted soil, road densities, percent of area in roads, or number of stream crossings. There would therefore be no changes to the magnitude and frequency of peak flows beyond those which may already be occurring.

In the long term, climate change projections indicate that the West and Pacific Northwest are likely to experience continued warming and increased precipitation along with more extreme wet and dry years (Furniss, et al., 2010). As a result, hydrologic changes, particularly the changes in snowpacks and runoff patterns are among the most prominent and important consequences. Declines in snow water equivalent occurring in low and mid-elevation sites may result in earlier spring flows and lower late season flows. Changes in average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased inter-annual precipitation variability would cause increased runoff in wet years and increased rain-on-snow probability in low elevation snowpacks.

Given these impacts, effective climate change adaptation strategies will need to focus on maintaining watershed resiliency. Under this alternative, given the right conditions, the lack of vegetation and fuels treatments may increase the likelihood a high intensity wildfire over part or all of the area may occur. Should this happen, it could alter the surface water and groundwater regime. Immediately after a severe fire, the loss of vegetation would make more groundwater available for streamflow and low summer flows would likely increase. However, the absence of vegetation may also result in an increased risk of higher peak flows and increased erosion.

b. Alternative 2

Direct and Indirect Effects

This alternative proposes various prescriptions of commercial helicopter, tractor and cable timber harvest, new road construction, and road renovation. In addition, depending on post-harvest conditions, activities would be followed up by fuels treatments that would entail hand thinning, piling and burning.

A total of 2.75 miles of new road construction, of which 0.41 miles is within Riparian Reserves, and 0.84 miles of road renovation are proposed. The road renovation and a portion of new construction would occur on private land. In addition, road maintenance including spot rocking, drainage improvements, and one major culvert upgrade would occur.

All vegetation treatments would maintain an overstory and mosaic of understory vegetation. At least 30-50 percent canopy cover would be maintained in harvest units. There would be no increase of percent canopy cover less than 30 percent within the analysis area, including the TSZ; therefore, there would be no changes to the magnitude and frequency of peak flows beyond those which may already be occurring. Baseflows would likely remain unaffected as the magnitude of vegetation removal would not significantly reduce transpiration. Since there is no harvest proposed within Riparian Reserves, and road construction would only occur in short-term intermittent channels, stream temperatures would not be affected by the proposal and the project would allow attainment of the Aquatic Conservation Strategy (ACS). An assessment of the ACS Objectives is contained in Section E, this Chapter (below).

Where fuel treatments occur, tree thinning and low intensity underburning and pile burning would retain a mix of hardwoods and conifers, organic duff layer, leaf litter, and coarse wood debris. Collectively these forest components provide nutrients, bacteria and fungi decomposers, and mycorrhizae to maintain long term site productivity. Additionally, fuel treatments would likely occur over a period of years, distributing activity over time. These activities would not appreciably decrease canopy cover as only small diameter vegetation would be cut and piled.

As described above, sediment levels due to roads, past harvest, grazing and other disturbances is the primary focus of concern. In addition to road construction and renovation, this proposal includes log hauling and associated road maintenance. This includes ditch cleaning, road blading, and maintenance of drainage features. Log truck traffic, especially on unsurfaced roads, loosens the road surface and makes that material available for transport to channels. When road maintenance is performed improperly or best management practices (BMPs) are not implemented the potential for sediment delivery to streams increases dramatically. Examples include sidecasting material, undercutting cutslopes, improper disposal of material, and unnecessary disturbance within riparian reserves. Luce and Black (1999) found no significant increase in erosion when only the road surface was treated; however, statistically significant erosion occurred when road ditches were bladed. Luce and Black (2001) observed an 87% decrease in erosion and sediment transport from roads in years one and two following road maintenance activities.

With this alternative, hauling and road maintenance activities are expected to result in a short term increases in sediment and turbidity. If BMP's are implemented and maintenance activities are properly conducted, these increases are expected to me minor. If transport occurs during high flows, which is likely, the introduced sediment would become an immeasurable fraction of the total sediment load and would not be detectable at downstream locations. This proposal includes a pipe installation and drainage improvements that would likely reduce impacts over the existing condition. These treatments would occur on public and private land on road 37-1E-23. This road has received little maintenance and a completely blocked culvert would be replaced with a larger pipe. Additionally, active erosion on this road due to incision would be remediated to the extent possible.

Road construction has the potential to increase sediment production as well. Compared to the existing road system, the amount proposed is minor in extent. New road construction would increase road density and the compacted area attributed to roads. An indirect affect that is difficult to quantify is OHV use following harvest. In areas not already closed by gates or other measures, OHV use of skid trails and other features such as previously closed roads has been observed. The result is a potential increase of unmanaged OHV trails leading to elevated sediment rates and adverse impacts to soils and other resources. These effects may persist over time. Within the analysis area, light to moderate use is occurring and may increase if project design features (PDFs) specific to road closures are not adhered to.

Actions included in this proposal that have a higher probability of sediment delivery include road use and maintenance, cable and tractor yarding, and road construction. If project design features (PDFs) and BMPs contained in Chapter 2 are implemented properly, there would be small increases of sediment routed to stream channels. Also, given the small amount of additional compacted area and no increases in canopy cover less than 30 percent (Table 3-4), there is little probability the proposal would modify the magnitude or timing of peak or base flows.

In the long term, climate change projections indicate that the West and Pacific Northwest are likely to experience continued warming and increased precipitation along with more extreme wet and dry years (Furniss, et al., 2010). As a result, hydrologic changes, particularly the changes in snowpacks and runoff patterns are among the most prominent and important consequences. Declines in snow water equivalent occurring in low and mid-elevation sites may result in earlier spring flows and lower late season flows. Changes in average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased inter-annual precipitation variability will cause increased runoff in wet years and increased rain-on-snow probability in low elevation snowpacks.

Given the uncertainty in climate models and the predicted effects of climate change on a site specific scale, it is difficult estimate the combined effects of this site-specific project with those anticipated effects of climate change with any certainty. Therefore, the best way to address this issue is to discuss the effects of this project on maintaining watershed resiliency. Under this alternative, vegetation and fuels treatments may decrease the likelihood a high intensity wildfire over part or all of the area may occur. This would maintain or slightly improve watershed resiliency. Alternately, roads and road construction can decrease watershed resiliency.

Cumulative Effects

As described in the affected environment, impacts from roads, recreation, grazing, OHVs, clearcut logging and water diversions has altered watershed processes in the upper drainages. In the lower stream reaches of the sub-watersheds, grazing, roads, channel alteration, and water diversions are responsible for degraded aquatic processes and conditions. This mix of impacts is typical of many of the drainages that are tributary to Antelope and Lake Creeks.

It is expected that reasonably foreseeable future actions including rotational harvest on commercial timberlands that maintain forest conditions in an early to mid seral condition (USDI 1995) and land disturbance attributed to development of private lands will continue. Activities on BLM lands will likely continue to focus on commercial thinning for forest health and fuels reduction projects. Some recovery is expected to occur as previously harvested areas within Riparian Reserves improve shade and large wood recruitment. Grazing impacts on private lands will likely continue to occur at near present levels. On BLM managed lands, environmental analysis is occurring on the Deer/Reno and Lake Creek Spring and Summer allotments. It is expected that livestock numbers and/or season of use will be modified to reduce grazing impacts in the long term.

Overall, Alternative 2 would not reduce canopy cover below critical thresholds (<30 percent) or result in appreciable increases in ground disturbance. These would be the primary catalysts that may trigger synergistic responses. The proposal does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. Road densities however are considered high in all drainages, including within Riparian Reserves. One drainage in particular (0709) has both high road densities and a relatively high percentage of forested acres that is less than 30 percent canopy cover. This drainage may be at an increased risk of cumulative impacts. However, there are no new roads proposed and the canopy cover would be maintained, therefore this alternative would not increase risk within this drainage. The drainages with proposed new road construction under this alternative are 1003, 1015, 1024, 1027, and 1103. Within these, two drainages would have new road construction within Riparian Reserves. The table below summarizes the changes between Alternative 1(No-Action) and Alternative 2.

Table 3-6. Comparison of Road Density in Miles/Square Mile for Drainages with New Construction

Subwatershed	HUC 7 (Drainage)	Alternative 1 (no action)		Alternative 2	
		Total	Riparian	Total	Riparian
Upper Antelope	1003	5.3	5.4	5.3	
	1015	5.4	6.5	5.5	
	1024	7.1	5.8	7.3	6.1
	1027	4.8	4.7	5.0	6.0
Lower Antelope	1103	6.3	7.4	6.3	

Increased road density, particularly with Riparian Reserves, can increase the potential for sediment delivery to stream channels. Although road densities would increase, all new road construction would be outsloped to eliminate connectivity with stream channels. Also, all new construction occurs high up in the drainages within Riparian Reserves along intermittent streams. No perennial channels would be affected. Although these drainages are at an elevated risk of cumulative effects, and this alternative increases that risk, it is expected that sediment delivery from new road construction would be short-term and minor.

A recent action that has reduced road densities within Lake Creek drainages includes the Lake Creek OHV Road and Trail Decommissioning project. The BLM received funding and implemented the decommissioning of approximately 16 miles of user created routes on public and private land. Additionally, there are 25 roads that were identified in the Little Butte Creek Watershed Analysis that are proposed for decommissioning should funding become available. This would further reduce road densities in the affected drainages. These roads are summarized below.

Table 3-7. Roads Identified as Opportunities for Decommissioning

Road Number	Miles	Road Number	Miles	Road Number	Miles
37-1E-11.1		37-2E-19.4		38-2E-1.4	
37-1E-11.3		37-2E-24.0		38-2E-1.6	
37-1E-11.5		37-2E-25.2		38-2E-3.3 (part)	
37-1E-13.1		37-2E-29.0		38-2E-3.4	
36-2E-35.0		37-2E-33.3		37-3E-5.2	
37-2E-19.0		37-2E-33.5		37-3E-5.3	
37-2E-19.1		38-2E-1.0		38-3E-15.3	
37-2E-19.2		38-2E-1.2		38-3E-27.3	
37-2E-19.3		38-2E-1.3		38-3E-29.4	

This alternative elevates the potential for cumulative effects resulting from increasing already high road densities. Since canopy cover would not be reduced below 30 percent, synergistic cumulative effects would likely be minimal. Sediment production resulting from road use and construction may increase in the short term. In many cases riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural and human induced risk factors for cumulative effects, this alternative is not expected to significantly increase these within the project area drainages, or the larger sub-watersheds.

c. Alternative 3

Direct and Indirect Effects

This alternative proposes various prescriptions of commercial tractor and cable timber harvest, new road construction, and road renovation. In addition, depending on post-harvest conditions, activities would be followed up by fuels treatments that would entail hand thinning, piling and burning.

A total of 1.25 miles of new road construction, of which 0.16 miles is within Riparian Reserves, and 0.84 miles of road renovation are proposed. The road renovation and a portion of new construction would occur on private land. In addition, road maintenance including spot rocking, drainage improvements, and one major culvert upgrade would occur.

All vegetation treatments would maintain an overstory and mosaic of understory vegetation. At least 30-50 percent canopy cover would be maintained in harvest units. There would be no increase of percent canopy cover less than 30 percent within the analysis area, including the TSZ, which may result in an increase in peak flows. Baseflows would likely remain unaffected as the magnitude of vegetation removal would not significantly reduce transpiration. Since there is no harvest proposed within Riparian Reserves, stream temperatures would not be affected by the proposal and the project would allow attainment of the Aquatic Conservation Strategy (ACS). An assessment of the ACS Objectives is contained in Section E, this Chapter (below).

Where fuel treatments occur, tree thinning and low intensity under burning and pile burning would retain a mix of hardwoods and conifers, organic duff layer, leaf litter, and coarse wood debris. Collectively these forest components provide nutrients, bacteria and fungi decomposers, and mycorrhizae to maintain long-term site productivity. Additionally, fuel treatments would likely occur over a period of years, distributing activity over time. These activities would not appreciably decrease canopy cover as only small diameter vegetation would be cut and piled.

As described in the affected environment section, sediment levels due to roads, past harvest, grazing and other disturbances is the primary focus of concern. In addition to road construction and renovation, this proposal includes log hauling and associated road maintenance. This includes ditch cleaning, road blading, and maintenance of drainage features. Log truck traffic, especially on unsurfaced roads, loosens the road surface and makes that material available for transport to channels. When road maintenance is performed improperly or best management practices (BMPs) are not implemented the potential for sediment delivery to streams increases dramatically. Examples include sidecasting material, undercutting cutslopes, improper disposal of material, and unnecessary disturbance within Riparian Reserves. Luce and Black (1999) found no significant increase in erosion when only the road surface was treated; however statistically significant erosion occurred when road ditches were bladed. Luce and Black (2001) observed an 87% decrease in erosion and sediment transport from roads in years one and two following road maintenance activities. With this proposal, hauling and road maintenance activities are expected to result in a short term increases in sediment and turbidity. If BMPs are implemented and maintenance activities are properly conducted, these increases are expected to be minor. If transport occurs during high flows, which is likely, the introduced sediment would become an immeasurable fraction of the total sediment load and would not be detectable at downstream locations. This alternative includes a pipe installation and drainage improvements that would likely reduce impacts over the existing condition. These treatments would occur on public and private land on road 37-1E-23. This road has received little maintenance and a completely blocked culvert would be replaced with a larger pipe. Additionally, active erosion on this road due to incision would be remediated to the extent possible.

Road construction has the potential to increase sediment production as well. Compared to the existing road system, the amount proposed is minor in extent and 1.50 miles less than that proposed in Alternative 2. New road construction would slightly increase road density and the compacted area attributed to roads. An indirect affect that is difficult to quantify is OHV use following harvest. In areas not already closed by gates or other measures, OHV use of skid trails and other features such as previously closed roads has been observed. The result is a potential increase of unmanaged OHV trails leading to elevated sediment rates and adverse impacts to soils and other resources. These effects may persist over time. Within the analysis area, light to moderate use is occurring and may increase if project design features (PDFs) specific to road closures are not adhered to.

Actions included in this proposal that have a higher probability of sediment delivery include road use and maintenance, cable and tractor yarding, and road construction. If project design features (PDFs) and BMPs contained in Chapter 2 are implemented properly, there would be minor increases of sediment routed to stream channels. Also, given the small amount of additional compacted area and no increase in canopy cover less than 30 percent (Table 3-4), there is little probability the proposal would modify the magnitude or timing of peak or base flows.

In the long term, climate change projections indicate that the West and Pacific Northwest are likely to experience continued warming and increased precipitation along with more extreme wet and dry years (Furniss, et al., 2010). As a result, hydrologic changes, particularly the changes in snowpacks and runoff patterns are among the most prominent and important consequences. Declines in snow water equivalent occurring in low and mid-elevation sites may result in earlier spring flows and lower late season flows. Changes in average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased inter-annual precipitation variability will cause increased runoff in wet years and increased rain-on-snow probability in low elevation snowpacks.

Given the uncertainty in climate models and the predicted effects of climate change on a site specific scale, it is difficult estimate the combined effects of this site-specific project with those anticipated effects of climate change with any certainty. Therefore, the best way to address this issue is to discuss the effects of this project on maintaining watershed resiliency. Under this alternative, vegetation and fuels treatments may decrease the likelihood a high intensity wildfire over part or all of the area may occur. This would maintain or slightly improve watershed resiliency. Alternately, roads and road construction can decrease watershed resiliency.

Cumulative Effects

As described in the affected environment, impacts from roads, recreation, grazing, OHVs, clearcut logging and water diversions has altered watershed processes in the upper drainages. In the lower stream reaches of the sub-watersheds, grazing, roads, channel alteration, and water diversions are responsible for degraded aquatic processes and conditions. This mix of impacts is typical of many of the drainages that are tributary to Antelope and Lake Creeks.

It is expected that reasonably foreseeable future actions including rotational harvest on commercial timberlands that maintain forest conditions in an early to mid seral condition (USDI 1994; 4-5) and land disturbance attributed to development of private lands will continue. Activities on BLM lands will likely continue to focus on commercial thinning for forest health and fuels reduction projects. Some recovery is expected to occur as previously harvested areas within Riparian Reserves improve shade and large wood recruitment. Grazing impacts on private lands will likely continue to occur at near present levels. On BLM managed lands, environmental analysis is occurring on the Deer/Reno and Lake Creek Spring and Summer allotments. It is expected that livestock numbers and/or season of use will be modified to reduce grazing impacts in the long term.

Alternative 3 does not reduce canopy cover below critical thresholds or result in appreciable increases in ground disturbance. These would be the primary catalysts that may trigger synergistic responses. The proposal does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. Road densities however are considered high in all drainages, including within Riparian Reserves. One drainage in particular (0709) has both high road densities and a relatively high percentage of forested acres that is less than 30 percent canopy cover. This drainage may be at an increased risk of cumulative impacts. However, there are no new roads proposed and the canopy cover would be maintained, therefore this alternative would not increase risk within this drainage. The drainages with proposed new road construction under this alternative are 1003, and 1024. Within these, one drainage would have new construction within a Riparian Reserve. Table 3-8 below summarizes the changes between Alternative 1(No-Action) and Alternative 3.

Table 3-8. Comparison of Road Density in Miles/Square Mile for Drainages with New Construction

Subwatershed	HUC 7 (Drainage)	Alternative 1		Alternative 3	
		Total	Riparian	Total	Riparian
Upper Antelope	1003	5.3	5.4	5.3	
	1024	7.1	5.8	7.3	6.1

Increased road density, particularly with Riparian Reserves, can increase the potential for sediment delivery to stream channels. Although road densities would increase slightly, all new road construction would be outsloped to eliminate connectivity with stream channels. Also, all new construction occurs high up in the drainages within Riparian Reserves along intermittent streams. No perennial channels would be affected. Although these drainages are at an elevated risk of experiencing cumulative effects, and this alternative slightly increases that risk, it is expected that sediment delivery from new road construction would be short term and minor.

Another action that has reduced road densities within Lake Creek drainages is the Lake Creek OHV Road and Trail Decommissioning project. The BLM received funding and contracted the decommissioning of approximately 16 miles of user created routes on public and private land. This work took place in the summer of 2011. Additionally, there are 25 roads that were identified in the Little Butte Creek Watershed Analysis that are proposed for decommissioning should funding become available. This would further reduce road densities in the affected drainages (see Table 3-7).

This alternative slightly elevates the potential for cumulative effects resulting from increasing already high road densities. Since canopy cover would not be reduced below 30 percent, synergistic cumulative effects would likely be minimal. Sediment production resulting from road use and construction may increase in the short term. In many cases riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural and human induced risk factors for cumulative effects, Alternative 3 is not expected to significantly increase these within the project area drainages, or the larger subwatersheds. Any effects would be less than Alternative 2 since less road construction is proposed.

D. AQUATIC HABITAT & FISH

The proposed Rio Climax Forest Management Project would be located in the south western-most portion of the Little Butte Creek Level 5 Watershed, in the Rogue River Basin. For the fisheries analysis, areas will be discussed by major catchment, defined by areas that drain to distinct fish bearing streams. This area will henceforth be referred to as the analysis area. In the Rio Climax Project, the analysis area catchments consist of Antelope Creek, which includes the named channels of Yankee and Burnt Canyon Creeks, and the mainstem and other tributaries of Antelope Creek itself. Antelope Creek is a large tributary to Little Butte Creek. The other analysis catchment is Lake Creek and its unnamed tributaries, which also flows into Little Butte Creek. All project elements proposed in the Rio Climax timber sale would occur within these analysis catchments except for a small amount of haul; several miles of haul routes slop over the drainage divides of the analysis area catchments, and into both the Lost Creek catchment (adjacent and to the east of Lake Creek), and in the Walker Creek catchment, in the Bear Creek Watershed. These areas will be analyzed for haul only because the haul routes are near the ridge tops of these catchments, are all rocked surface, and involve only a few intermittent stream crossings; use of these roads for haul would have little potential to adversely impact aquatic habitats.

Little Butte Creek is not included within the analysis area, but the Little Butte Creek Watershed as a whole will be discussed in this analysis, as the Northwest Forest Plan requires that Aquatic Conservation Strategy objectives be analyzed at the site, drainage, and fifth field watershed scales. However, the primary focus of this analysis will be on the analysis catchments at the site and drainage scales, as it is in these particular streams that potential effects to fisheries resources from this project would be discernable.

1. Key Fisheries and Aquatic Resources Issues

Scoping (external and internal) generated the following key issues for fish and fish habitat both existing and anticipated under implementation of one of the various alternatives:

Riparian areas and instream aquatic habitats in the watershed are currently degraded from a host of past and ongoing activities within the watershed, particularly but not limited to: 1) extensive urbanization and development, especially along the main channel of Little Butte Creek and its larger tributaries, has resulted in a high percentage of the watershed now being covered by non-porous surfaces. This has altered run off patterns, which in turn has led to reduced water quality, and physical alterations of aquatic habitat. 2) Extensive road construction has created high road densities and led to increased sediment inputs to aquatic habitat. 3) Demands for water use have led to: construction of dams which may obstruct fish passage; some streams in the watershed being over allocated; and altered stream flow regimes. 4) Historical and ongoing grazing has resulted in increased erosion and sediment transport to many stream reaches, particularly within uppermost portions of the watershed. 5) Past timber harvest has reduced riparian canopy cover and the potential for large wood inputs.

Sediment and turbidity levels in many of the watershed streams are elevated, compromising the function and health of both the stream system and populations of aquatic organisms. The Oregon Department of Fish and Wildlife (ODFW) considers fine sediment levels of greater than 20% to be "undesirable" for salmonids. Furthermore, several streams are listed for other water quality deficiencies, including exceeding water temperature standards. Sedimentation from use of roads, and other ground disturbing activities associated with timber harvest has potential to increase sediment levels in stream channels, which could further degrade habitat, as a result of implementing the action alternatives.

Off-highway Vehicle (OHV) use is high, with many miles of trails bisecting the watershed. Some OHV trails in the Lake Creek catchment have been identified as directly contributing to instream habitat degradation. Openings and new roads created by timber harvest operations may encourage increased use by OHVs, potentially further increasing sediment delivery levels to aquatic habitats.

2. Fish and Designated Habitat

Endangered Species Act

In 1997 the Southern Oregon/Northern California Coasts (SONCC) Evolutionary Significant Unit (ESU) of coho salmon (*Onchorynchus kisutch)* was listed as "threatened" with the possibility of extinction under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS). SONCC coho are known to occur in the mainstem of Little Butte Creek and several of its larger tributaries, including lower portions of both Antelope and Lake Creeks.

Coho Critical and Essential Fish Habitat

On May 5, 1999, NMFS designated Coho Critical Habitat (CCH) for SONCC coho salmon. Critical habitat includes "all waterways, substrate, and adjacent riparian zones below longstanding, naturally impassable barriers." It further includes "those physical or biological features essential to the conservation of the species and which may require special management considerations or protection...", including all historically accessible waters (F.R. vol. 64, no. 86, 24049). CCH is broken into occupied CCH, habitat known to support coho based on observation or historical records, and unoccupied CCH, which is habitat that is assumed to be capable of supporting populations of coho should the species be recovered.

The upper distribution of unoccupied CCH is often determined by fisheries biologists, whom use available information and professional judgment to make an educated estimate of where coho could have historically been present. Determinations are usually based on stream conditions (such as stream size, gradient, presence and nature of natural barriers such as waterfalls, etc.).

Lacking information regarding historical distribution of coho salmon, and in the absence of natural fish migration barriers, fisheries managers often consider unoccupied CCH to include stream reaches known to be accessible to other migratory fish, particularly to steelhead. This document will consider unoccupied CCH to include all waters known to be accessible to steelhead trout, which includes reaches of both Antelope and Lake Creeks.

Essential Fish Habitat (EFH) has been defined by NMFS as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." This definition includes all waters historically used by anadromous salmonids of commercial value (in this instance, coho salmon). EFH within the analysis area is identical to CCH. More information regarding EFH may be found at: http://www.nmfs.noaa.gov/ess_fish_habitat.htm.

Riparian Reserves

Under the Northwest Forest Plan, Riparian Reserves (RRs) have been established on all stream channels displaying annual scour located on federal lands. Areas of unstable/potentially unstable ground are also managed as RRs. Riparian Reserve widths have been identified as 300' or twice the length of a site potential tree (whichever is greater) for fish-bearing streams, 150' or the length of one site potential tree for non-fish bearing perennial streams, and 100' or the length of one site potential tree for intermittent streams. Widths are measured as slope distance from the edge of the stream, and are applied to both sides of the channel. Site potential tree heights average 165 feet on BLM lands in the analysis area catchments and are greater than the interim widths established in the Northwest Forest Plan. Therefore, the average site potential tree length of 165 feet (330 feet for fish-bearing streams) was used. These Riparian Reserve widths are in accordance with the Medford District Resource Management Plan (RMP). See Appendix A, pg. C-31 of the Medford District RMP, 1994. The primary function of Riparian Reserves is to provide shade and a source of large wood inputs to stream channels. Additionally, they are a source of nutrient inputs to the aquatic ecosystem, they provide bank stability, maintain undercut banks that offer prime salmonid habitat, and provide habitat for a diverse range of other aquatic and terrestrial organisms (Meehan, 1991).

Aquatic Conservation Strategy

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain ecological health of watersheds and aquatic ecosystems on public lands. It includes 9 objectives, which guide BLM's management of Riparian Reserves. These objectives are examined at the site (e.g. a single pool or stream reach), HUC 7 (drainage) and HUC 5 (large watershed) scale. An assessment of the ACS Objectives is contained in Section E, this Chapter (below).

3. Foreseeable Future Actions

This section will present projects proposed in the foreseeable future that may add cumulative impacts to fisheries resources on top of anticipated impacts resulting from the Rio Climax Project, within the analysis area. Anticipated direct and indirect affects to fisheries resources will be described from each action. For any foreseeable future action determined to have any anticipated effects to aquatic habitat, the cumulative effect of the action coupled with effects from the Rio Climax Forest Management Project will be discussed at the end of this analysis.

Federal Timber Harvest

The Shale City Salvage proposes to harvest dead and dying trees within ~ 39 acres in the analysis catchments. This project would not involve any road work, would not reduce canopy cover appreciably, and would not occur in Riparian Reserves. It would have no hydrological connectivity with aquatic habitat, and no causal mechanism to affect aquatic habitat, and hence would not contribute any direct, indirect, or cumulative effects to fish or fish habitat.

Private Timber Harvest

Future timber harvest on private lands would likely occur within the analysis area. The water resources analysis of this EA addresses future timber harvest on private lands, and assumes that it will continue to occur at a similar rate as has occurred in the past, with similar affects to aquatic habitats. Private lands are governed under state forestry regulations, and as such receive a different level of protection than federal lands. Analysis of effects from private timber harvest generally considers the worst case scenario (i.e. , suitable forested lands would be logged at ~ 60 year tree-growing rotations). At this time, it is not known when or where private timber harvest will occur in the area. This analysis will assume that all suitable private lands will continue to be subject to timber harvest, and that the amount of disturbance to aquatic systems as a result of this harvest will continue similar to present rates, helping to maintain degraded aquatic habitats.

Grazing

Cattle grazing is widespread throughout both the analysis area catchments and in the larger watershed, both on private and BLM managed lands. Several allotments on BLM managed lands are up for renewal. The lease renewal process utilizes standards and guidelines which consider effects to aquatic habitat, so at a minimum it is anticipated that no additional degradation to aquatic habitat would result from renewal of the allotments which overlap with the Rio Climax analysis catchments. A more likely result of the renewal process would be a reduction of impacts, which could be accomplished by such measures as reducing the number or duration of livestock grazing, riparian exclusions, providing off site water, etc.

At present, specific management plans for area allotments have not been fully developed at this time, so this analysis will assume that cattle grazing will continue across all ownerships as at present. Cattle grazing in sensitive riparian areas will continue to impact water quality, with chronic episodic inputs of sediment and turbidity occurring to stream reaches adjacent to destabilized and trampled banks. Small springs and seeps are particularly vulnerable to degradation, as these areas often contain suitable browse along with a reliable water source, which both attracts and concentrates cattle to these areas. In areas lacking a large overstory component, cattle browse of riparian vegetation will also add to stream temperature warming.

Future Fuels Treatments

Fuel treatments are tentatively planned in the analysis area. Fuels treatments would leave riparian buffers, require minimal ground disturbance, and would not treat large trees. All check lines would be waterbarred and rehabilitated after ignition operations were completed. Because stream side shade producing vegetation would be buffered, treatments would not lead to increases in water temperature or sediment inputs to channels. Canopy levels would not be reduced by treatments, nor would ground compaction increase; hence peak flows would not be affected. The only effect fuels treatments may have to fisheries resources is a possible increase in ground water storage and subsequent release to streams throughout the dry season. However, any extra water available is likely to be utilized by remaining vegetation before entering stream channels. For these reasons, fuels treatments are not expected to impact fisheries resources, and hence they would not contribute to cumulative impacts.

OHV trail decommissioning

16 miles of user created OHV trails, located primarily in the Lake Creek catchment, have been decommissioned. This project occurred in summer 2011. The method used to close particular route segments varied depending on the nature of the trail and its associated topography, but generally speaking, a small excavator was used to rip the compacted surface of the trail, create an outslope where feasible, and install dips or water bars installed where necessary to ensure the newly disturbed area is not subject to channelized flow from intercepted water. Disturbed areas were be seeded with native grass seed and mulched with straw and slash and other organic debris. The intent of this project is to reduce chronic sources of erosion and sediment deposition to aquatic systems in the Lake Creek catchment. Short term effects were minimal, as mitigating measures were in place to minimize the potential for erosion and transport of disturbed soil down slope towards aquatic environments. Over the long term, this project would reduce sedimentation and turbidity to stream reaches in the Lake Creek catchment.

Road Maintenance
Road maintenance including spot rocking, drainage improvements, and one major culvert upgrade are anticipated to occur prior to the Rio Climax Project. Maintenance activities are generally undertaken to improve drainage issues associated with roads, such as upgrading culverts to reduce the risk of failure during flood events, installing additional cross drains or water dips to help reduce the length of road with hydrological connectivity to the aquatic system, and addition of surfacing to reduce erosion of the running surface along the road. Maintenance activities in general increase short term risk of sediment transport to aquatic systems, coupled with long term reductions in the same risk. Different activities associated with maintenance are coupled with varying degrees of impacts; for example, a culvert replacement on a perennial stream would be expected to result in the input of fine sediment to the stream below the location of the culvert, while the action of adding additional rock surfacing would not be expected to generate sediment. Of the foreseeable future maintenance activities tentatively planned in the analysis area, the upgrading of culvert on a perennial tributary to Antelope Creek which is currently plugged and in danger of failing, would be the most likely to contribute sediment.

PDFs for road maintenance projects such as culvert replacements include dewatering the channel through the work area, use of sediment fences, and adherence to the instream work period. These PDFs would serve to minimize the amount of sediment turned loose during this project, and should confine immediate impacts to one pool below the culvert. Anticipated effects resulting from this project would be a shallow layer of fine sediment deposited over natural substrate in the pool below the culvert. This sediment would remain settled in the pool throughout the summer following the replacement, and would be transported throughout the aquatic system during subsequent high flows, eventually either settling out in natural depositional areas, or in the case of a large flood, entrained and carried downstream as pulse of increased turbidity, which would not likely be noticeable beyond background turbidity levels likely to occur during a flood event. Though a short term adverse impact, upgrading the culvert would reduce the likelihood of a future failure of the culvert, which would potentially result in an input of sediment many times larger.

4. Affected Environment - Fish and Designated Habitat

This section and the following sections present baseline conditions in the Little Butte Creek Watershed and within the analysis area specifically, as well as anticipated effects resulting from this project. The effects of past actions manifest themselves in the current conditions. Effects added on top of these past actions as a result of the Rio Climax Forest Management Project, coupled with foreseeable effects from future projects as described above, are the cumulative effects of this project to fisheries resources in the watersheds and specific analysis catchments.

Little Butte Creek Watershed
SONCC coho salmon, fall Chinook salmon (*O. tshawytscha)*, summer and winter steelhead (*O. mykiss*), and Pacific lamprey (*Lampetra tridentata)* are native migratory fish species present in the watershed. Chinook distribution includes the mainstem of Little Butte Creek from its mouth to the confluence of the South and North Forks of Little Butte Creek, at which point they begin to peter out. Coho and steelhead occur far up both forks, and are also present in many of the larger tributary streams in the watershed, including Dead Indian, Soda, Lost, Lake, and Antelope Creeks. In the analysis catchments, coho have been described as currently present to river mile 5.7 in Antelope Creek, and to river mile 1.8 in Lake Creek. Steelhead are present much further upstream; to ~ river mile 19 of Antelope and to river mile 7 in Lake Creek. They are also present in lower portions of Yankee and Burnt Canyon Creeks, two of the larger tributaries to Antelope Creek, and have been observed in a small unnamed tributary as well.

Cutthroat trout (*O. clarkii*), sculpin (*Cottus spp.*), Klamath small-scale sucker (*Catostomus rimiculus*), and rainbow trout (*O. mykiss*) are native fish species present in the watershed that do not migrate to the ocean. Distribution of most of these species extends well upstream in both forks of Little Butte. Cutthroat and rainbow trout are typically found the farthest upstream. Their distribution in streams draining the Rio Climax timber sale mirrors steelhead distribution.

A host of introduced fish species are also present in the watershed, including brook trout (*Salvelinus fontinalis*) redside shiners (*Richardsonius balteus*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), Yellow Perch (*Perca flavescens*), andcommon carp (*Cyprinus carpio)*. The warm water species are primarily found in Agate Reservoir and many of the other watershed impoundments, and in the slower and warmer water areas in lower reaches of Little Butte and Antelope Creeks. The brook trout reside in the headwater stream reaches at higher elevations.

Little Butte Creek is used as a migratory corridor for adult and juvenile coho and steelhead to access their primary spawning and rearing habitats located in the larger tributaries. Fall Chinook salmon are mainstem spawners and utilize suitable spawning locations in Little Butte Creek. Some steelhead and coho likely also spawn in the mainstem, especially during periods of low flow when access into spawning tributaries is difficult. Both forks of Little Butte and the larger tributaries including both Antelope and Lake Creeks are utilized as spawning and rearing habitat for coho and steelhead and resident trout species.

Little Butte is considered occupied CCH to well up both forks (http://www.streamnet.org/). Within the analysis area catchments, sections of Lake Creek and Antelope Creek, including several of its tributaries support anadromous fish, and this document will consider these reaches as unoccupied CCH. Table 3-9 (below) and map 3-4 display fish and fish habitat distribution within the Rio Climax analysis area.

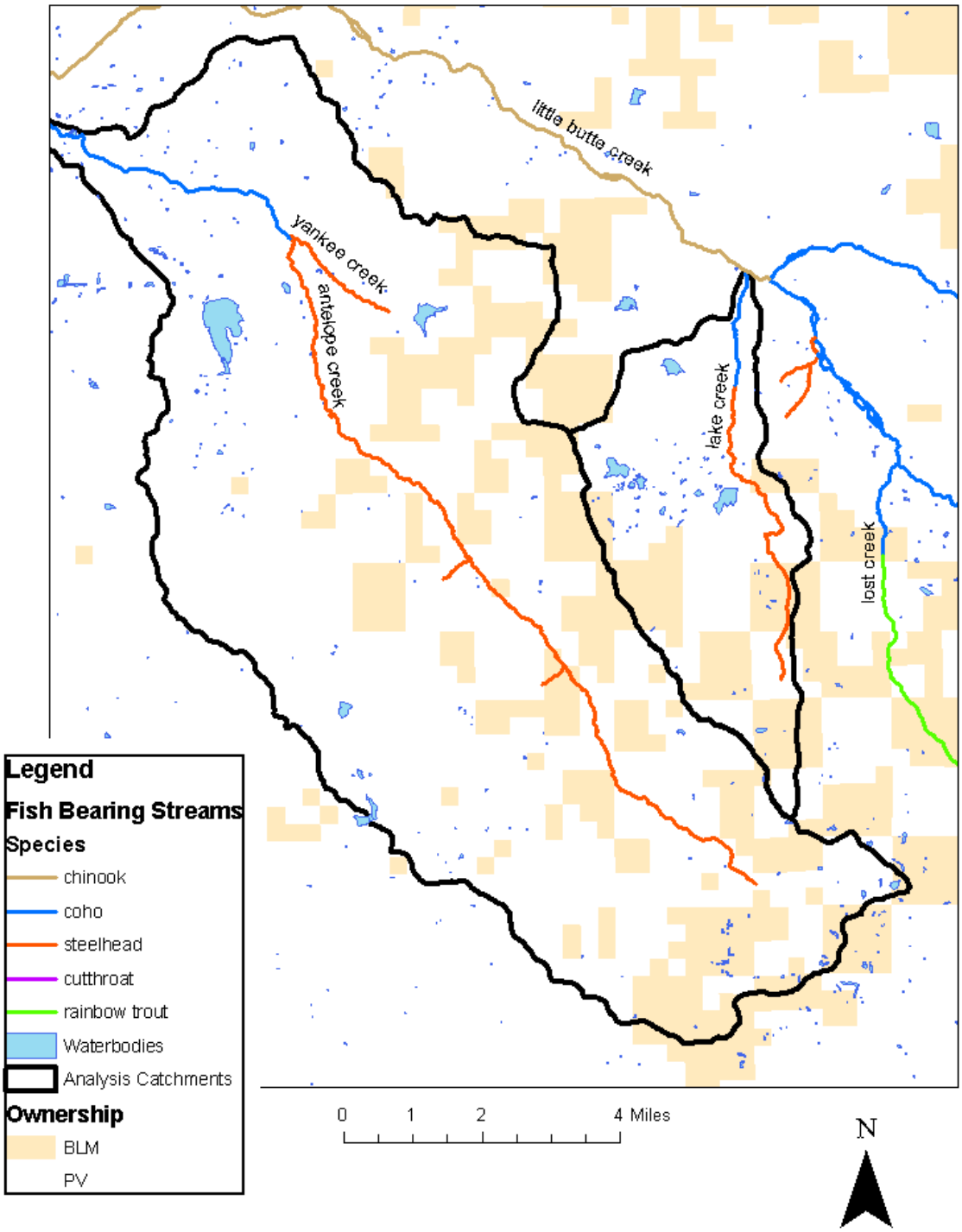
Table 3-9. Known and Assumed Historical Salmonid and Habitat Distribution, by River Mile

Stream drainage	Coho[1]	CCH/EFH[2]	Steelhead, Cutthroat and Rainbow Trout[1]
Antelope Creek	5.7	19	19
Antelope Tributaries	0	3	3
Lake Creek	1.8	7	7
Total Fish/habitat (Miles)	7.5	29	29

(Miles rounded to nearest tenth)

[1] - Current observed/recorded distributions.
[2] - Assumed historic distribution, based on best available information.

Map 3-4. Rio Climax Analysis Area Fish Streams



5. Environmental Consequences - Fish and Designated Habitat

a. Alternative 1

The No Action Alternative will have "*No Effect*" to fish populations or distribution, SONCC coho salmon, CCH, or EFH, as no ground disturbing activities would occur under this alternative. Effects already occurring to fish habitat as a result of past and ongoing activities are presented in the Aquatic Habitat and Riparian Reserve sections (below).

b. Alternatives 2 and 3

The BLM has chosen to consult on Alternative 2, as this alternative would equate to the greatest level of disturbance, and hence have the highest likelihood of affecting listed fish and their habitat. Alternative 2 has been determined to be "*May affect/Not Likely to Adversely Affect*" SONCC coho salmon, CCH, and EFH. This determination was made based on analysis to fish and aquatic habitat in the Biological Assessment prepared for the NMFS. Informal consultation on this project has been initiated. Effects to aquatic habitat were determined to be of insufficient magnitude and of a nature to not meaningfully impact aquatic habitats in fish bearing channels. Though not consulted on, Alternative 3 would be a "*May affect/Not Likely to Adversely Affect*" as well, as effects to fish and fish habitat would be very similar, albeit of a slightly lesser magnitude, than in Alternative 2.

6. Affected Environment - Aquatic Habitat

Little Butte Creek Watershed

Instream habitats in the Little Butte Creek Watershed as a whole can be described as degraded as compared to pre-European settlement. Generally speaking, lower portions of the watershed have been impacted more so than upper portions, as lowland areas have been settled and developed extensively. Houses, businesses, and roads occur adjacent to much of the mainstem of Little Butte Creek and its major tributaries, resulting in narrowed and constrained riparian corridors. Confinement of the streams by roads and structures has resulted in a loss of habitat features as little natural stream channel meander remains; this has resulted in higher riffle to pool ratios, and a corresponding reduction in the amount of quality rearing habitat.

Water quality is relatively poor in the mainstem of Little Butte, which is plagued by elevated water temperatures, and subject to moderate to high levels of sediment and turbidity, as well as a suit of other water quality issues (see Water Resources, this Chapter). Water is withdrawn for agricultural purposes from many of the streams in the lower watershed, exacerbating water quality/quantity issues during the summer months. The forks of Little Butte and tributaries farther up in the watershed, though far from pristine, have been subject to less channel adjacent development, and as such contain greater habitat complexity which provides higher quality habitat for aquatic organisms. In general, water quality is better in these stretches, though water temperature and sediment/turbidity problems are pervasive through many of these stream reaches as well.

Many miles of road have been constructed in the watershed, and road densities in many of the subwatersheds and drainages, including the analysis catchments, are considered high (see Water Resources, this Chapter). Roads have contributed to sedimentation of instream habitat. The effects of fine sediment on aquatic organisms have been well documented; fine sediment (such as decomposed granitic sand or silt) in excessive amounts degrades stream and aquatic organism health. This sediment can fill in pools, cover spawning gravels, and smother eggs (Meehan et al., 1991). Reduced substrate availability and complexity may decrease the diversity and quantity of aquatic organisms, upsetting the ecological balance of the stream system.

Increased turbidity, which occurs when fine sediment becomes entrained in the water column, can disrupt feeding and territorial behavior of juvenile salmonids. This can lead to decreased growth rates and increased mortality. These effects may be far-reaching, and stream reaches many miles downstream of point-sources of sediment input (including downstream areas designated as CCH and EFH) have the potential to be negatively impacted (Meehan et al., 1991). The Little Butte Creek Watershed Assessment identified roads as the largest human impact to the watershed in terms of sediment delivery and negative effects to fish habitat (USDI, 1997).

Upland areas of the watershed have been affected primarily by commercial logging and roads associated with harvest activities and cattle grazing. These activities have in the past and continue at present day to contribute to elevated levels of sediment delivery to aquatic habitats. Clear cutting large swaths of forested land is still practiced on private lands in the watershed.

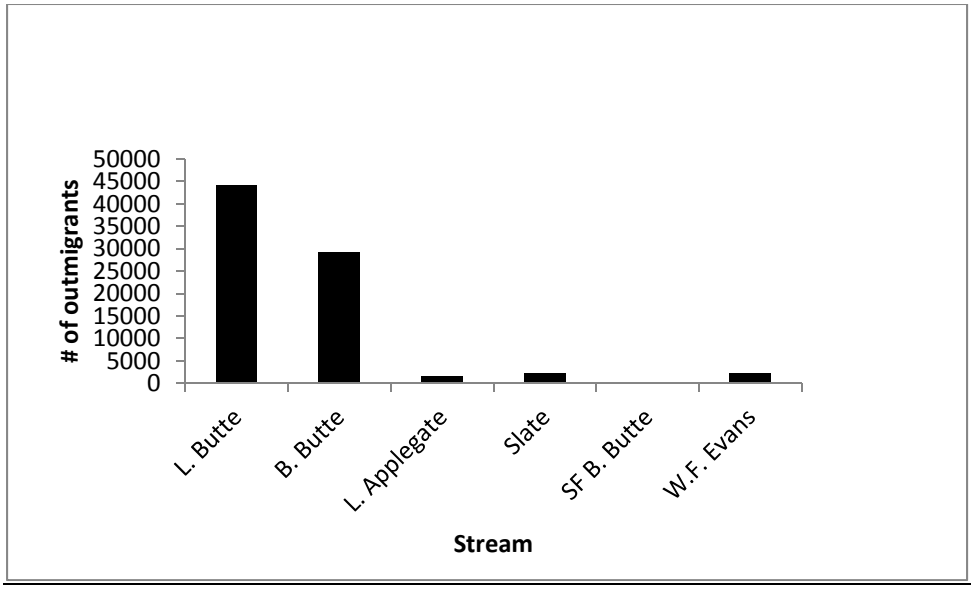
Some of the cuts have occurred in areas prone to large scale erosional processes; this coupled with an extensive road network which has a high degree of hydrological connectivity has increased the risk of events with potential to impact aquatic habitat. A recent example of such an event occurred in the Deer Creek Watershed, outside of but adjacent to the Rio Climax analysis area, where debris-slide erosion was observed during the winter of 2005 in T. 37 S., R. 2 E., sections 23 and 25. These slides occurred mainly in steep drainage areas and were the result of relatively heavy rainfall events on saturated soils associated with past management practices and roads; on both BLM and private land.

Cattle grazing is widespread throughout the entire watershed, particularly in upper portions, both on private and federal lands. The primary effects to aquatic habitat from cattle grazing occur when cattle are concentrated for extended periods in sensitive riparian areas (i.e., those not armored by rocky banks or surrounded by dense vegetation), and are manifested as reduced riparian vegetation and bank stability and corresponding increases in water temperature and sediment inputs. Where cattle use is concentrated in stream side areas, they may contribute excessive nutrient and/or bacterial (such as fecal coliform, including E. coli) amounts to the aquatic system as well.

OHV use has been documented as contributing to fine sediment deposition in the watershed as well. OHV trails with connectivity to aquatic environments impact aquatic habitat in a similar fashion as roads. However, as OHV trails are typically user created natural surfaced trails with no thought given to their drainage capabilities, they can be particularly prone to rutting and subsequent transport of eroded particulates down the trail and towards aquatic habitat.

In spite of the myriad of issues affecting both water quality and aquatic habitat, Little Butte Creek remains a very productive stream, producing some of the highest numbers of salmon and steelhead smolts observed in the upper Rogue River basin (Figure 3-1). Recognizing this, extensive restoration efforts have occurred in the watershed over the last decade or so, and include the removal of barriers, the placement of large wood in many miles of stream, planting of riparian vegetation, and exclusion of cattle from sensitive riparian areas. Efforts are ongoing; currently slated to occur in the summer of 2011is the obliteration of many miles of user created OHV trails with hydrological connectivity on federal and private lands.

Figure 3-1. Estimated # of Coho, Steelhead, and Lamprey Outmigrants from 6 Rogue Basin Tributaries



(Data from Smolt Trapping project conducted by ODFW and BLM in 1999)

Antelope Creek

At a little over 48,000 acres in size and composed of eighteen7th field drainages, the Antelope Creek catchment is among the larger tributaries to Little Butte Creek. BLM managed lands include only 20 percent of the catchment area and 7 percent (1.5 miles) of the fish bearing channels. Roads, residences, and agricultural enterprises parallel the entire fish bearing portion of Antelope Creek. This has led to channel confinement in areas, agricultural related inputs into the stream, and a pronounced reduction in the width of the riparian zone, all of which collectively have reduced water quality. Antelope Creek is listed by the Oregon Dept. of Environmental Quality (ODEQ) for exceeding temperature and E. coli standards from its mouth to river mile 19.7, which includes the entire fish bearing portion of the mainstem.

ODFW conducted an extensive aquatic inventory of Antelope Creek, when surveyors assessed the instream aquatic habitat conditions of the lower 10 miles of the mainstem channel (ODFW 1991). Of note, surveyors documented that Antelope Creek had a low gradient channel, a high riffle to pool habitat ratio throughout, and cobble and gravel dominated substrate. They did not find excessive fine sediment amounts in any of the surveyed reaches. These are characteristics that are indicative of good spawning habitat. Surveyors also noted that much of the natural flow in Antelope Creek is withdrawn for irrigation purposes. One reach was found to be degraded as a result of intense cattle grazing in stream adjacent areas, and surveyors noted a higher percentage of actively eroding banks in this reach. The noted lack of pools, especially when coupled with decreased summer stream flows due to water withdrawals, limits the amount of summer rearing habitat available to fish in Antelope Creek. Pieces of large wood were not tallied during this survey, and large wood densities are not known. However, casual observations suggest large wood is a rare feature in the mainstem channel of Antelope Creek.

There are several private impoundments on tributary streams in the Antelope Creek catchment, including the larger Agate and Yankee Creek Reservoirs (204 and 44 surface acres, respectively).

Lake Creek

At roughly 9,100 acres and composed of six 7th field drainages, the Lake Creek catchment is adjacent and to the east of upper portions of the Antelope catchment. BLM managed lands account for 26 percent of the basin area, and include 23 percent (1.3 miles) of fish bearing channels. In general, riparian corridors along the mainstem channel are relatively intact, as few roads and residences are adjacent to the stream. A large private cattle ranch encompasses most of the lower portions of Lake Creek, which flows through a predominately oak woodland habitat type. Lake Creek is listed by the ODEQ as being water quality limited for temperature, E. coli, and sediment from its mouth up to river mile 7.8, which includes the entire fish bearing portion of the stream.

Aquatic habitat inventories were conducted on roughly the lower 8 miles of the mainstem of Lake Creek. Surveyors noted that the channel gradient of Lake Creek is moderately high, that substrate was dominated by gravels and cobbles, but that the percent of fine sediment was higher than desirable, at 28 percent (ODFW 1994). Rapids and riffles were the dominant instream habitat types, and slow water habitat units accounted for less than 5 percent of the reach, again suggesting a lack of suitable rearing habitat. Surveyors also noted that large wood densities were very low. The lack of large wood is a contributing factor directly related to the lack of pools present in the channel.

There are numerous private impoundments on many of the tributaries to Lake Creek, the largest of them being the Lake Creek Reservoir at ~ 42 surface acres (estimated from GIS). Many of these reservoirs have been stocked with nonnative fish species. The reservoirs function in part as sediment traps, capturing fine sediment eroded through natural or anthropogenic means and transported down the headwater tributaries, keeping it from reaching the mainstem channel of Lake Creek. In addition to the reservoirs, there are numerous diversions and ditches in the Lake Creek catchment, some of which divert significant volumes of flow out of the natural stream channel during the irrigation season.

Deleterious effects to aquatic habits in the Lake Creek catchment stem primarily from roads and user created OHV trails, cattle grazing and associated water withdrawals, diversions, and impoundments, and to a lesser extent, past timber harvest. The roads and OHV trails with hydrological connectivity are chronic sources of sediment input into the aquatic environment, and likely account for a significant portion of the elevated sediment and turbidity which plague the system. Cattle grazing in sensitive riparian areas contribute sediment to the stream system, as well as elevated levels of organic nutrients and bacteria. Browse of riparian vegetation reduces streamside shading and contributes to elevated water temperatures. Withdrawals, diversions, and impoundment of water disrupts natural flow paths, leading to reduced water quantity to the downstream mainstem channel, and elevated water temperatures as water is exposed to increased sunlight in the reservoirs relative to natural channels.

7. Environmental Consequences - Aquatic Habitat

a. Alternative 1

The No-Action Alternative would have no direct or indirect effects, and hence would not contribute to cumulative impacts on aquatic habitats, as no ground disturbing activities would occur. Aquatic habitats within the watershed would continue to exist in their current degraded state. As no new road construction or renovation of old roads would occur, road densities would remain at the current level within the analysis area. Fish habitat would continue to be impacted as a result of past and ongoing activities, as described in the current condition sections.

Urban and agricultural lands would likely remain in their current state, impacting fish habitat in the drainages and in the Little Butte Creek Watershed as described. It is unknown at this time what additional development may occur on private lands, but increased development of the area would place greater stresses on aquatic habitats.

Future fuels reduction projects in the area are not anticipated to have any adverse impacts to aquatic habitats. Fuels treatments projects proposed in the area would remove only small diameter vegetation, would require minimal ground disturbance (no slashbuster units are proposed), and would leave vegetative buffers around most stream channels (short duration channels may receive channel adjacent treatments, as needed, to accomplish fuels objectives). All check lines would be rehabbed after ignition operations, minimizing the risk of erosion and transport of sediment down the lines towards aquatic habitats.

b. Alternative 2

This alternative proposes various prescriptions of commercial timber harvest, follow-up fuels treatments, new permanent and temporary operator spur road construction, road renovation, and log haul, as described in Chapter 2 of this document. These project elements and their potential to affect fish and aquatic habitat are discussed below. Disturbances proposed in the Rio Climax Forest Management Project with proximity and/or connectivity to aquatic habitats include new road construction, road renovation and log haul, which would include multiple stream crossings.

Ground disturbing activities in or near stream channels and roads have the greatest potential to impact fish habitat; it is these activities that could increase erosion and sediment transport to, and storage in, stream channels. The new road construction and log haul are the project elements proposed under this alternative which have been identified as having the greatest potential to contribute sediment to streams.

Commercial Timber Harvest

There are three primary mechanisms by which timber harvest could influence aquatic habitat: 1) Removal of stream side vegetation reduces shade, which can increase water temperature, and reduce recruitment potential of large wood, a key habitat feature of aquatic systems. 2) Reduction of canopy (particularly in the transient snow and snow zones) if applied to large areas of watersheds has been shown to alter hydrological processes, such as increasing peak and base flows, or altering the timing of these flows, which in turn may impact channel and habitat features. 3) Ground disturbance and compaction from yarding corridors or skid trails can bare soils, reduce infiltration, channel overland flow, and route eroded particulates (fine sediment) to downslope stream channels.

In the Rio Climax Project, with the exception of trees removed for new road construction (see section below titled New Roads and Section 9, b, (Riparian Reserves) for analysis of effects of new road construction on Riparian Reserves), timber harvest would occur outside of Riparian Reserves, at a minimum distance of one site potential tree height from the edge of the stream channel. Because existing large wood densities and shade would be maintained within the Riparian Reserves, harvest and yarding operations would have no impact to stream temperatures, or future large wood recruitment potential. The Water Resources analysis of the Rio Climax Project documented that harvest operations would not reduce canopy cover within any of the analysis area catchments enough to measurably affect or alter the timing of peak or base flows (see Water Resources). Because harvest and yarding operations would not take place in Riparian Reserves, no hydrological connectivity would exist between harvest units and stream channels. Fine sediment mobilized from units or skid trails would be filtered by remaining vegetation within the Riparian Reserves, and deposited on the forest floor before reaching aquatic habitat. In sum, no connectivity, and hence no causal mechanism, would exist for commercial timber harvest to input sediment through the RR buffers and into stream channels.

Because harvest and yarding operations would not decrease stream shade, reduce future wood inputs, increase peak flows, negatively modify summer base flows or input sediment into aquatic habitats, they would not directly or indirectly affect the aquatic environment, and hence would not impact fisheries resources, and therefore would not contribute to adverse cumulative impacts to aquatic habitat in the Rio Climax analysis area.

Fuels Treatments

Fuels reduction treatments would thin non-commercial small diameter vegetation and accumulated understory fuels on 187 acres outside of commercial harvest units and would treat activity fuels generated from timber harvest as described in Chapter 2. Fuel treatment activities would involve only hand crews with saws, thinning and piling small diameter vegetation and cutting and piling small diameter activity fuels. Very little ground disturbance would occur. Ground cover, such as forbs and grasses, trees greater than 8 inches diameter and all riparian plant species would remain after fuels activities. Follow-up maintenance burning would impact ground vegetation for the short-term however, would be conducted when fuel and soil moistures are high so that protective duff and large woody material would remain on the majority of the treated area helping to hold soil in place. Any fire lines would be rehabilitated following ignition operations, reducing the risk of the fire-lines contributing sediment downslope.

No-treatment buffers adjacent to stream channels, as outlined in the project design features, would prevent removal of shade producing vegetation along stream channels. The vegetative buffers remaining adjacent to channels would trap any off-site sediment or ash movement (very unlikely) mobilized as a result of fuels treatment activities. There is no probability that aquatic habitat would be affected, as no avenue would exist for sediment or ash to enter the channels from fuels treatments. In sum, fuels treatments as proposed in the Rio Climax Project would have no causal mechanism to affect any aquatic habitats, and hence would not contribute to cumulative effects.

New Roads

The primary mechanism by which new road construction in upslope areas may impact water quality is the potential to intercept, concentrate, and route flow down the road prism, which disrupts natural flow paths, while at the same time increasing erosion of the road surface and subsequent transport of sediment

towards downslope aquatic habitat. New road construction in riparian areas involving channel crossings increases hydrological connectivity and necessitates the removal of riparian trees along the road right-of-way. Felling and yarding activities along proposed road right-of-ways are considered as part of the disturbance associated with new road construction. In the Rio Climax Project, five new permanent road segments are proposed, totaling about 2.75 miles in length. All segments would be located in the Antelope catchment.

All reported new road mileage has been rounded up to the nearest tenth. One road (the 37-1E-17.01 Rd., hereafter new road "A") would be located on a ridge, and would not cross any streams or draws. New road "B" (37-1E-17.00), located ~ one quarter of a mile downslope (to the east) of new road "A" would cross the tops of three intermittent stream channels and their associated Riparian Reserves, and one dry draw. New road "C" (37-1E-23.00, which includes some improvement of existing road) would be located on the upper third of a ridge, though the re-construction portion would cross two intermittent channels and their associated Riparian Reserves. For analysis purposes, the reconstruction will be considered as new road construction. New road "D" (37-1E-25.01) would be located on a flat sub ridge, and would not cross any drainage features. Proposed new road "E" (38-2E-09.10) would also be located on a ridge, far from any channels.

New roads "A", "D", and "E" would have no hydrological connectivity with the aquatic environment, as they would be located on ridge tops and not cross any drainage features. Therefore, there is no probability they would contribute sediment to aquatic habitat in Antelope Creek. Roads "B" and "C" would have hydrological connectivity via the intermittent channels.

These roads would cross only short duration intermittent (ephemeral) channels, would incorporate drainage features which would serve to disconnect the majority of the road segments from aquatic systems, and the surfaces would be rocked. The roads would be constructed during the dry season, when the channels were dry, and would be designed to provide for maximum drainage to minimize the risk of the road failing during a flood event. This includes outsloping of the road prisms and installation of drainage structures as outlined in the RMP. The majority of the road surfaces would divert any captured flow and routed sediment off the roads and into downslope vegetation. Only at the approaches to the channels, for the distance between the last cross drain/water bar and the draw crossing would water and routed sediment be available for transport into the channels.

Disturbed sediment near these crossings could be mobilized and transported downstream during subsequent high precipitation events during subsequent seasons following construction activities; as both channels are short duration intermittent channels, they would flow only in response to a high precipitation event. Based on personal observation by BLM fisheries biologist, there is sufficient vegetation and structure in the channels downstream of the roads to capture and store sediment, hence any sediment routed into the channels would likely settle in the channels, and would not be transported downstream and into fish habitat in Antelope Creek under most environmental conditions.

During a large flood event, stored sediment contributed to the channels by the new roads could potentially become entrained and transported to downstream habitat. During such an event, the stream system would be at a stage to allow for a quick flush of the sediment/turbidity through the aquatic system, or for the deposition of transported sediment to natural storage areas either in the channel, or on the flood plain, where it would be assimilated and undetectable beyond background levels which would be anticipated to occur in Antelope Creek during such an event.

In sum, because two of the new road segments would have hydrological connectivity with intermittent channels, new road construction is expected to contribute sediment to aquatic habitat. Under most circumstances, this sediment would not affect fish habitat in the larger downstream channels. Under environmental conditions when the sediment could be reasonably expected to impact the larger channels, it would not be detectable beyond sediment contributed during such events from the myriad of other sources, and hence would not represent a meaningful negative impact to fish or other aquatic organisms in Antelope Creek.

Temporary Operator Spurs
Several temporary operator spur roads are proposed for construction and use to facilitate timber harvest and yarding. These spurs would be in upslope stable areas, and the combined length of them is estimated to total less than 1,500 feet.

Though one spur is proposed in the outer portion (upslope from an existing road) ofa Riparian Reserve of a seasonal wetland, none would cross any streams channels or draws, and hence they would not be hydrologically connected to the stream network. After harvest operations were completed, the spurs would be decommissioned, mulched, reseeded, and allowed to revegetate. Because these spurs would have no hydrologically connectivity, they would have no causal mechanism to contribute sediment to aquatic habitat.

Road Renovation
Less than 0.9 miles (0.83 miles) of existing natural surface road would be renovated. Renovation would only consist of spot rocking the road at wet spots. Roughly 1,000 feet of this road lies within riparian areas on private lands (natural stream channels and a small constructed pond). The area near the pond, a flat wet meadow, would receive the bulk of the spot rocking. The road is located on the upper third of the slope in the Antelope catchment, near the Lake Creek drainage divide. All renovation would be seasonally restricted whenever soil moisture conditions or rainstorms could result in the transport of sediment to nearby stream channels.

There is no probability that renovation would contribute sediment to fish habitat; the only activity proposed would be adding rock to protect the road sub-grade in a few wet areas. This activity is not likely to increase sediment run-off from the road; rather it is proposed to reduce the potential. Furthermore, these areas are immediately upstream of a small constructed pond and associated wetland located on a flat bench. Even if renovation resulted in increased sediment production, it would be transported to the pond where it would settle out and not be transported further on down the system towards fish bearing habitats.

Haul Routes
Repeated use of the unpaved haul roads may both directly and indirectly contribute fine sediment to streams as rocked surfaces become pulverized rock (i.e., dust, a form of fine sediment) surfaces after repeated heavy truck traffic. Natural surfaced roads are vulnerable to rutting and erosion from use, particularly if the road is used during the wet season. Direct contributions of fine sediment could occur if dust mobilized by haul should settle out in stream channels crossing or adjacent to the haul route. Indirectly, the fine sediment that remains on the road prism would be available to be transported off of the road during the first significant rain event following a season of haul. Properly engineered roads are capable of shedding the majority of mobilized sediment off of the road (or road ditch) downslope and into vegetation. However, the road/ditch distance from the last cross drain located on either side of a channel crossing would directly contribute captured water and mobilized sediment into the stream channel. Therefore, use of the roads for haul would increase the risk of road derived sediment transport to stream channels, particularly in the vicinity of road/stream crossings.

Log hauling would occur on an estimated 54 miles of non-paved road, of which 41 miles would occur on rocked roads, and 14 miles on natural surfaced roads. The majority of log hauling would be in the Antelope and Lake Creek catchments, although portions of several roads do slop over the ridge and into the adjacent Walker and Lost Creek catchments. Haul routes would be located on BLM and private timber land roads. An estimated 18.2 miles of unpaved haul roads would exist within a Riparian Reserve width distance of stream channels (includes riparian areas on private lands), most of which (15 miles) are rocked. A little more than half (11.5 miles) of the total riparian haul routes would be in the Antelope catchment. The main line haul routes are rocked surfaces which would parallel the mainstems of Antelope and Lake Creeks. The Antelope route would closely parallel Antelope Creek for 7 miles, with some portions as close to 40’ from the wetted channel edge. The Lake Creek route would parallel the

stream for 1.3 miles, with short portions also adjacent and within 40' of the wetted channel of Lake Creek.

Routes in the Lost and Walker catchments would be limited, and confined to upslope areas. In Lost Creek, only 4.7 miles of rocked surfaced roads with only three crossings over intermittent channels, located ~ 3 miles away from fish habitat in Lost Creek, while in Walker Creek only 1.7 miles of rocked roads involving 3 intermittent crossings located over 4 miles from fish habitat in Walker Creek would be used. Given the location and limited amount of haul in these catchments, there is little potential that haul would adversely modify any aquatic habitat in either the Lost or Walker Creek catchments.

Within Antelope Creek there would be 63haul route crossings over streams, roughly half (36) of which would be over intermittent streams, while in Lake Creek there would be a total of 46 crossings, 38 over intermittent streams. Six crossings over fish habitat would be utilized in the Antelope catchment, including1 bridge crossing over the mainstem channel. Three arterial roads stemming from the mainline Antelope Creek Road also cross Antelope Creek, all by ford. The other two crossings are via culverts on rocked surfaced roads over Burnt Canyon Creek and an unnamed fish bearing tributary to Antelope Creek. In Lake Creek only two stream crossings (both via culvert) over fish habitat would be used for haul.

Log hauling would directly contribute fine sediment and turbidity into fish habitat in the Antelope Creek catchment, particularly in the mainstem of Antelope Creek, due to the fords which directly cross critical habitat in Antelope Creek, and the proximity of the haul route to the mainstem channel of Antelope Creek. Heavy truck traffic through these fords would disrupt the substrate at and near the crossing points, displacing small amounts of fine sediment already stored in the channel with each crossing, which would lead to increases in turbidity. Additionally, any mud stuck to the tires could be transported and sloughed off in the channel during the crossings.

Under Alternative 2, it is estimated that nearly 400 crossings (includes coming and going) by log trucks would be needed to haul off harvested timber. Many more crossings would be required by smaller vehicles and other equipment, as fellers, loaders, etc. would also need to access the units. To avoid the impacts associated with repeated use of these fords, the BLM has opted to purchase a mobile bridge capable of spanning the channel of Antelope Creek. Use of the bridge would essentially minimize direct impacts to aquatic habitat to airborne dust displaced by vehicles settling out in the stream below the crossing.

Other direct inputs of sediment to Antelope Creek could occur as dust disturbed from dry road surfaces near the stream channel could potentially settle out in adjacent stream areas. Direct inputs of dust to Lake Creek would also probably occur, though to a lesser extent, as there would only be two crossings over Lake Creek, and less length of the haul route is adjacent to the stream than in Antelope Creek. However, the magnitude of the dust/sediment inputs would be small because dry season haul restrictions and dust abatement PDFs would reduce impacts to the road surfaces. It is not anticipated that the amount of sediment input into aquatic habitats in Antelope or Lake Creeks resulting from dust would be discernable above contributions which occur chronically. As such, the amount of dust (sediment) to reach and settle out in any one pool would be insufficient to adversely modify aquatic habitats.

Indirect sediment inputs to aquatic habitat may also result from haul. Potential sediment sources from log hauling in upland areas are surface erosion from truck traffic and dust. Surface erosion would be minimized because PDFs would limit log hauling to during dry conditions and it would be restricted whenever soil moisture conditions or rainstorms could result in the transport of sediment to ditch lines and nearby stream channels. Most of the haul roads (31of 41 miles) are rocked or paved, rather than native or natural surfaced. This reduces the probability of road surface erosion and subsequent sedimentation of aquatic habitat, as the hardened surfaces can withstand more wear and tear.

c. Alternative 3

This alternative is similar to Alternative 2, with two major differences; less harvest is proposed, and less new road construction is proposed. This alternative drops most of the units proposed in Alternative 2 in T 37S, R 1E, section 17, in the Antelope catchment. Dropping these units would negate the need for two of the proposed new road segments which would be constructed under Alternative 2; road segments "A" and "B", and also significantly reduces the amount of haul which would come out of the Burnt Canyon road system.

Effects to aquatic habitat under Alternative 3 would largely be the same as described under Alternative 2, with the following major differences: As new roads "A" and "B" would not be constructed, 1.5 miles less road construction would occur. This would reduce the hydrological connectivity from 5 to 2 crossings, and reduce road sediment inputs to intermittent channels in the Antelope catchment as compared with Alternative 2. Though haul routes would not be appreciably different under Alternative 3 as compared with Alternative 2, there would be much less volume coming out of the Burnt Canyon road system. This is meaningful to aquatic habitat, as this route closely parallels Burnt Canyon Creek, a fish bearing stream, and crosses Burnt Canyon and Antelope Creeks. Under Alternative 3, an estimated 50 log truck loads as compared to 170 under Alternative 2 would come out this system, and this would equate to reduced sediment inputs directly to fish habitat resulting from haul.

Aquatic Habitat Effects Summary

Short term (one to three years) there would likely be small inputs of sediment to channel crossings and reaches adjacent to some rocked and natural surfaced roads used for haul, particularly in the Antelope Creek catchment. Any sediment increases would be minor relative to existing sediment levels. The construction of the two road segments ("B" and "C") under Alternative 2 would also input small amounts of sediment, as these roads would be hydrologically connected with intermittent streams. One of these roads would not be constructed under Alternative 3, and hence road construction would have a lesser impact the sediment regime under Alternative 3. Under either alternative, upland work, including timber harvest and follow up fuels treatments would have no effect on fine sediment levels, due to the filtering action of Riparian Reserve buffers, extensive PDFs designed to prevent overland sediment movement, and normal BMPs. Stream temperatures would not be affected, as no riparian vegetation adjacent to perennial streams would be removed (see Riparian Reserves discussion, below).

Future private timber harvest is assumed to continue at present levels, and cumulative effects to water resources have been assessed (see Water Resources). Future private harvest, coupled with ongoing erosion issues stemming from grazing, is expected to continue the declining trends in streambank stability, sedimentation potential, and health of riparian areas currently present in the analysis area.

Decreased OHV trail density (assuming trail decommissioning is effective) would be expected to reduce chronic sediment sources, particularly in the Lake Creek catchment. The Rio Climax Project would, in the short term contribute a small amount of sediment to channels in the Antelope and Lake Creek catchments, on top of the large amounts contributed annually from all other sources. Direct inputs of fine sediment resulting from haul would be of insufficient magnitude to meaningfully affect fish or fish habitat. Inputs from new road construction would occur in areas or during times that it is not anticipated to measurably impact fish habitat. In sum, though this project would not benefit aquatic resources (i.e., no road decommissioning or closures), no measurable changes to aquatic habitat are anticipated to result from implementation of these alternatives.

8. Affected Environment- Riparian Reserves

Riparian corridors along fish bearing stream reaches in the Little Butte Creek Watershed have been reduced from historical levels as agriculture and urban development of valley lands, road construction, and historic timber harvest practices have cleared vegetation adjacent to stream channels. This has increased penetration of solar radiation to stream channels, resulting in elevated summer stream temperatures.

Riparian corridors are narrow around most reaches as roads, businesses, and homes now exist in the historic flood plain. Generally, riparian corridors are likewise very narrow or absent throughout the majority of the lower, fish bearing reaches of the tributary streams in the watershed, as residences, roads, and agriculture lands now parallel these lower stream reaches.

Invasions of introduced species (especially Himalayan blackberry) have also reduced the quality of riparian vegetation in the watershed. The result in many areas are riparian corridors that do not provide desirable levels of shade to stream channels to prevent solar penetration to, and heating of, the water. ODFW considers greater than 70% shade desirable, and less than 60% shade undesirable to aquatic organisms in small (less than 12 meters wide) forested streams. Little Butte, Antelope, and Lake Creeks are all listed as water quality limited for exceeding summer stream temperature criteria by the Oregon Dept. of Environmental Quality (DEQ). Elevated water temperatures can affect spawning and incubation time, feeding, growth, and survival of salmonids (Meehan, 1991).

Within the analysis area catchments, there are an estimated 3,363 acres of Riparian Reserves (calculated from GIS) on BLM managed lands. There are many more acres of riparian areas located on private lands that do not receive the same level of protection as that provided by RRs. Overlaying the vegetation condition (GIS) layer with Riparian Reserve boundary layer is a useful way to display current vegetative states of the reserves over the large area encompassed within the project boundary. Note, however, that the vegetative condition layer was generated primarily to reflect upland conditions, and only estimates the conditions in riparian areas, especially those areas adjacent to stream channels (the primary shade and large wood producing zone). A summary of existing vegetative states in RRs on BLM managed lands within the Rio Climax analysis area is presented by catchment in table two below.

Table 3-10. Seral State of Riparian Reserves in the Rio Climax Analysis Area

Catchment	Riparian Reserve Acres by Vegetation Type						
	Grass and shrubs	Hardwoods	Early Seral (seedlings/ saplings)	Poles (5-11" DBH)	Mid Seral (11-21" DBH)	Mature (>21" DBH)	Total Acres of RRs
Antelope Creek	240	1,117	5	40	738	522	2,662
Lake Creek	29	190	69	0	312	101	701
Project total	269	1,307	74	40	1,050	623	3,363

The seral stage of vegetation surrounding the reserves can provide insight to how well the reserves are capable of functioning, in terms of providing shade and as a source of large wood inputs. For the purpose of this analysis, it was assumed that trees in a mid seral stage (minimum 11" in diameter at breast height (dbh)) or older will function to provide sufficient shade to stream channels, and that pole size trees (< 11" dbh) and younger may not provide sufficient shade to stream channels to prevent solar penetration to the stream channel. It was also assumed that only stands in a mature stage (>21" dbh) are capable of providing a source of large wood of sufficient size to encourage channel modification and habitat improvements.

Hardwoods were not included in this comparison as they do not conform well to dbh measurements, and do not provide large wood of the same quality that conifers do (Beechie et al., 1999). Excluding hardwoods (a common component of riparian areas) and pole size trees may tend to underestimate the percent of reserves that are currently providing sufficient levels of shade to stream channels. Table three below displays the percent of all reserves that are in mid seral or greater stage (capable of providing high levels of shade), and in a mature stage (capable of providing large wood to channels).

Table 3-11. Percent of Reserves in Mid Seral or Greater, and Mature Seral Stages; Analysis Area

Catchment in Analysis Area	% of Reserves in Mid Seral Stage or Greater (Trees >11" DBH)[1]	% of Reserves in Mature Stage (Trees >21" DBH)[1]
Antelope Creek	47%	20%
Lake Creek	59%	14%
Project Total	50%	19%

[1]Does not include acres of hardwoods, which likely underestimates actual shade provided to stream channels.

Data obtained through this analysis suggests that within the Rio Climax analysis area, Riparian Reserves capable of providing both maximum shade and inputs of large wood are lacking throughout. However, it should be noted that within the analysis area catchments, there are many areas that naturally contain a large hardwood (in particular oak) component. In these areas, the lack of mid seral and/or mature conifers is a natural condition, and exclusion of them in this type of analysis tends to overstate past disturbances to RRs. In any event, RRs in forested areas which have been altered by past human caused disturbances will continue to mature over time, and it is expected that both the amount of shade and the potential for large wood inputs will increase, barring a catastrophic wildfire or major flood event.

9. Environmental Consequences- Riparian Reserves

a. Alternative 1

The No-Action Alternative would have no direct or indirect effects to RRs within the Little Butte Creek Watershed. The reserves would remain as they are currently, slowly recovering as stands mature. It is anticipated that levels of shade and large wood input will slowly increase over time. Benefits will be limited in RRs impacted by roads, as barring major road decommissioning, the existing road system will likely remain in use, perpetuating canopy openings adjacent to the fish bearing stream reaches. As this alternative would not contribute any direct or indirect affects to the reserves, no cumulative effects would result from implementation of the no action alternative.

b. Alternative 2

Activities proposed in RRs include new permanent road construction (includes reconstruction of existing road), road renovation, construction of a temporary operator spur, and log haul. Renovation and haul would not change the existing condition of the RRs; neither activity would require the removal of riparian vegetation. New construction of ~ 2,000' of road through Riparian Reserves surrounding intermittent channels would necessitate the removal of riparian vegetation along the road right of ways. This would impact an estimated less than 1 acre of riparian vegetation. Because the streams in question are intermittent, any reduction in shade would not adversely impact summer stream temperatures. Future large wood input potential would be reduced slightly in the vicinity of the five new road crossings (the only portions of the new roads which would be close to the streams). This reduction would be negligible to aquatic organisms, as only five short areas would be affected, and as the intermittent streams are unlikely to contribute large wood to downstream perennial habitats anyways.

Construction of approximately 150' of a temporary operator spur in a RR surrounding a seasonal wetland would not meaningfully impact the function of the reserve. The spur would be located north and upslope of an existing road. It is likely that construction of the spur would require the removal of a couple of trees, but as the wetland is seasonal and dry during the summer months, and the spur would located to the north, shade and water temperatures in the wetland would not be affected.

c. Alternative 3

The only difference to Riparian Reserves under Alternative 3 as compared with Alternative 2, is that under Alternative 3, roughly 1,200' less riparian road would be constructed. This would correspond with a reduction in disturbed riparian vegetation (0.3 compared to ~ 1acre), and less loss of future large wood input to the aquatic system, as only 2 stream crossings, as opposed to 5 would be constructed.

E. CONSISTENCY WITH AQUATIC CONSERVATION STRATEGY

1. Introduction

The Northwest Forest Plan's (NWFP) Aquatic Conservation Strategy (ACS) has four components: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. It is guided by nine objectives which are meant to focus agency actions to protect ecological processes at the 5th-field hydrologic scale, or watershed, at the 6th and or 7th fields (subwatershed and or drainage), and at the site level. In this case, Antelope Creek is made up of two sixth field subwatersheds, which are themselves composed of18 smaller 7th field drainages. The Lake Creek catchment, composed of only six 7th field drainages, is part of another 6th field subwatershed. All of the subwatersheds and catchments are within the larger Little Butte Creek 5th field watershed. How the four components of ACS relate to the Rio Climax Forest Management Project is explained below:

1. Riparian Reserves: Riparian Reserve widths for streams, springs, wetlands, and unstable soils have been determined according to the protocol outlined in the NWFPs Aquatic Conservation Strategy and are listed in the PDFs for the Rio Climax timber sale.

2. Key Watersheds: Tier 1 Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. The Little Butte Creek Fifth Field Watershed is not a Key Watershed.

3. Watershed Analysis: BLM completed the Little Butte Creek Watershed Analysis in 1997. The Watershed Analysis covers the project and analysis areas.

4. Watershed Restoration: Most of the restoration activities in the watershed have focused on restoring fish passage to provide better access to habitat on upstream private and federal lands. Projects by the local watershed council, ODFW and/or BLM include culvert removal and replacement, dam removal, road decommissioning, and irrigation ditch fish screens and siphoning.

2. Consistency Review

Evaluation of this project's consistency with Northwest Forest Plan Aquatic Conservation Strategy Objectives (ACSOs):

ACSO 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.*

Topography, slope, forest fire regime, climate, and the distribution of soil types and plant communities are some of the landscape-scale features affecting aquatic systems in the Little Butte Creek Watershed. One of the treatment objectives of the project is to compensate for an altered fire regime and restore certain plant communities. The intent of this objective is to restore the function of landscape-scale processes like wildfire in order to protect the complexity and distribution of plant communities (including riparian areas) across the landscape. This would be noticeable at the site level, but would have only a minor benefit at the watershed scale, as less than 1% of the watershed would be treated.

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

In the Bear Creek Watershed, BLM-managed land is concentrated in the steeper slopes of the tributary streams of both catchments. Here, longitudinal connectivity and road densities are the primary issues for aquatic species. No activities planned under the Rio Climax Project would affect spatial and/or temporal connectivity, as no culverts are proposed for addition, replacement, or removal on perennial channels under the project. One plugged culvert is slated for replacement under road maintenance, which would restore site level connectivity at the site of the culvert. Temporary bridges planned to facilitate haul would allow for unhindered passage of all aquatic organisms during the time they are in use.

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

The only proposed action in the Rio Climax project that would affect the physical integrity of the aquatic system is construction of two road segments which includes 5 channel crossings. The channel bottoms in these five intermittent streams would be altered from their natural state, as they would be converted to natural stream fords. These site level impacts would not impact the physical integrity of the aquatic system at larger spatial scales.

*ACSO 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.*

There would be no effect on water temperature, because shade would not be reduced along any perennial stream channels. Short term (one to three years) there would likely be a small amount of fine sediment entering stream channels in the Antelope and Lake Creek catchments from haul, and under Alternative 2, some additional fine sediment contributed to channels in the Antelope catchment from the new road construction. Sediment increases resulting from this activity would be minor relative to existing sediment levels, and detectable behind background levels only at the site level. Upland work would have no effect on fine sediment levels, due to the filtering action of Riparian Reserve buffers, extensive PDFs designed to prevent overland sediment movement, and normal BMPs.

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

The only elements of this project which could affect the sediment regime are the new road construction, road renovation, and log haul. At the 5 crossing sites along the new road construction, a small quantity of sediment would likely remain in the channels after construction activities. The nature of the substrate would not be detrimental to the overall sediment regime of the small intermittent streams. Haul is expected to contribute some sediment to aquatic habitats. Haul would likely input a very small amount of fine sediment to aquatic habitats adjacent to or crossing haul routes. This sediment would affect site level habitats during an uncharacteristic time of year (i.e., during haul, which would likely occur during the summer). However, given the small magnitude of sediment anticipated to be input from hauling, it would be undetectable in downstream habitats plagued by high sediment and turbidity from a myriad of other sources. Also see ACS O #4. In general, high road densities, past and ongoing intense harvest of industrial and federal timber lands, extensive agricultural and urban development, increasing OHV use, and cattle grazing in the analysis area catchments will continue to impact the sediment regime.

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

Peak flows and summer low flows are unlikely to be affected by the Rio Climax Project. See the Water Resources section for details. Any effects on ground water availability from the project would be too small to be noticeable at the site, much less the drainage or watershed scale. Storage dams, water transfers and withdrawals for agriculture and residential use, and the high amount of non-porous surfaces (roads, buildings, etc.) have the most significant impacts to instream flows in the watershed.

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

Only harvest would have any mechanism to affect the timing, variability, and duration of floodplain inundation and water table elevation. However, harvest would not occur in Riparian Reserves and across the project area would leave canopy cover within the range of natural variability. Because of this, any extra water input intercepted by the ground as a result of harvest would likely be utilized by remaining vegetation before it reached the floodplain. Therefore, this objective would not be measurably affected at any spatial scale.

*ACSO 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.*

New road construction in riparian areas is the only project element which would affect this indicator. Riparian vegetation would be removed along the ROWs for the roads, affecting ~ 1 acre of riparian vegetation under Alternative 2, and less than 1/3 of an acre under Alternative 3. This would not impact thermal regulation; the streams in question are intermittent, and would be dry during the summer, as the proposed roads would be constructed perpendicular to the stream paths', very little shade would be reduced in any event. Nutrient filtering, and future large wood inputs would be reduced and erosion rates would likewise be slightly increased at the site level, at all five of the constructed channel crossings. These effects would not be meaningful to the larger aquatic system.

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

See ACSOs # 3, 4, 5, and 8. Site level effects to aquatic and riparian habitat would not be of sufficient magnitude to compromise this objective. The amount of habitat affected would be insignificant and immeasurable at the drainage, subwatershed, and watershed scales compared to the past and ongoing degradation that has impacted habitat in these catchments.

F. TERRESTRIAL WILDLIFE

The Rio Climax project area falls within the Little Butte Creek Watershed Analysis Area. Watershed Analysis was conducted for the Little Butte Creek Watershed using the guidance of BLMs 1995 Record of Decision and Resource Management Plan and Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis, version 2.2 (USDA/USDI 1997: 2).

1. Introduction

a. Vegetation Conditions & Terrestrial Wildlife Habitats (General)

The Rio Climax Forest Management Project proposal is located in the western portion of the Little Butte Creek watershed, which is a tributary to the Rogue River. The project area is 1,135 acres and the analysis area is 39,285 acres. For the purpose of analyzing the affected environment and the proposed project with regard to terrestrial wildlife, the analysis area considers 12 HUC 7s (called sub-watersheds or 7th field hydrologic units). (For a complete listing of drainages included in the analysis area see the Water Resources Section.) The total size of the analysis area is 39,285 acres or approximately 61 square miles. BLM administered lands comprise 26% of this area.

The vegetation condition classes presented in the table below provide habitat for the terrestrial wildlife species found in the proposed Rio Climax analysis area. Acreage of each vegetation condition class and several wildlife species that are representative of the various habitats are also displayed. Approximately 200 vertebrate terrestrial wildlife species are known or suspected to occur in the analysis area based on known range and habitat associations. This includes species that migrate through the area.

Table 3-12. Vegetation Communities & Condition Classes; BLM lands- Rio Climax Analysis Area

Vegetation Condition Class	Acres (BLM Administered Lands)	Representative Species (from Brown 1985)
Grassland	690	Gopher snake, California ground squirrel, western meadowlark
Brushland/Shrubland	86	Western fence lizard, wrentit, dusky-footed woodrat
Hardwood/Woodland	3268	Acorn woodpecker, western gray squirrel, ringneck snake
Seedling/Sapling >10 ft height; <60% crown canopy	454	Northwestern garter snake, mountain quail, pocket gopher
Small Conifer >60% canopy; ~40-100 years old	96	Golden-crowned kinglet, porcupine, Southern alligator lizard
Large Conifer >21 " dbh	3312	Ensatina, Stellar's jay, mountain lion
Mature Conifer Old-growth, >200 years, multiple layers w/decadence	1278	Northern spotted owl, northern flying squirrel, pileated woodpecker,

Approximately 1,030 acres within the analysis area are not accounted for in this table. These acres are not considered to provide habitat for terrestrial wildlife species due to their current condition (e.g., roads, buildings, water bodies, etc.)

b. Threatened, Endangered, Survey and Manage, and Bureau Sensitive Terrestrial Wildlife

Special Status Species are those species that are federally listed as threatened or endangered; proposed or candidates for federal listing as threatened or endangered; or are BLM designated sensitive species. Survey and Manage species are listed for protection under the Northwest Forest Plan. The table below lists the special status and Survey and Manage species that are known or suspected to be present in the analysis area. Only those species that could reasonably be assumed present are included – not species that would be considered as "accidental" in the analysis area.

Table 3-13. Threatened, Endangered, Bureau Sensitive, and Survey and Manage Terrestrial Wildlife

Species	Scientific Name	Status
Bald Eagle	*Haliaeetus leucocephalus*	BS - Known
Chase Sideband Snail	*Monadenia chaceana*	BS and S&M- Suspected
Fisher	*Martes pennanti*	FC - Suspected
Foothill Yellow-legged Frog	*Rana boylii*	BS - Suspected
Fringed Myotis	*Myotis thysanodes*	BS - Suspected
Great Gray Owl	*Strix nebulosa*	S&M – Known
Johnson's Hairstreak Butterfly	*Callophrys johnsoni*	BS--Suspected
Mardon Skipper Butterfly	*Polites mardon*	FC - Suspected
Northern Spotted Owl	*Strix occidentalis caurina*	FT -Known
Northwestern Pond Turtle	*Actinemys marmorata marmorata*	BS - Known
Oregon Shoulderband Snail	*Helmithoglypta hertleini*	BS and S&M – Suspected
Oregon Spotted Frog	*Rana pretiosa*	FC – Suspected
Peregrine Falcon	*Falco peregrinus anatum*	BS - Suspected
Pallid Bat	*Antrozous pallidus*	BS - Suspected
Siskiyou Hesperian Snail	*Vespericola sierranus*	BS - Suspected
Siskiyou Short-horned Grasshopper	*Chloealtis aspasma*	BS – Suspected
Travelling Sideband Snail	*Monadenia fidelis celeuthia*	BS - Known

FT - Federal Threatened
FC – Federal Candidate
BS - Bureau Sensitive
S&M - Northwest Forest Plan Survey and Manage

2. Affected Environment - Northern Spotted Owl (NSO)

The northern spotted owl (*Strix occidentalis caurina*) is a federally listed threatened species. This species is closely associated with older forests for nesting, roosting, and foraging throughout most of their range (Forsman et al. ,1984; Carey et al., 1990; and Solis and Gutierrez, 1990). The ideal NSO habitat consists of large trees in the overstory, smaller trees of varying sizes and species in the lower and middle story, large standing and fallen dead trees, and patchy shrub and herb communities (Spies and Franklin, 1991).

The Bureau of Land Management (BLM), Forest Service (FS), and US Fish and Wildlife Service (USFWS) have conducted a coordinated review of four recently completed reports containing information on the northern spotted owl. The reviewed reports include the following:

- Scientific Evaluation of the Status of the Northern Spotted Owl (Sustainable Ecosystems Institute, Courtney et al. 2004);
- Status and Trends in Demography of Northern Spotted Owls, 1985-2003 (Anthony et al. 2004);
- Northern Spotted Owl Five Year Review: Summary and Evaluation (USFWS 2004); and
- Northwest Forest Plan – The First Ten Years (1994-2003): Status and trend of northern spotted owl populations and habitat, PNW Station Edit Draft (Lint 2005).

Anthony et al. (2004, 2006) is the most recent published meta-analysis of owl demographic data collected in 14 demographic study areas across the range of the northern spotted owl. Four of the study areas are in western Washington, six are in western Oregon, and four are in northwestern California. Although the agencies anticipated a decline of NSO populations under land and resource management plans during the past decade, the Anthony et al. identified greater than expected NSO population declines in Washington and northern portions of Oregon, and more stationary populations in southern Oregon and northern California.

Summarizing Anthony et al., between 1985-2003:

- The northern spotted owl population declined over its entire range, and varied from the most pronounced decline in Washington (7.3% year per) to the least pronounced in California (2.2%)
- Within Oregon, the northern demographic study areas averaged 4.9% population decline, and in the southern study areas decline averaged less than 1% per year and were statistically stable, with a western Oregon average of 2.8% decline per year.
- Range-wide, adult survival rates declined in 5 of 14 study areas (western Washington and northwestern California) and western Oregon was stable in all six study areas.

The reports did not find a direct correlation between habitat conditions and changes in NSO populations, and they were inconclusive as to the cause of the declines. Even though some risk factors had declined (such as habitat loss due to harvesting) other factors had continued such as habitat loss due to wildfire, potential competition with the barred owl, West Nile virus, and sudden oak death (USFWS 2004, Lint 2005). The barred owl is present throughout the range of the spotted owl, so the likelihood of competitive interactions between the species raises concerns as to the future of the spotted owl (Lint 2005). Lint (2005) also found that between 1994-2003, federal lands in the Klamath Province lost 6.6% of spotted owl nesting habitat to stand-replacement fire, mainly to the Biscuit Fire (almost 500,000 acres).

An updated draft meta-analysis (http://www.reo.gov/monitoring/reports/nso *Population Demography Of Northern Spotted Owls,* Forsman, et al.) is projected to be published in July 2011. The conclusions reached in this draft are similar to those found in Anthony et al. Forsman et al, 2011 detected a decline but lacked statistical precision to determine if it was real or an artifact of sampling.

The current habitat conditions within the Rio Climax analysis area are a result of the complex interactions of the historic vegetative patterns and the changes to that historic vegetation from human activities and disturbance events. There are 10 northern spotted owl sites with some portion of their provincial home range on BLM administered land within the analysis area. A limited number of surveys have been conducted at these sites over the past 10 years. For purposes of this analysis, all sites are assumed to be occupied.

a. Northern Spotted Owl Habitat

Within the Little Butte Creek Watershed, wildlife habitat 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. These habitat categories are:

- Nesting, Roosting and Foraging habitat (NRF),
- Dispersal-only habitat, and
- Unsuitable habitat.

Nesting, roosting and foraging (NRF) habitat is characterized by forested stands with older forest structure with characteristics such as canopy closure of approximately 60 percent or greater, trees with large crowns, multiple canopy layers, snags and down wood. NRF habitat has large old trees with cavities, broken tops, mistletoe platforms, large branches, dead standing and fallen decayed trees, and multiple canopies of shade tolerant hardwoods and conifers that support prey base. NRF habitat also functions as dispersal habitat.

Dispersal-only habitat for spotted owls is defined as stands that typically have a canopy closure of approximately 40 percent or greater, and are open enough for flight and predator avoidance, but do not meet the habitat criteria of NRF habitat. Dispersal-only habitat is used throughout this document to refer to habitat that does not meet the criteria of NRF (nesting, roosting, or foraging) habitat, but has adequate cover to facilitate movement between blocks of suitable NRF habitat. Unsuitable habitat does not currently meet the NRF or dispersal-only habitat criteria.

Approximately 5,053 acres of the BLM lands within the analysis area are classified as NRF (late-successional) habitat, or approximately 50% of the BLM administered lands in the analysis area. There are approximately 436 acres of suitable spotted owl habitat, and 278 acres of dispersal-only habitat in the project area. Not all lands in the analysis area or project area are capable of becoming NRF habitat due to the natural limitations of some soil types, and agricultural and rural development.

b. Northern Spotted Owl Critical Habitat

None of the proposed treatment units are located in designated Critical Habitat (2008 designated)(73 Federal Register 157:47326) for the northern spotted owl. Critical Habitat is designated under the auspices of the Endangered Species Act of 1973

3. Affected Environment - Pacific Fisher

The Pacific fisher (*Martes pennanti*) was petitioned for listing as endangered or threatened under the Endangered Species Act on December 12, 2000. In 2003, the USFWS released their notice of 90-day petition finding and initiation of status review (68 Federal Register, No. 132, 41169-41174) and in 2004 published their Notice of 12-month petition finding, concluding that listing fishers as threatened was warranted, but was precluded by higher priority listing actions (Federal Register Vol. 69, No. 68, April 8, 2004, 18769-18792). The species remains a USFWS candidate species (USDI, USFWS 2004, 71 Fed. Reg. 53777, Sept. 12, 2006). In their 2006 update on the status of the Pacific fisher, the USFWS define the reasons for listing as: "Major threats that fragment or remove key elements of fisher habitat include various forest vegetation management practices such as timber harvest and fuels reduction treatments.

Other potential major threats include: stand-replacing fire, sudden oak death, (*Phytophthora*), urban and rural development, recreation development, and highways." (71 Fed. Reg. 53777 (Sept. 12, 2006)). The USFWS also states that the three remaining fisher populations "appear to be stable or not rapidly declining based on recent survey and monitoring efforts." (Id.)

Fishers are closely associated with low to mid elevation (generally <4,000 feet) forests with a coniferous component, large snags, or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor to support adequate prey populations (Aubry and Lewis 2003). Powell and Zielinski (1994) and Zielinski et al. (2004) suggest that habitat suitable for denning and resting sites may be more limiting for fishers than foraging habitat. The NRF habitat type described above for the NSO also adequately describes suitable fisher denning and resting habitat because there is a direct correlation of key habitat features used to assess NSO habitat and fisher habitat (high canopy cover, multi-storied stands, large snags, and large down trees on the forest floor). Using northern spotted owl habitat as a surrogate for fisher habitat has been accepted by the courts as a reasonable practice (KS Wild v. US BLM, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Based on the NSO habitat analysis, approximately 5,053 acres of suitable fisher denning and resting habitat exist on BLM lands within the analysis area. The project area contains approximately 436 acres of suitable fisher habitat. However, all of these acres may not provide optimal fisher habitat because past harvest practices and land ownership patterns have fragmented this habitat. BLM "checkerboard" ownership may be one of the primary factors limiting the ability of BLM lands to provide optimal habitat for fishers (USDA and USDI 1994). This checkerboard ownership pattern was created by the Congressional acts that provided land grants, and is outside of BLM's control.

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). 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.

Forest carnivore surveys using bait stations with motion and infrared detection cameras have been conducted in portions of the Ashland Resource Area and have detected fishers approximately 10 miles to the southeast of the project area, in the vicinity of Howard Prairie Reservoir. No surveys have been conducted within the project area. Due to the proximity of the project area to known fisher detections, it is reasonable to assume the area is used by fisher. The extent (dispersal, foraging, or breeding) to which the Rio Climax Project area is used by fisher is not known.

4. Affected Environment - Survey and Manage and Bureau Sensitive Species

a. Red Tree Vole

The red tree vole (RTV) is an arboreal rodent species with very low dispersal capabilities. 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 (USDA, USDI 2000a). 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. The Rio Climax Project is outside the known range of this species. Surveys east of Interstate 5 in the Rogue Valley have never located RTVs. The nearest known location of RTVs is nearly 20 miles to the west in the Applegate River Drainage.

b. Great Gray Owl

The great gray owl is a NWFP Survey and Manage species. Great gray owls (*Strix nebulosa*) 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 USDI 2004b). Suitable nesting habitat is defined in the "Survey Protocol For The Great Gray Owl " (USDI, USDA 2004b) as large diameter trees with roosting cover within 200 meters of suitable foraging habitat. Foraging habitat is described as relatively open, grassy habitats, such as bogs, natural meadows, open forests and recent selective/regeneration harvest areas (USDA USDI 2004b). Approximately 5,000 acres of habitat suitable for great gray owl reproduction and foraging exist in and around the Rio Climax analysis area. The project area contains approximately 950 acres of habitat suitable for great gray owl reproduction and foraging. Protocol surveys were conducted for great gray owls in the Rio Climax analysis area in 1997, 1998, 2010 and 2011. Three (3) reproductive sites were located.

c. Mollusks

Potential habitat exists throughout the project area for four Survey and Manage mollusks, *Helminthoglypta hertleini, Monadenia fidelis celeuthia, Monadenia chaceana,* and *Vespericola sierranus* (USDI USDA 2001 Survey and Manage ROD). *Helminthoglypta hertleini* (Bureau Sensitive species) utilizes down woody debris, rocky areas, including talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. Previous Medford District detections were found in rocky areas associated with damp grassy areas, oak woodlands, and shrub lands, or in conifer forests closely associated with these habitat types. *Monadenia chaceana* (Bureau Sensitive species) is associated with rocky areas, talus deposits, associated riparian areas, and coarse woody material (USDA, USDI 2003). *Vespericola sierranus*is primarily a riparian associate found in perennially moist habitat, including spring seeps and deep leaf litter along stream banks and under debris and rocks. *Monadenia fidelis celeuthia* is associated with deciduous, mixed or coniferous forests generally, but also sometimes in open woods and grassy places, such as Garry oak (*Quercus garryana*) meadows.

Protocol Surveys for terrestrial mollusks (*Helminthoglypta hertleini, Monadenia fidelis celeuthia, Monadenia chaceana*, and *Vespericola sierranus*) are underway throughout the Rio Climax project area.

d. Golden Eagle

In Oregon, the Golden Eagle inhabits a wide range of habitats, including shrub steppe, grasslands, juniper, open ponderosa pine, and mixed conifer / deciduous habitats. The preferred foraging habitat is generally open areas with a shrub component that provides food and cover for prey (primarily black-tailed jackrabbit). Nests are typically large (3-10' tall and 3' wide), and often built in large live ponderosa pines (>30" dbh) or on ledges along rims and cliffs (Marshall et al., 2003).

Currently, the Golden Eagle is not recognized as a federally or state listed species (under the Endangered Species Act) or under the Bureau's Special Status Sensitive Species program. However, protection is afforded under the Bald and Golden Eagle Protection Act and under the Medford District RMP.

During the summer of 1990, a Golden Eagle nest was discovered by a wildlife surveyor while conducting northern spotted owl surveys. The nest was documented to have fallen from the tree by the late 1990s and has never been reconstructed. Golden Eagles are still observed in the area on a regular basis. No active nest sites have been located since the 1990s. Large tracts of suitable nesting and foraging habitat exist in this the analysis area and across the Little Butte Creek watershed.

5. Affected Environment - Land Birds (Neotropical Migrants)

All neotropical migrants go to Central or South America each year. They are addressed here due to widespread concern regarding downward population trends and habitat declines. BLM has interim guidance for meeting federal responsibilities under the Migratory Bird Treaty Act and Executive Order 13186 (EO). 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) found in various Bird Conservation Regions (project area is in BCR 5)and *Game Birds Below Desired Condition* (GBBDC). The following table displays those species that are known or likely to be present in the analysis area.

Table 3-14. Land Bird Species Known or Likely to be Present – Rio Climax Analysis Area

Species	Status
Band-tailed Pigeon (*Patagioenas fasciata*)	GBBDC
Flammulated Owl (*Otus flammeolus*)	BCC
Mallard (*Anas platyrhynchos*)	GBBDC
Mourning Dove (*Zenaida macroura*)	GBBDC
Olive-sided Flycatcher (*Contopus cooperi*)	BCC
Rufous Hummingbird (*Selasphorus rufus*)	BCC
Wood Duck (*Aix sponsa*)	GBBDC

Bird Species of Conservation Concern (BCC)
Game Birds Below Desired Condition (GBBDC)

Land birds use a wide variety of habitats, including late-successional forests, riparian areas, brush in recovering clearcuts, and small trees in developing stands. Some birds, such as the olive-sided flycatcher, use residual canopy trees for perching, and forage over adjacent clearcuts. Many land birds are associated with deciduous shrubs and trees in early successional habitats (e.g., rufous hummingbirds). Some of the recovering clearcuts and pine savannahs in the analysis area with lower tree and shrub heights would provide these optimal foraging conditions.

Resident birds remain in the same general area or migrate to lower elevations in the winter. Total numbers of late-successional dependent migratory or resident birds within the Rio Climax analysis area are unknown. However, knowledge of specific numbers is not necessary to assess effects of land management activities on migratory or resident birds.

Current research indicates the most appropriate scale to study impacts to migratory birds is at the eco-regional scale (California Partners in Flight 2002). Breeding bird surveys in the Southern Pacific Rainforest Physiographic Region (which includes western Oregon) indicate that songbirds are declining. The exact cause of these declines is still unclear, but issues associated with their winter grounds (Central and South America) are suspected to be an important factor (Sauer et al., 2004).

6. Affected Environment - Deer and Elk

Deer Winter Range and Elk Management Area

Approximately 4,122 acres of the Rio Climax analysis area are in the Little Butte Big Game Winter Range Area and approximately 1,300 acres are in the Grizzly Peak Elk Management Area as identified in the Medford District RMP. A substantial portion of these areas is located behind locked gates. More than 15 miles of BLM roads have gates restricting general access. The inaccessibility of much of the winter range/ management area to vehicles provides seclusion for deer and elk at a time when they are under physiological stress in winter due to low temperatures and reduced forage quality and availability. This is a benefit because nutritional reserves are not depleted on avoidance behavior.

Within the analysis area, approximately 4,040 acres serve as foraging areas (grass, brush, woodland, and early seral vegetation condition classes). Approximately 4,686 acres serve as thermal cover (mid-seral and mature forest with a high degree of canopy closure). Thus, approximately 12% of the total analysis area is currently providing thermal cover (including privately owned parcels) and more than 45% of the Federal ownership within this same area is providing such habitat. Generally, brushland/shrubland and mature conifer forest vegetation condition classes also provide hiding cover.

Management for deer and elk in these areas is focused primarily on improving forage and cover conditions and decreasing the density of roads that are open to vehicular traffic, particularly in the winter. Winter range is located at lower to mid-elevations in the analysis area, and generally on south to west facing slopes where solar radiation is most intense. Concentrating foraging and other life functions on these aspects allows the animals to maintain normal body temperature with less energy expenditure. Elk winter range is located at higher elevations than deer winter range. "Thermal cover for big game winter range is not as critical in Little Butte Creek Watershed as it is in eastern Oregon due to the milder winters west of the Cascades. Although thermal cover may not be a major issue in this watershed, it can benefit big game by moderating thermal extremes." (USDA, USDI, 1997)

Note: In the sections that follow regarding environmental consequences, only those wildlife species that are present within the analysis area and/or are anticipated to be affected by the Rio Climax Project are discussed.

7. Environmental Consequences - Northern Spotted Owl

a. Alternative 1

Under Alternative 1, the No-Action alternative, none of the proposed BLM activities would occur. Forest stand conditions would continue to develop along the general current trends toward higher density stand conditions, especially in the understory, than what was historically present in the area. It is likely that many of the stands within the analysis area would eventually contain tree densities two to three times that of historical levels (Hardy and Arno, 1996). The majority of the lower elevation stand conditions reflect past fire exclusion efforts. As discussed in further detail in the Silviculture and Fire and Fuels sections, high stocking levels, competition mortality, fuel loading and ladder fuel conditions work to increase the susceptibility of the existing late-successional and NRF habitat to high severity fire.

The No-Action Alternative would not alter the current habitat conditions across the analysis area, and the NSOs that inhabit and utilize the analysis area would not be impacted from any loss of habitat or project related disturbance. NSOs would be expected to behave and utilize the habitat within the project area in the same fashion as they have in the past.

Under the No-Action Alternative, no loss of NRF or dispersal habitat would be expected across the analysis area from active forest management on Federal lands. It is difficult to estimate the potential loss of NRF or dispersal habitat due to wildfire or other disturbance events and when such loss might occur. Recent trends in Southwest Oregon illustrate that fire has been converting mature forest structure into earlier seral stages at a higher rate than harvest. For this reason, the retention of mature forest habitat is problematic in dry forested ecosystems (Courtney et al., 2004; Spies et al., 2006).

In general terms, wildfire would remain the most immediate hazard to late-successional forest habitat (NRF) and its associated species (Courtney et al., 2004), including the NSO. High severity fires could be expected to remove or downgrade habitat randomly across the landscape, setting back forest succession and development, and likely resulting in the loss of large tree structure critical to late-successional forest habitat dependent species. High severity fires resulting from these dense stand conditions would cause more severe impacts to soils, which may prolong the recovery and colonization of mycorizzal organisms, and macroinvertebrate and small mammalian prey food webs important to suitable foraging areas for spotted owls.

Under the No-Action Alternative, the development of future late-successional forest habitat within the project area would be delayed or potentially at risk. This process is discussed in further detail in the Silviculture section of this EA. This is because current stand conditions are too dense and trees are not developing the diameter to height ratio required to develop late-successional structure (Davis et al., 2007). This ratio was historically created through frequent fire events that reduced stem densities and competition that created open grown conditions. Under the No-Action Alternative, the current stand conditions would likely develop into less complex stand structures and species compositions than that of old-growth stands (Sensenig, 2002), or at the very least, would require a much longer time scale to develop (Tappeiner et al., 1997).

b. Alternative 2

Forest management treatments result in one of the following categories: habitat removal, habitat downgrade, or a maintenance treatment (treat and maintain). Forest management treatments proposed in this alternative include thinning but maintaining NSO nesting, roosting, foraging, and dispersal habitat, pine series thinning, dry Douglas-fir thinning, mixed conifer thinning, downgrading of NSO nesting, roosting, foraging habitat, and removal of NSO dispersal habitat. A description of these silvicultural prescriptions is included in Chapter 2, Silvicultural Objectives and Descriptions.

Harvest Treatments

There are approximately 473 acres of suitable spotted owl habitat, and 284 acres of dispersal-only habitat in the project area. It is estimated that Alternative 2 would remove 10 acres of dispersal habitat and downgrade 148 acres of northern spotted owl nesting, roosting, or foraging habitat.

Some treatment units of the Rio Climax Project would take place within the provincial home range radius (1.2 miles) of 10 historical northern spotted owl sites. An estimated 482 acres of treatment within the provincial home range of a northern spotted owl site maintain northern spotted owl habitat in its current functional condition (i.e., habitat suitable for northern spotted owls prior to this action would remain suitable for northern spotted owls following this action[NRF remains NRF and Dispersal remains Dispersal].). The downgrading of approximately 148 acres of suitable habitat (NRF) inside of northern spotted owl provincial home ranges in the analysis area may impair the ability of the owls to breed, feed, and shelter on those acres. Across the analysis area, more than 90 percent of existing suitable northern spotted owl NRF habitat would remain untreated.

Table 3-15 below shows current and post-harvest percent of NRF habitat around NSO sites. These percentages are shown for the 0.5 mile core area and the 1.2 mile Provincial Home Range area, and represent habitat on BLM administered lands only.

Table 3-15. Current and Post-harvest Percent of NRF Habitat Around NSO Sites

NSO Site Number	0.5 mile Core: Current condition (%)	0.5 mile Core: Post-harvest condition (%)	Home Range: Current condition (%)	Home Range: Post-harvest condition (%)
0967O	42	42	18	18
0968O	41	41	32	32
1944O	32	32	20	19
1956O	24	24	13	12
2075O	39	39	30	30
2262O	24	24	10	10
2393O	36	36	24	20
2405O	27	27	14	14
3563O	5	5	19	19
4464O	30	30	17	17

When examining the impacts to NSOs from timber harvest, the amount and intensity of harvest are not the only factors to consider. One critical factor to consider is the spatial arrangement of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO nest sites. Researchers have found that the habitat quality within 300 meters of a nest site (known as the nest patch) is critically important to determining nest site positioning across the landscape (Perkins et al., 2000), and is further recognized as an important area under the Incidental Take Statement Methodology used to estimate the number of NSOs affected by federal actions (USDI 2008). Therefore, two similar treatments in very similar habitat types could have differing impacts to NSOs depending on if the treatment would occur within 300 meters of NSO nest locations (i.e., the nest patch). No harvest treatments are proposed in the nest patch of any NSO sites.

The removal of selected dwarf mistletoe infected trees outside of NSO nest patches would remove some trees with potential nest structures formed by the mistletoe. Suitable nesting structure is retained within units through retention of large dominant trees and most trees infected with mistletoe.

The long term (>10 year) effects of Alternative 2 are anticipated to increase the health and vigor of the residual stands post treatment. It is likely that the treated stands would develop into more complex, structurally diverse forests in the long term in comparison to the No-Action Alternative. In fact, thinning dense stands may be necessary in order to achieve old-growth forest characteristics in the absence of natural disturbance events (Tappeiner et al., 1997). Thinning younger forest stands may provide growing conditions that more closely approximate those historically found in developing old growth stands (Hayes et al., 1997). Thus, the treatments as proposed under Alternative 2 would have long-term beneficial effects to NSOs by increasing growth rates of the residual stand and accelerating the development of late-successional old growth characteristics within the treated areas than would occur if left untreated.

Thinning around pines (by a distance of double the drip line of the pine to be buffered) would aid in recolonization of pines in stands that have seen a conversion from pine dominated forest to Douglas-fir and white fir dominated forest due to fire suppression. Pine forest is the historically typical condition of these forest stands. Restoration of these pine forests would enhance habitat for a variety of native wildlife species and improve the fire resiliency of these forest stands. This would in turn reduce the likelihood of landscape scale, stand replacement fires which are a significant threat to NSO habitat throughout this analysis area. For example, the East Antelope Fire (2002) destroyed the core habitat and all known nest sites of the Rummel Rock NSO site which is located within this analysis area. Some NRF habitat would be downgraded to Dispersal only habitat by these thinning treatment.

Northern spotted owls would likely be adversely affected (LAA) by the proposed project; therefore formal consultation with the U.S. Fish and Wildlife Service is required. The consultation was initiated through a consultation with the Service for timber sales and other projects in July of 2011. The Biological Assessment, AshPass, is available for review on BLM's Medford District Website**.** The Biological Opinion (BO) rendered by the USFWS in response to this BA is also available for review.

With regard to effects to northern spotted owls, "the Service anticipates the incidental take of spotted owls, six adults and 4.5 juveniles, at three historic spotted owl sites (1944O, 1956O and 2393O). This harm, through reduced fitness (decline in survival and reproduction), will occur due to the downgrade of 148 acres of NRF habitat from the Rio Climax project, reducing available NRF habitat to below 40 percent at the home range scale of these three sites." (BO# 13420-2011-F-0206, p. 52). Owl site 19440 was last surveyed in 1999, which detected an owl; reproduction for this site was last confirmed in 1996. Owl site 19560 was last surveyed in 1994 with no owls detected; reproduction at this site was last confirmed in 1993. Owl site 23930 was last surveyed in 2004 with no owls detected; the last owls were detected at this site in 2002 with reproduction confirmed in 2001. The Service concluded that the Medford District's proposed action would not jeopardize the continued existence of the northern spotted owl)BO# 13420-2011-F-0206, p. 51).

Effects to Spotted Owl Prey

Timber harvest and associated fuels reduction projects may impact foraging by changing habitat conditions for prey. Sakai and Noon (1993) stated that dusky-footed woodrats, an important prey species of NSOs, may benefit from some thinning or harvest which would increase shrub and pole stands. Bushy-tailed woodrat presence is more dependent on cover and food availability than on seral stage (Cite). This species often uses areas previously disturbed by fire (Carey 1991). Both of these NSO prey species are likely to be present in the analysis area.

Residual trees, snags, and down wood that are retained in the thinned stands would provide some cover for prey species, and would help minimize harvest impacts to some prey species. Lehmkuhl et al. (2006) found that fuels projects in eastern Washington could have impacts on bushy-tailed woodrats, but confirmed the importance of maintaining snags, down wood, and mistletoe.

Some disturbance of habitat may improve forage conditions, provided understory structure and cover are retained. Removal of tree canopy would bring more light and resources into the stand, stimulating forbs, shrubs and other prey food. Once the initial impact of disturbance recovers (6 months to 2 years), the understory habitat conditions for prey forage would improve over the next few years, until shrubs and residual trees respond to again close in the stand.

Edges created from harvest can be areas of good prey availability and potentially increased prey vulnerability (i.e., better hunting for owls) (Zabel 1995). Prey animals may be more exposed in the disturbed area or may move away from the disturbed area for the short-term. Changes in prey availability may occur as cover is disturbed and prey species move around in the understory. They may become more vulnerable and exposed. The disturbance might 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 may also improve prey availability for northern spotted owls.

Bingham and Noon (1997) reported that a spotted owl core area 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 (the area closest to the nest) being the focal area. Several studies (Wagner and Anthony, 1998; Dugger et al., 2005; Zabel et al., 2003; Bingham and Noon, 1997) indicate the core area size for the Klamath and South Cascades provinces is 0.5 miles (or 500 acres) around the nest site.

Therefore, effects to prey species are most critical at the nest patch and core areas. Within the Rio Climax Project, there would be no treatment within nest patches and all treatment within core areas would be "treat and maintain".

Overall, the spacing, timing and the retention of key habitat features as called for under Alternative 2 and PDFs for this project (EA Chapter 2) are likely to avoid adverse impacts to spotted owls with respect to prey availability, although localized, short-term changes in prey species distribution and abundance are likely to occur within a treated stand. The dispersed nature of treatment sites over a large area is especially important in maintaining spotted owl prey populations within the project area. Large dominant

trees, moderate to high canopy cover residual trees, snags, and down wood retained in the treated stands would continue to provide cover and nest structure for prey species and would help reduce harvest impacts to some prey species, such as dusky-footed woodrats and northern flying squirrels. Treatment implementation would be spread out temporally and spatially within the analysis area, and greater than 90 percent of NSO habitat across the analysis area landscape would remain untreated, providing large, undisturbed areas for spotted owl foraging.

Additionally, research has indicated that thinning treatments are not necessarily detrimental to small mammal communities as a whole. In an experimental study, researchers found of 12 mammal species studied, the number of captures increased for four species and decreased for only one species two years after moderate to heavy thinning occurred in the Oregon coast range (Suzuki and Hayes, 2003).

This study also found the total number of small mammal captures was higher in previously thinned vs. unthinned stands. Gomez et al.(2005) noted that commercial thinning in young stands of coastal Oregon Douglas-fir (35-45 yr) did not have a measurable short-term effect on density, survival or body mass of northern flying squirrels, an important prey species for spotted owls.

PDFs and normal operating procedures applied by the Medford BLM reduce the impacts to the extent possible, while still facilitating tree harvest and other projects.

Effects of Disturbance to Northern Spotted Owls

Mandatory PDFs would be incorporated into all action activities. Applying the Mandatory PDFs should avoid harm to nesting owls and their young that might occur from noise or activity. Nesting owls are confined to an area close to the nest, but once the young fledge, they can move away from noise and activities that might cause them harm. Since all projects would follow mandatory PDFs that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds, no harm to nesting owls, or their young, is expected from project related noise or activities.

Fuels Reduction Treatments

Alternative 2 proposes to treat slash created from forest thinning. The fuels reduction treatments as proposed in Chapter 2 would not alter the overstory forest structure or remove key habitat components related to spotted owl habitat. In very dense stands, these treatments reduce understory density and improve flight paths within stands, in turn, increasing the accessibility of owls to the forest floor and prey abundance or availability (Sakai and Noon, 1993, 1997). In some instances, fuels treatments can reduce the habitat quality for owls because these treatments simplify the forest structure, which can in turn have negative effects to prey species. Conversely, results from other studies on small mammals and fuel reduction treatments have demonstrated that the total amount of small mammal biomass increases as a result of fuel reduction treatments (Converse et al., 2006).

Large down woody debris, patches of unburned vegetation in draws and cooler aspects, and some unburned slash piles would continue to provide ground cover habitat during and after treatments. These untreated areas and residual habitat features, along with the spatial and temporal staggering of treatments across the landscape should ameliorate the potential negative effects (e.g., removal of cover; disruption of normal feeding, breeding, and sheltering activities) of these fuels treatments on prey species at the landscape level.

Underburning treatments have the greatest potential to impact spotted owl prey because these treatments can fully or partially consume the snags or coarse woody material (CWM) that many prey species are associated with during underburn operations (Stephens and Moghaddas, 2005). However, these effects to prey species are expected to be limited and localized because not all the existing snags or CWM within an underburn is lost during underburn treatments (Pers. Comm. Mitchell, 2009). In addition, while some prey species may be adversely affected from mechanical and underburn treatments, a good proportion of the prey are primarily arboreal in habit, and would remain largely unaffected by these treatments.

Road Construction
Under Alternative 2, the BLM proposes to maintain about 64.23 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). Approximately 2.75 miles of new road would be constructed under this alternative. There are a number of ways roads affect wildlife in addition to habitat removal. Some of the more common ones are vehicular noise disturbance which affects behavior patterns, increased potential for poaching, increased potential for over hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads. Road maintenance has the potential to influence wildlife species through noise, but would be of short duration and subject to wildlife seasonal PDFs.

In summary, Alternative 2 would have impacts to the NSOs found within the analysis area given that:

- 9 percent of the total NRF habitat located within the analysis area would receive treatments
- The treatments would downgrade or remove 148 acres of existing habitat within NSO 1.2 mile provincial home range areas
- Adverse impacts to NSO prey are anticipated to only occur in the short term (<5 years) and would be spatially separated and well distributed across the owl analysis area.

Conservation Measures were implemented to reduce impacts to spotted owls or critical habitat.

- Spotted owl habitat assessments were used to reduce impacts to NRF
- Protection of red tree vole, mollusk, great gray owl sites found during protocol surveys
- Protection of sensitive plants that occur in the treatment areas
- Project design that incorporated historic owl survey data assessments
- Protection of fragile soils
- None of the projects in this BA are located within CHU (USDI FWS 2008)
- None of the projects occur in Late-Successional Reserves (USDA and USDI 1994)
- No projects occur with Known Spotted Owl Activity Centers (KSOAC). KSOAC are the best 100 acres around northern spotted owl activity centers that were documented as of January 1, 1994 on Matrix and AMA lands, and are managed as Late-Successional Reserves (LSR). The criteria for mapping these areas are identified on pages C-10 and C-11 of the Northwest Forest Plan Standards and Guidelines (USDA USDI 1994)
- None of the proposed treatments would occur within a NSO nest patch

c. Alternative 3

Alternative 3 differs from Alternative 2 in that all spotted owl habitat treated under this alternative would maintain its current function as spotted owl habitat (i.e., current NRF habitat would remain NRF habitat post-treatment and current dispersal-only habitat would remain Dispersal-only habitat post-treatment). Total treatment acres that are currently NRF habitat would be 451 under this alternative and total treatment acres that are currently Dispersal-only habitat would be 272. Road construction under Alternative 3 would be reduced to 1.25 miles.

Effects to spotted owls, spotted owl habitat, and spotted owl prey species under Alternative 3 would be very similar to the effects of Alternative 2. The majority of the narrative above applies to this alternative as well. However, the overall effects of Alternative 3 would be expected to be "*may affect not likely to adversely affect*" the northern spotted owl. The elimination of treatments that downgrade owl habitat and the reduction in miles of new road construction both contribute to this alternative being of lesser impact to northern spotted owls. Current habitat conditions within NSO 1.2 mile provincial home ranges would be maintained post treatment. Disturbance to NSOs would be avoided through application of PDFs.

8. Environmental Consequences – Pacific Fisher

a. Alternative 1

Under Alternative 1, the No-Action Alternative, none of the proposed BLM activities would occur. Forest stand conditions would continue to develop along the general current trends toward higher density stand conditions, especially in the understory, than what was historically present in the area.

The No-Action Alternative would not alter the current habitat conditions across the analysis area. Fishers would be expected to behave and utilize the habitat in the same fashion as they have in the past.

Particularly to fishers, the greatest risk of No-Action is the potential wildfire related loss of large live remnant conifers as well as snags and down wood important to fisher natal and denning habitat.

b. Alternative 2

Harvest Treatments

No known denning sites would be impacted and proposed activities would not be expected to cause direct mortality of any fishers. Disturbance from project activities would likely be the principal effect on any fisher within the analysis area. However, fishers are highly mobile and have large home ranges and would likely move to another part of their home range while the activity is ongoing.

Thinning treatments would have short term negative effects to habitat for some fisher prey species due to the reduced vegetation. These effects are relatively short term, as understory vegetation typically returns within 5 years. However, these short term effects to fisher prey species would be minimal, because the large amount of untreated areas within the analysis area would continue to provide forage habitat while canopy cover in the treated stands increases. Additionally, these treatments would retain key habitat characteristics such as large snags and coarse woody debris (CWD) to provide existing and future habitat for fishers.

Fishers may avoid roaded areas (Harris and Ogan, 1997) and humans (Douglas and Strickland 1987; Powell 1993). Disturbance from project activities would be temporally and geographically limited and would occupy a geographic area smaller than the average fisher home range (approximately 36 sq. km. for an adult male and approximately 11 sq. km. for an adult female(Lofroth et al., 2010)). Seasonal restrictions listed as Project Design Features for other resources would also reduce the likelihood of impact to fishers by restricting project activities until young are approximately six weeks old, approximately the age when fisher move young from natal dens and become more mobile. Fishers have large home ranges and would be able to move away from the action area while the disturbance is occurring, without impacting their ability to forage and disperse within their home range.

Fuels Reduction Treatments

Alternative 2 proposes to treat approximately 1,135 acres for fuels reduction in harvest and pre-commercial thinning units. Approximately 436 acres of fisher habitat would be treated. These proposed treatments would have minimal impacts to the habitat located across the analysis area, as the vast majority of the existing habitat would not be treated.

The fuels reduction treatments as proposed in Chapter 2 do not typically alter the overstory forest structure or remove key habitat components related to fisher habitat. In some instances, mechanical fuels treatments can reduce the habitat quality by simplifying the forest structure. The Project Design Features in Chapter 2 include the retention of snags and CWM, which are important habitat features for fisher. This provision, along with the spatial and temporal staggering of treatments across the landscape would ameliorate the potential negative effects (e.g., removal of cover; disruption of normal feeding, breeding, and sheltering activities) of these fuels treatments on prey species at the landscape level.

Underburning treatments have the greatest potential to impact fisher habitat because these underburning treatments can partially or fully consume the snags or coarse woody material (CWM) that fishers often utilize for denning or rest sites (Stephens and Moghaddas, 2005). However the potential loss of these snags or CWM is expected to be limited and localized because not all the existing snags or CWM within an underburn is lost during underburn treatments (Pers. Comm. Mitchell, 2009).

Road Construction

Under Alternative 2, the BLM proposes to maintain about 64.23miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). About 2.75 miles of new road would be constructed. Some of this road construction will remove existing forest and contribute to the fragmentation of habitat used by the fisher. Approximately 1 mile of road construction will take place in or adjacent to NRF habitat. The effects from this road construction on fisher are not quantifiable due to the small percentage of habitat affected in the analysis area (<1 percent) that would be physically altered by this action.

Effects Summary for Fisher - Alternative 2

Alternative 2 would not contribute to the need to federally list the fisher as threatened or endangered because habitat features, such as large snags and coarse wood, would be retained throughout the Project Area, which would provide habitat for denning and resting. More than 90% of suitable habitat located within the Analysis Area would not receive any treatments.

c. Alternative 3

Under Alternative 3, less road construction (1.25 miles) would take place lessening the effects to fisher through habitat fragmentation. All treatment activities would maintain current function of northern spotted owl habitat and would thus maintain function of current fisher habitat as well. General effects from proposed treatments would be similar to similar treatments proposed under Alternative 2.

Effects Summary for Fisher Alternative 3

Alternative 3 would not contribute to the need to federally list the fisher as threatened or endangered because habitat features, such as large snags and coarse wood, would be retained throughout the project area, which would provide habitat for denning and resting. More than 90% of suitable habitat located within the analysis area would not receive any treatments.

9. Environmental Consequences – Great Gray Owl

a. Alternative 1

Under the No-Action Alternative, none of the proposed harvest activities would occur, and the forested stands in the analysis area would continue to develop along their current pathways. Therefore, none of the potential nesting habitat found within the analysis area would be altered. Great gray owls would continue to utilize the analysis area in more or less the same fashion as they have in past years.

Specific to great gray owls the No-Action Alternative would not affect use of the analysis area for nesting or foraging in the short term. At longer time scales, the open meadow habitats that provide foraging areas would continue to be encroached upon by fire intolerant plant species, thereby reducing the amount of potential foraging opportunities found within the analysis area. Some forest stands would grow too dense over time for great gray owls to fly through, thus further reducing nesting and foraging habitat. Stand replacement fire would remain the greatest risk to the nesting habitat found within the analysis area.

b. Alternative 2

Alternative 2 would treat 938 acres of forest habitat. While commercial thinning treatments may remove individual potential nest trees, the thinning treatments are not expected to affect the majority of the stands or individual potential nest trees found throughout the analysis area. Protocol surveys were conducted for great gray owls for the Rio Climax analysis area in 2007, 2008, 2010 and 2011. Three (3) reproductive

sites were located. Each reproductive site would be protected with a ¼ mile radius (or equivalent area polygon) no harvest buffer. Any additional reproductive sites located prior to harvest activities would also receive this protection.

Short term effects would include reduced canopy closure and structural complexity, and the loss of future potential nest trees. However, these habitat changes would also open stands for unobstructed flight and increased foraging opportunities. Long term beneficial effects include accelerated development of late-successional forest habitat suitable for potential great gray owls nesting and improved potential foraging habitat as understories respond from increased light penetrating to the forest floor .

The fuels reduction treatments proposed under Alternative 2 would remove vegetation from the understory or the smaller components of the midstory. This would have minimal effects on great gray owl habitat, as the trees removed by this type of treatment do not provide nesting habitat. These treatments have the potential to improve foraging conditions in treated stands by opening the understory and increasing access to prey species. The road construction associated with Alternative 2 would not occur in suitable great gray owl habitat, and thus would not directly affect any nesting habitat. Each reproductive site would be protected with a ¼ mile radius (or equivalent area polygon) no harvest buffer.

c. Alternative 3

Effects to great gray owls under Alternative 3 would be very similar to the effects under Alternative 2. No measurable change in habitat suitable for use by great gray owls would be expected. Each reproductive site would be protected with a ¼ mile radius (or equivalent area polygon) no harvest buffer.

10. Environmental Consequences -Golden Eagle

a. Alternative 1

Under the No-Action Alternative, management activities would not remove or alter suitable habitat within the project area and habitat would continue to develop along current successional pathways. For golden eagles, the greatest risk of the No-Action Alternative is the potential wildfire related loss of large live remnant conifers needed to support golden eagle nesting structures, and the loss of suitable foraging habitat due to conifer encroachment.

b. Alternatives 2 and 3

Due to the habitat available within this watershed suitable for use by golden eagles, any impact to the species from the Rio Climax Project is expected to be slight because of the retention of over 90% of nesting and foraging habitat within the analysis area. Most large suitable nest trees would be retained post-harvest. Grasslands suitable for foraging would not be treated and would remain usable by golden eagles to their present extent. Some encroachment into these grasslands will continue to occur and thus reduce golden eagle foraging habitat.

Similar to the effects from Alternative 2, the effects to golden eagles under Alternative 3 would be negligible.

11. Environmental Consequences - Bureau Sensitive Species

The Bureau Special Status Species list, updated February 7, 2008, is divided into Sensitive and Strategic species (IM No. OR-2008-038). As mentioned above, only federally listed or Bureau Sensitive species known or suspected to be present within the analysis area and impacted by the proposed actions are addressed in this EA. Table 3-16 below documents the basic conclusions of this assessment by species. A description of the table's headings and letter codes are located at the bottom of Table.

Table 3-16. Special Status Wildlife Species – Rio Climax Analysis Area

SPECIES	7/7/10 STATUS	RANGE (Y/N)	PRESENCE	PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS
Birds Bureau Sensitive & Bureau Strategic				
Peregrine falcon	BSEN	Y	S	No known nest sites within the planning area. Some potential nesting cliffs are present. Suitable habitat would remain suitable post-harvest.
Northern spotted owl	FT	Y	P	Seasonal Restrictions would protect known sites from project activity disturbance. Proposed activities impacts have been addressed in detail in subsection 7.
Amphibians Bureau Sensitive & Bureau Strategic				
Foothill yellow-legged Frog	BSEN	Y	S	A slight increase in sedimentation from road maintenance and construction, and road use for timber harvest, could have negative short term impacts on foothill yellow-legged frog habitat. However, sediment delivery to streams due to project activities would be highly localized, immeasurable, and of short duration. Soil and hydrology PDFs would minimize potential impacts from sedimentation to water quality and no loss of frogs would be expected to occur.
Oregon Spotted frog	FC	Y	U	No known sites within the project area. Habitat would be protected by riparian buffers within the Rio Climax project area.
Reptiles Bureau Sensitive & Bureau Strategic				
Northwestern pond turtle	BSEN	Y	P	Females lay eggs in upland areas up to ½ mile from the nearest water source. Riparian zone buffers would protect aquatic habitats used by this species. Upland sites utilized for nesting are not usually forested and would not likely be impacted by the proposed action. Some individual turtles may overwinter in duff in forested locations and could be subject to incidental impacts.
Mammals Bureau Sensitive & Bureau Strategic				
Fisher	FC	Y	S	Potential habitat exists within and adjacent to the project area. Temporary human disturbance, both temporally and spatially would be inconsequential. No known sites located within project units. Proposed activities impacts have been addressed in detail in subsection 8.
Fringed myotis	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (PDF Ch. 2) post treatment.
Pacific pallid bat	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (PDF Ch. 2) post treatment.
Invertebrates Bureau Sensitive & Bureau Strategic				
Chase sideband snail	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Known locations would be protected by no harvest buffers.
Evening fieldslug	BSEN	Y	U	No known sites in project area. Habitat would be protected by riparian buffers within the Rio Climax project area.
Johnson's Hairstreak	BSEN	Y	S	This butterfly species has not been documented in the project area. Surveys for the species have been determined to be impractical as it spends the majority of its lifecycle high in the canopy of older conifers with mistletoe infection. This butterfly is likely to be impacted through removal of conifer trees and the mistletoe which they host. As mistletoe would not be eradicated from the project area, this butterfly would likely continue to

SPECIES	7/7/10 STATUS	RANGE (Y/N)	PRESENCE	PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS
				persist.
Mardon skipper butterfly	FC	Y	S	No known sites within the project area. This species is associated with wet meadows. There would be no treatment of this type of habitat under the provisions of this project.
Oregon shoulderband snail	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Known locations would be protected by no harvest buffers.
Siskiyou hesperian snail	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Known locations would be protected by no harvest buffers.
Siskiyou short-horned grasshopper	BSEN	Y	S	The Siskiyou short-horned grasshopper is associated with open grassland with an elderberry shrub component. No activities are proposed for this habitat type in the Rio Climax project area. They are unlikely to be impacted by the proposed action.
Travelling sideband snail	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Known locations would be protected by no harvest buffers.

Table Headings and Letter Code Definitions

Species: Grouped alphabetically by taxon.
Status: lists the Oregon BLM Program codes as follows:
Oregon BLM Codes:

FT - USFW Threatened - likely to become endangered species within the foreseeable future
FC - USFW Candidate - proposed and being reviewed for listing as threatened or endangered
BSEN - Bureau Sensitive (BLM) - eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally these species are restricted in range and have natural or human caused threats to their survival.
BSTR - Bureau Strategic Species (BLM) - not presently eligible for official federal or state status, but of concern which may at a minimum need protection or mitigation in BLM activities.

Range: indicates yes or no, if the breeding range overlaps with the Ashland Resource Area. If not within the range, both presence and basic conclusion are not applicable (N/A). For invertebrates in which there is inadequate data to determine ranges, 'U' is used for unknown.

Presence: indicates 'P' if a species is known to occur in the project area, 'S' suspected to occur based on known sites adjacent to the project area, or suitable breeding habitat exists, 'U' uncertain that the species occurs within the project area based on insufficient data, 'A' absent from the project area based on no known sites and/or no suitable breeding habitat within the project area, and 'T' possibly transitory species utilizing habitats within the project area during migration.

Basic Conclusion: describes the facts, context and intensity to provide the rationale for the conclusion of the proposed action(s) on the species and its habitat.

12. Environmental Consequences - Land Birds (Neotropical Migrants)

a. Alternative 1

Neotropical birds that favor dense conditions may benefit for a time from the No-Action Alternative because the dense understories would continue to build within the project area. However, the increased chance of stand replacing fires that would eventually be a result of No-Action Alternative would also lead to the loss and decline of a variety of habitat conditions, including the present dense conditions that benefit some species.

b. Alternatives 2 and 3

Any action that changes or removes vegetation used by one species may benefit another. Species requiring dense cover that have benefited from the dense understories created by the lack of fire could be negatively affected by thinning treatments designed to reduce vegetation density. Due to habitat removal, songbird composition and abundance in treated stands could be reduced in the short term (Janes 2003; Hagar et al. 2001; and Siegel and DeSante, 2003). Harvest treatments would remove hiding cover and nesting habitat for neotropical birds that use older forests. However, untreated riparian buffers, untreated late-successional forest habitat, and 100-acre spotted owl activity centers would continue to provide adequate hiding cover, foraging, and nesting habitat within the analysis area for birds that use older forests. The untreated late successional forests within the project area do not differ measurably from the

similar forests proposed for harvest. The percentage of such habitats proposed for treatment (<10% within the analysis area) leaves more than 90% of such habitat in their current condition. Use of these habitats by land birds would not be expected to change.

Additionally, existing large diameter snags and down wood found in older seral stands would be retained in the project area, and would continue to provide nesting, roosting, or foraging opportunities for species dependent on these key habitat structures.

Some individual birds may be displaced and nests could be destroyed during project activities. However, untreated areas adjacent to the treatment areas would provide refuge and nesting habitat. Some nests may be lost from timber harvest and thinning occurring during active nesting periods. However, the failure or loss of a nest during one nesting season would not be expected to reduce the persistence of any bird species in the analysis area. That is because habitat of all types remains to support the wide diversity of bird species in the area. As >99% of the lands found within the Little Butte Creek Watershed would remain untreated, impacts to these species are anticipated to be negligible at the landscape scale. The loss would not be measurable at the regional scale; therefore, populations in the region would be unaffected; Partners in Flight support the eco-regional scale, as appropriate, for analyzing bird populations (California Partners in Flight, 2002).

Effects to Land birds under Alternative 3 would not be measurably different from those noted in the narrative for Alternative 2.

13. Environmental Consequences - Deer Winter Range and Elk Management Area

Common to all Alternatives:
Mitigation measures are taken to minimize the accessibility of logging roads, skid trails, and yarding corridors to OHVs. These measures may include: construction of tank traps or berms; use of gates; scattering of logging debris; decommissioning of temporary roads. Extensive mitigation measures of these sort were taken in the summer of 2011 in cooperation with Cascade Ranch. While OHV use behind locked gates has been an on-going issue, the BLM continues to take actions to curtail this activity. The BLM, in cooperation with the Cascade Ranch, recently closed about 16 miles of roads/OHV trails in the analysis area and continues to monitor these closures. Large rocks and debris were placed by gates to prohibit OHV entry behind problematic gates in the analysis area. The restriction of access is a challenge in this area due to the checkerboard pattern of private and federal ownership. OHVs can access BLM road systems not by circumventing gates, but across private property and intercepting BLM roads beyond existing barriers. The closure of roads on BLM-administered land and Cascade Ranch land will continue to reduce points of access behind locked gates.

a. Alternative 1

Under Alternative 1, no treatment would take place. Many portions of the analysis area are currently overly dense forest stands which do not provide good forage for deer and elk and, if extremely dense, can impair movement of these animals across the landscape. The continued increase in forest and brush density would impair use of this landscape by deer and elk. The destruction of forest stands by severe forest fire would remove the thermal cover currently provided by this forest to deer and elk. Post-fire early successional vegetative growth can provide improved forage conditions for deer and elk.

b. Alternative 2

Within the Rio Climax analysis area there are 4,122 acres of the Little Butte Big Game Winter Range. The primary impact of the proposed timber harvest in deer winter range would be the reduction in thermal cover effectiveness due to a reduction in canopy closure in the commercial-sized conifer stands. The Medford District RMP ROD recommends maintaining at least 20 percent of designated deer winter range in thermal cover (i.e., conifer/evergreen canopy closure >70%).

Approximately 4,123 acres of the Little Butte Big Game Winter Range within the analysis area are on BLM managed land. Of this total, approximately 3,224 acres currently provide optimal thermal cover (>70% canopy closure). Approximately 201 acres are scheduled for treatment in the Little Butte Big Game Winter Range, and none of these acres would provide the optimal thermal cover effectiveness post-harvest. Post-harvest, this would reduce optimal thermal cover on BLM-managed land to 3,023 acres which is approximately 73 percent of deer winter range on BLM-managed land. This exceeds the current RMP guidance.

Approximately 25% of the Grizzly Peak Elk Management Area also falls within the Rio Climax analysis area. Approximately 1,113 acres of the Grizzly Peak Elk Management Area are on BLM managed land within the analysis area. Of this total, approximately 509 acres currently provide optimal thermal cover (>70% canopy closure). Approximately 101 acres are scheduled for treatment in the Grizzly Peak Elk Management Area, and none of these acres would provide the optimal thermal cover effectiveness post-harvest. Post-harvest, this would reduce optimal thermal cover on BLM-managed land to 408 acres, which is approximately 37 percent of the elk management area on BLM-managed land. While there is no specific RMP requirement for thermal cover in Elk Management Areas, thermal cover is an important consideration for elk management. Thermal cover provides protection from extreme temperatures and thus reduces stress these animals.

Several other factors would mitigate this reduction in thermal cover effectiveness:

(1) Post-harvest most project units (except about 10 acres of disease management and regeneration harvest) will have canopy closures of 40-60 percent. Although not optimal, the thermal cover effectiveness of the stands would still be about 50 percent based on data in Thomas et al. (1979).

(2) The loss in thermal cover effectiveness would not be compounded by vehicular traffic. Approximately 75 percent of the deer winter range and elk management area is in a portion of the analysis area located behind locked gates. The deer and elk in these areas do not have to waste energy in avoidance behavior.

(3) The harvest would probably improve forage conditions in the stands by stimulating the growth and abundance of shrub and herbaceous species.

Additionally, the concept that thermal cover moderated weather conditions, and thus, was important to survival and reproduction in ungulates has recently been challenged (Cook et al., 2004a). Cook et al. (2004) conclude that "the primary benefit attributed to cover is probably not operative across a considerable range of climate, including those in boreal ecosystems of the northeastern U.S., maritime ecosystems of the inland Pacific Northwest, and cold, dry ecosystems of the central Rocky Mountains". This finding indicates that the reduction in thermal cover effectiveness would be of little consequence to wintering deer.

Under Alternative 2, the BLM proposes to maintain about 64.23 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). Approximately 2.75 miles of new road would be constructed under this alternative; however only 0.35 mile of new permanent road construction is located inside of the Elk Management Area and no new permanent roads are located inside of the Deer Winter Range area. The 0.35 mile of new road is located behind year around gated closures; disturbance from timber sale operations would be short-term (<3yrs). There are a number of ways roads affect wildlife in addition to habitat removal. Some of the more common ones are vehicular noise disturbance which affects behavior patterns, increased potential for poaching, increased potential for over hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads. Newly constructed roads would be closed(gated, barricaded, etc) following operations. Road maintenance has the potential to influence wildlife species through noise, but would be of short duration and subject to wildlife seasonal PDFs.

c. Alternative 3

Under Alternative 3, less road construction would take place. This would be beneficial for big game species through minimizing habitat fragmentation and lessening the likelihood of disturbance by vehicular traffic that may occur under Alternative 2. The reduced levels of timber harvest on some units and the elimination of other units as compared to Alternative 2 may reduce the amount of new growth and forage for big game. Thermal cover and hiding cover would remain essentially the same as pre-treatment levels.

14. Cumulative Effects

Cumulative effects analysis of foreseeable state and private actions provide the Service and the Medford BLM an accurate environmental baseline to assess impacts of Federal actions.

The land base in the action area has a checker board pattern of ownership of private land interspersed with BLM lands. A range of management practices occur on private lands from residential home site development to intensive industrial timber management.

In the Biological Opinion for the NWFP (USDA and USDI 1994, Appendix G, 44-45), the Service concluded,

> "Non-Federal landowner compliance with the take prohibition of the [Endangered Species] Act does not assure the maintenance of spotted owl dispersal habitat within Areas of Concern and checkerboard ownership nor provide for improvement of existing populations. Consequently, it is likely that a reduction in dispersal habitat would occur on non-Federal lands in certain areas."

The majority of state and private forests in Washington, Oregon, and Northern California are managed for timber production. Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas et al., 1990; USDA and USDI 1994). Historically, non-Federal landowners practiced even-aged management (clear-cutting) of timber over extensive acreages. Private industrial forest lands are managed for timber production and will typically be harvested between 40 and 60 years of age, in accordance with State Forest Practices Act standards.

In 2008, during the development of the District Analysis and Biological Assessment of Forest Habitat, data was requested from Oregon Department of Forestry and the Pacific Northwest Inventory and Analysis team to help determine harvest rates in the past decade on private lands within the Medford District. These records indicated private harvest rates in Jackson and Josephine Counties have never exceeded 1.08 percent of the total private lands per year since 1998. These records did not provide information of pre-treatment habitat conditions. Some loss of owl habitat on private lands is predicted, but it is not possible to predict the rate of loss, or the specific location of harvest.

The Medford BLM assumes these past management practices will continue and reduce the amount of NRF habitat for spotted owl on non-Federal lands over time. Harvest activities on state and private lands can be expected to impact spotted owls located within adjacent Federal lands by removing and fragmenting habitat and through disturbance activities adjacent to occupied sites during sensitive periods. Under Oregon Forest Practice Rules (629-665-0210), owl nest sites (70-acre core areas) are protected for at least three years following the last year of occupation.

Past harvest activities on Federal land are reflected in current condition discussions in this document. Acres of habitat have been adjusted to reflect these activities. The only planned activity on BLM land in the South Fork Little Butte Creek watershed planned in the reasonably foreseeable future is the Heppsie timber sale. This harvest action would take place within the home range of one known northern spotted owl site. This project is not yet sufficiently delineated to provide a quantifiable summary of foreseeable effects. Some effect to the northern spotted owl site in question is possible.

G. SILVICULTURE

1. Affected Environment

a. Landscape Pattern

The Rio Climax Forest Management Project proposal is located in the Little Butte Creek watershed, which is a tributary to the Rogue River. For purposes of analyzing the affected environment and the proposed project the analysis area for silviculture considers BLM lands within the Upper and Lower Antelope Creek and portions of Lake Creek called sub-watersheds and represent 6th field hydrologic unit codes. The total size of the analysis area is 39,254 acres or 61 square miles. BLM administered lands comprise 14,504 acres within this area (Table 3-17).

The current landscape pattern of the vegetation in the Rio Climax analysis area is a result of topography, fires, wind events, timber harvesting, and forest pathogens. There is a natural diversity of vegetation condition classes[1] within stands and between stands whose patterns and boundaries are generally dictated by soils, aspect, past disturbance, and fire suppression. The present day vegetation pattern across the watershed landscape results from the dynamic processes of nature and human influences over time. As a consequence, the variation and scales of landscape components are innumerable (USDI 1997).

Vegetation disturbance mechanisms (abiotic and biotic) that influence the watershed's forest stand structure are logging, fire, and fire suppression, bark beetles, pathogens, and dwarf mistletoe species associated with Douglas-fir and true fir species (USDI 1997).

Table 3-17. Vegetation Condition Classes – Rio Climax Analysis Area; BLM Lands

Vegetation Condition Class	Acres
Grass, Forbs, Herbaceous	1481
Shrubs, Non-forest Land	116
Hardwood/Woodland	6236
Suitable/Non-Suitable Woodland	314
Early (0-5 years) and Seedlings/Saplings (0-4.9 inches DBH)	885
Poles (5-11 inches DBH)	130
Mid (11-21 inches DBH)	3796
Mature (21+ inches DBH)	1546
Total Acres	14,504
Total Forest Land Acres	6,357

At the stand level, the landscape pattern can be considered coarse-grained. Subtle changes in species composition and stand structure are occurring over the landscape. Many trees with old-growth characteristics are dying as a result of increased competition for limited resources with second growth trees. Douglas-fir (DF) and white fir are replacing ponderosa pine (PP), sugar pine (SP), and incense cedar (IC) because of their more shade-tolerant nature. Douglas-fir and white fir are encroaching into oak woodlands and meadows are slowly shifting to shrub dominated sites. Shade intolerant shrub and hardwood species that once thrived in open canopy conditions are now limited in growing space opportunities and are subjected only to the edges of closed canopy stands. White oak and black oak have dropped out of some conifer stands where light and water have become limited.

Since landscape vegetative patterns are in constant development, current observations of the landscape vegetation are a snapshot at one single point in time. Although current vegetation stem densities are high

[1] Vegetation Condition Class - The BLM Medford District Watershed Analysis Committee designated 8 vegetation condition classes to describe the types of and size of vegetation present on the landscape. The condition classes are as follows: grass and herbaceous vegetation; shrub lands; Hardwood/Woodlands; early seral stage trees (0 to 5 years of age); seedlings/saplings (0 to 4.9 inches DBH); poles (5 to 11 inches DBH); mid (11 to 21 inches DBH); and mature/Old-growth (21 inches DBH and larger trees). (DBH=diameter at breast height)

and are mostly in the mid and mature seral stages, the vegetation condition classes of today are atypical when compared to historical patterns. With or without silvicultural management, the vegetation will continually change because of natural succession. Nature is dynamic, constantly changing, developing, and growing and dying. Species that appeared at an early stage of a site are almost entirely nonexistent in future successional stages. Natural succession is a process where vegetation types and conditions change over time in a given site. The species that initially appear on a site are largely dependent on the seed availability (windblown seed sources, seedbed, serotinous cones, etc.), the type and severity of disturbance that brought the stand into an early seral stage (either following a fire, wind event, harvest, insect infestation, disease, or other disturbance), and other biotic or abiotic factors. Species that once occupied the early seral stage of development in a landscape gap will give way to other species as the landscape further develops.

b. Plant Series and Associations

There are four plant series types in the Rio Climax Analysis Area: Douglas-fir, ponderosa pine, white fir, and white oak (Table 3-18). Plant association (a stand or group of stands made up of plants characterized by a definite floristic composition consisting of uniformity in physiognomy and structure and uniform habitat conditions) descriptions within these series can be found in Preliminary Plant Associations of the Siskiyou Mountain Province (Atzet & Wheeler, 1984) and the Field Guide to the Forested Plant Associations of Southwestern Oregon (USDA 1996). The Preliminary Plant Associations of the Siskiyou Mountain Province can also be applied to segregate other landscapes that exhibit similar recognizable vegetation patterns (Atzet, 2008) as encountered on the landscape in the Southwestern Oregon Cascades.

Table 3-18. Tree Series and Plant Associations Common to Rio Climax Analysis Area

Douglas-fir Series / Plant Associations	Ponderosa Pine Series / Plant Associations	White Fir Series / Plant Associations	White Oak Series/Plant Associations
PSME (Douglas-fir)-ABCO (White Fir)	PIPO–PSME	ABCO/BENE	QUGA (Oregon White Oak)-PSME/RHDI
PSME-PIPO (Ponderosa Pine)	PIPO-QUKE (California Black Oak)	ABCO/Herb	QUGA/CYEC (Hedgehog Dogtail)
PSME-ABCO/HODI (Pacific Ocean Spray)		ABCO/ACGL (Douglas Maple)	
PSME-ABCO/BENE		ABCO-PSME/HODI	
PSME-ABCO/SYMO (Creeping Snowberry)			
PSME/RHDI (Poison Oak)-BEPI (Piper's Oregongrape)			
PSME/RHDI			

Douglas-fir plant associations comprise 50% of forestland in the analysis area. These associations are predominantly found in warm and dry site conditions. Ponderosa pine is commonly found in the drier and warmer Douglas-fir sites, however Douglas-fir dominates the understory component of these associations. These dry forest sites make up 72% of the forestland in the analysis area and include the Ponderosa Pine Series. Of the total acreage from each plant series, almost half of the Douglas-fir Series (43%) are in the stem exclusion stage of forest development. In the stem exclusion stage, overstory trees grow very vigorously at the beginning, actively occupying all available growing space, and vigorously compete with neighbors (Oliver and Larson 1996). Shade intolerant trees such as ponderosa pine and sugar pine struggle to survive against more shade tolerant fir species under increasingly lessening light conditions. Pine and other shade intolerant species become suppressed and eventually are excluded from the stand giving way to a pure or nearly pure fir forest. Without disturbances to release growing space, shade intolerant species such as pine continue to decline in number, reducing stand-level species diversity. This is evident in the core samples taken from ponderosa pine in the analysis area.

In acreage, PIPO/QUKE plant association is the largest represented forest land plant association in the analysis area at 30%. According to the Field Guide to the Forested Plant Associations of Southwestern

Oregon (USDA 1996), this Association is slightly cooler and drier than the Ponderosa Pine-Douglas-fir Association, with covers of Douglas-fir less than 3 percent in the overstory and understory. California black oak is frequently present with covers usually greater than 15 percent. The highest showing in acreage in the Douglas-fir Series is the PSME-ABCO/HODI plant association group. This association is moderately dry with a high percentage of total herb cover; Douglas-fir performs better while white fir exhibits transpirational stress and reduced growth; ponderosa pine and sugar pine perform well. (Atzet and Wheeler, 1984).

c. Forest Stand Condition and Fire Hazard

Approximately 4,434 acres of forestland were initially reviewed for commercial treatment in the Rio Climax analysis area. Grasslands, shrublands, and woodlands comprise 56 percent of the total analysis area. Some of the forest lands within the analysis area have been previously harvested and most commercial forest stands originated between 1800 and 1900. The historical fire cycle in southwest Oregon's low elevation mixed conifer forests occurred every 20 years or less. As a result of fire suppression, the analysis area has missed about five fire cycles over the last 100 years (USDI 1997). The absence of fire has converted open savannahs and grasslands to hardwood woodlands and initiated the recruitment of conifers. As hardwoods and shrubs encroach into open savannahs and grasslands, over time, shade tolerant conifers begin proliferating through the understory converting the site to a mixed hardwood/conifer woodland condition. As a result, Oregon white oak is now a declining species largely due to fire suppression and encroachment by Douglas-fir and white fir on most sites (USDI 1997). These sites generally do not support shade tolerant conifers in terms of stocking densities, soil composition, moisture, and aspect.

Douglas-fir and white fir, therefore, do not grow to normal size, form, and vigor. Conversions from pine to fir are also evident and occur in the same sequence as the conversion from hardwoods to conifers. The conversion from pine to fir has created stands that are stressed. These non-vigorous conifers become susceptible to insect and disease mortality or prematurely die off due to overstocked conditions. aThe absence of fire due to suppression efforts has changed the make-up of the local forests to fire-intolerant, shade-tolerant conifers and has decreased species such as ponderosa pine and sugar pine (USDI 1997).

Competition in a stand has been directly correlated with stand density. The more stems (i.e., plants) that exist per acre on a site, the fewer resources are available per stem to sustain it. Each stem draws water and nutrients from the soil and occupies a place in the stand that captures sunlight. Absent disturbance, such as, resulting from fire suppression, these sites become occupied by shade tolerant species capable of outlasting their shade intolerant neighbor trees. Various scientific methods have been developed over the decades that can predict or identify a threshold when a forest stand will decline in production and health due to factors such as competition. Relative Density Index (RDI: the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume) and the Waring Tree Vigor Index are two such measures of both stand and tree level health and productivity.

Undisturbed populations eventually compete for growing space and gradually thin the population as individuals die in a self-thinning process (Barbour, et al., 1987). Drew and Flewelling (1979) concluded that the correlative density index rating of 0.55 for any given stand marks the initial point of imminent mortality and suppression. A productive forest stand absent of natural or human density control will continue growing until it reaches a condition where the vegetation in the stand occupies all the available growing space. The aftermath results in widespread competition and declining productivity as evident in dense stem exclusion stands. A decrease in stand vigor is expected and considered forthcoming with continued overstocking and increasing stand age. All of the forested stands in the Rio Climax analysis area inventoried have relative density indices between 0.662 and 1.00, which bounds the zone of imminent competition-mortality (Drew & Flewelling, 1979).

Currently, the relative densities of stands throughout the analysis area are high. This is primarily due to the lack of natural or manmade disturbance. The overall average relative density for forested stands in the

Rio Climax analysis area inventoried is 0.825,indicating that physiologically, the trees have entered the zone of imminent competition induced suppression and mortality.

Higher tree densities and increased ground fuels in stands have escalated the threat of stand replacing crown fires, which were historically rare (USDI 1997). The absence of fire due to suppression efforts has changed the forest composition from a fire dependent ecosystem to a densely forested fire intolerant condition. Shade-tolerant conifers have decreased the numbers of ponderosa pine, Oregon white oak, and sugar pine. The absence of disturbance has altered the structural complexity, health, and fire resiliency of the forest. Throughout southwestern Oregon and most of the western United States, fire is no longer a natural agent of ecosystem stability as it now creates major shifts in forest structure and function.

The current fire regime has transitioned from low to high severity (USDI 1997). The low severity fire regime historically prevalent in the analysis area was one of frequent (1-20 years) and widespread fires resulting from the hot, dry summers (USDI 1997). These frequent fires favored ponderosa pine as a dominant species and white fir as the least dominant. Without disturbance, Douglas-fir now dominates most sites with a higher tolerance to shade and understory competition than pine species. These long-lived shade tolerant species accumulate to abnormally high densities and, together with an increase of dead material, can easily transmit fire to the upper canopies. Of the forestland acreage of vegetation series exhibited in the analysis area, stands in the Douglas-fir Series comprised 50 percent compared to stands in the Ponderosa Pine Series at 48 percent (2 percent in the White Fir Series). A lack of disturbance, either natural or human caused, alters the vegetation condition of the forest.

Frequent fires prevent fuel from accumulating and prepare a seedbed favorable for perpetuating pine species (Waring & Schlesinger, 1985). High severity fire regimes on the other hand, exhibit infrequent, intense, large, stand-replacing fires that denude entire forests. These occur when tree densities and surface and ladder fuels build up to a level where fire resiliency is compromised and the entire stand is threatened by intensified burning conditions.

Most burned areas in the analysis area have regenerated. Most of the forest stands became established within 10 years after a fire, although some sites may have taken 30 to 40 years to become forested. The vegetation condition within the total analysis area comprises 45% hardwood/woodland, 10% grassland, 1% shrubland. Plantations comprise 3 percent of the analysis area (444 acres). Plantations are not considered commercial or natural stands and are not targeted for treatment with this proposal. The oldest trees sampled in the analysis area were 295 (PP) and 220 (DF) years-old. Average age of the trees sampled was 125 years old for the analysis area. Individual sample trees greater than 150 years old made up 15 percent of the total 233 tree sample.

The average canopy cover for sampled stands in the Rio Climax analysis area is 96 percent and ranges from 69 to 100 percent (ORGANON). Some forested stands have been selectively logged, underburned by fire, commercially thinned, or have suffered mortality from natural processes. These stands tend to be more diverse in species composition and vertical structure as a result of disturbance. The silvicultural activities proposed resemble natural disturbances that are inherent to forests in which the forest canopy is reduced. Such a modification is similar to a moderate forest ecosystem disturbance regime (Oliver & Larson, 1996; Waring & Schlesinger, 1985) such as moderate and frequent fires and moderate insect and disease-induced mortality pockets.

Older stands or patches of older trees are in the understory reinitiation stage of forest development and vertical stand structure is diverse. In the understory reinitiation stage, natural mortality to the overstory creates canopy openings. Structural complexity begins to develop as new conifers, hardwoods, shrubs and forbs establish in these openings (Oliver and Larson, 1996). Natural mortality is a result of openings in the forest canopy caused by Douglas-fir dwarf mistletoe, root diseases, branch abrasion, and windthrow. The understory of these stands consists of dense pockets of conifer regeneration and shrubs. Regeneration ranges from seedling to small pole size trees, with many of these suppressed. These stands would benefit from pre-commercial thinning.

d. Tree Vigor

Waring and others (1980) developed a vigor rating using a physiological index of growth efficiency. The Waring Tree Vigor Index is a measure of health defined as the ratio of annual growth of stemwood to the area of leaves present to capture sunlight (Waring et al., 1980). The vigor ratings can be accurately applied to individual trees and are comparable among conifers (Larsson et al., 1983; Waring ,2007). Vigorous trees have higher levels of productivity and increased incremental growth. Trees with high ratios of live crown will have more photosynthetic surface area and thus more photosynthetic capacity, subsequently increasing carbohydrate production for storage, seed production, and stem wood growth. Vigorous trees can also fight off beetle attacks with greater success. Waring and Pitman (1985) concluded that trees attacked and killed by bark beetles had such low carbohydrate reserves that they lacked the ability to produce sufficient oleoresins which protect the tree against beetles.

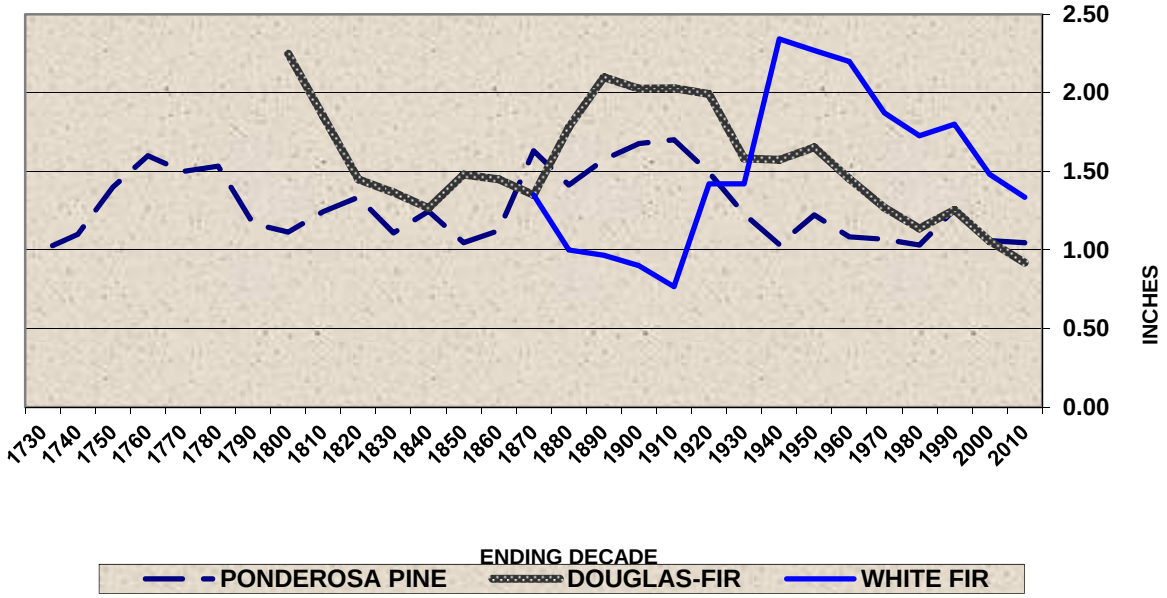
Vigor rating index numbers are calculations of stem growth per unit of leaf area expressed as grams of stem growth per meter squared per year ($g/m^2/yr$). Trees with vigor ratings below 30 ($g/m^2/yr$) will succumb to attack from bark beetles of relatively low intensity. Trees with vigor from 30-70 can withstand progressively higher attacks but are still in danger of mortality from infestation. Trees with a vigor rating of 70-100 can generally survive one or more years of relatively heavy attacks and trees with ratings above 100 cannot be killed by bark beetles (Christiansen et al., 1987; Waring & Pitman, 1985).

For all inventory stands, sample cores were taken from 233 trees representing all vegetation condition classes, major conifer species, and plant association groups across the analysis area. Each core was measured to determine individual tree age and growth rates. Individual tree vigor of Douglas-fir and ponderosa pine were also determined from these measurements. Vigor ratings were derived using the Waring Tree Vigor Index and growth rates were tabulated by decade. Figure 3-2 illustrates the 10-year growth rate of all 233 sample trees, combining Douglas-fir, white fir, and ponderosa pine, spanning a period from the year 1730 to 2010.

Pine species in the analysis area are becoming scarce. Stands in the analysis area that were identified as Pine and Douglas-fir plant associations, where pine are naturally encountered, shade tolerant species are encroaching and successfully competing against the pine for soil nutrients, water, and growing space. White fir and Douglas-fir continually advance into the shaded forest floor, occupying the growing space in the understory, and excluding the shade intolerant pine from naturally regenerating. Pine species currently exhibit poor vigor and their individual tree growth rates are declining.

Core measurements were taken from 76 ponderosa pine sample trees representing all vegetation condition classes. The current average relative density index for ponderosa pine stands is 0.823. At this density, pine stands exhibit reduced growth, crown decline, and competition-induced mortality. The current average ponderosa pine tree vigor rating is 18.47 g of annual wood production per square meter of foliage. The 10-year incremental growth data for ponderosa pine reveals a current rate of 1.05 inches per decade (Figure 3-2). The data indicates that, based on Waring's vigor rating indices, last decade's growth rate, and relative density indices, ponderosa pine survival in the analysis area is threatened. Ponderosa pine species in the analysis area are growing at a rate that leaves them prone to and at increased risk of bark beetle attack. Regarding tree vigor in general, a vigor index of 19.53 grams of stem growth per meter squared per year ($g/m^2/yr$) is very low.

Figure 3-2. Species Relationship of 10-Year Incremental Diameter Growth



e. Pathogens and Insects

Most conifers have an associated bark beetle that is capable of killing the tree under the right conditions (The Southwest Oregon Forest Insect and Disease Service Center). The bark beetles successfully colonize live trees when their host is under some form of physiological stress. Dolph (1985) found that bark beetle attack occurred in unmanaged stands when trees grew a slow 20 or more annual rings per inch (less than or equal to one inch diameter growth per decade). Entomologists and Silviculturists have found that at least 1.5 inches of tree diameter growth per decade decreases the risk of bark beetle attack (Cochran 1992; Chadwick and Eglitis, 2007; USDA 1998).

Pine bark beetles are initially attracted to pines that are under stress. Once a stressed tree has been successfully invaded, pheromones emitted by invading beetles attract additional beetles to the same tree, overpowering its defenses. A vigorous tree is able to eject invading beetles with its pitch; a tree under stress has a reduced capability of responding to the invasion. As a general rule, stands where growth rates are greater than or equal to 1.5 inches of diameter growth per decade or with less than 150 square feet of basal area[2] per acre are less prone to pine bark beetle attack. Stands on south and east aspects below 3,500 foot elevations are particularly vulnerable when their densities are high (USDA 1998).

Western pine beetle (*Dendroctonus brevicomis)* is attacking ponderosa pine in the analysis area, particularly in Unit #35-7. According to DeMars and Roettgering (1982), western pine beetles "breed in and kill scattered, overmature, slow-growing, decadent, or diseased trees and trees weakened by stand stagnation, lightning, fire, or mechanical injury." The beetles can aggressively attack and kill ponderosa pine of all ages and vigor classes, including vigorous host trees from 6 inches in diameter and larger. Group mortality can occur in dense overstocked stands or in dense pockets within a stand. Extensive mortality adversely affects distribution of trees and stocking level, depletes timber supplies, and increases fuel loading which can lead to catastrophic fires. DeMars and Roettgering describe tree resistance as one of the biotic conditions affecting outbreaks and beetle caused mortality. Vigorous trees produce sufficient oleoresins to expel beetles from their boring chambers inhibiting larval and fungal development. They suggest that prevention is the preferred method of control. "By maintaining thrifty, vigorous trees or stands that do not afford a suitable food supply for the beetle", land managers can prevent susceptibility of hosts to insect damage.

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[2] Basal Area - a) Of a tree: the cross-sectional area, expressed in square feet, of a tree stem measured at breast height. b) Of a forest stand: the total cross-sectional area of all the trees in a stand, measured at breast height, expressed in square feet per acre. Measurement of how much of a site is occupied by trees; directly related to stand volume and density.

The susceptibility of trees to damage by bark beetles can be mitigated by stocking control which is tied closely together with tree vigor (Larson, et al.,1983). Stocking control increases growing space, water and nutrient availability, sunlight penetration, and photosynthesis rates. Altogether, site disturbance such as fire and thinning improves tree vigor. Trees with vigor ratings above 70 can emit sufficient oleoresins to repel invading beetles and survive even relatively heavy insect attacks. Beetle infestations are occurring in the analysis area and causing mortality in small pockets. Although there is not a current widespread beetle infestation, treatments are designed to improve the vigor of trees to withstand potential outbreaks. Treatments primarily bring the vigor of ponderosa pine to a level where they can withstand attacks of any intensity in order to ensure the survival and perpetuation of pine in the analysis area. DeMars and Roettgering (1982) recommend that "reducing stand stocking to 55 to 70 percent of the basal area needed for full site utilization will relieve the competitive stress among the remaining trees, improve their vigor, and make them less prone to successful bark beetle attack."

Waring and Schlesinger (1985) establish that a reduction in canopy leaf area following a disturbance such as a silvicultural system, fire, insect, or disease induced mortality increases the penetration of radiation and precipitation to the forest floor thereby increasing soil temperature and available water supply. The overall rate of decomposition in a forest ecosystem is largely determined by temperature and moisture with temperature of primary importance; increasing the soil temperature and moisture stimulates microbial activity and mineralization (Waring & Schlesinger, 1985). As forests recover, nutrient and water uptake per unit of leaf area increases as well as the rate of wood production per unit of leaf area.

Since stands are dynamic, conditions will change over time as individual trees continue to compete for growing space. In the last decade the average diameter growth in the Rio Climax analysis area for all combined species was 0.98 inches/decade. As a general rule, stands with growth rates equal to or greater than 1.5 inches of diameter growth per decade are less prone to bark beetle attack (USDA 1998). By species, the average diameter growth for ponderosa pine was 1.05 in the last decade. This growth rate falls short of the 1.5 inches of diameter growth per decade required to withstand bark beetle attack.

In addition, the growth trend over the last 20 years for all sampled species exhibits a declining curve (Figure 3-2). Since 1990, all three species (Douglas-fir, ponderosa pine, and white fir) in the analysis area have been declining. If all influencing variables, that is, temperature, precipitation, soils, elevation, and densities, remain constant or worsen in terms of optimal forest productivity, diameter growth within the analysis area will continue to decline.

Douglas-fir tree core samples were taken from 146 trees representing all vegetation condition classes in the Douglas-fir Series and all plant association groups. The average tree vigor index, as measured by leaf area index (g of annual wood production per square meter of foliage) is 37.10 for Douglas-fir (compared to 18.47 for ponderosa pine) and the average growth last decade was 0.92 inches. Trees with vigor from 30-70 can withstand progressively higher attacks but are still in danger of mortality from infestation (Christiansen et al., 1987; Waring & Pitman, 1985). Based on Waring's vigor rating index, the data indicates that Douglas-fir in the analysis area can withstand progressively higher attacks but are still in danger of mortality from infestation. In addition, the 10-year diameter growth of 0.92 average inches in the last decade indicates that Douglas-fir is predisposed to bark beetle attack.

Western dwarf mistletoe (*Arceuthobium campylopodum*) and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) infections is widespread throughout the analysis area. Infections are usually systemic and form bunched globose growths of branches called "witches' brooms". These brooms, occurring mostly in the lower third of the tree canopy, are produced by local physiological changes induced by the parasite to get the tree to transport food to the mistletoe. Heavy infections result in growth loss, wood quality reduction, top-killing, and mortality. Food needed for healthy tree growth becomes diverted to the brooms significantly draining the host (Hull & Leonard, 1964). Although the spread of the infection is slow, infected trees lose vigor and become increasingly susceptible to other infectious diseases and insect attack. Weakened trees emit a different chemical signature than a healthy tree. Bark beetles consequently are drawn to trees in a weakened state and eventually finish off the infected tree.

Forest pathogens and subsequent beetle kill contribute to changing the forest stand structure and forest development pattern by creating openings of varied sizes and allowing light to reach the forest floor and the understory reinitiation stage to begin. If disease susceptible trees continue to recolonize infected sites, they too will become infected. The likelihood of infected trees to attain large sizes will be low and the pathogen will survive on the site unless immune species occupy the mortality gaps – an unlikely scenario without management intervention.

f. Coarse Woody Material

Measurements of coarse woody material for sampled stands in the Rio Climax analysis area totaled 16,800 feet of transect line. The average amount of coarse woody material (CWM) equaled 6.9 tons per acre. CWM ranged from 2.0 to 11.9 tons per acre. The coarse woody material stems were mostly concentrated in the 4-7 and 8-11 inch classes at the large end, although some sites contained pieces between 44+ inches large end diameter. The average total length per acre equaled 1225.7 feet. Coarse woody material was distributed across all decay classes, although decomposition classes 3 (twigs and branches gone but bole is still round, hard and in large pieces) and 4 (losing form) were most common.

2. Environmental Consequences

a. Alternative 1

Alternative 1 (No-Action) would allow forest stands to remain at the overall average of 0.825 relative density index, allowing density dependent mortality to occur and leaving forested stands more susceptible to insect and disease agents. Stand densities would continue on their current trajectory of stand development and remain overpopulated. A relative density index rating of 0.55 for any given stand marks the point of imminent mortality and suppression (Drew and Flewelling, 1979).

The current average relative density for the area indicates that physiologically the trees have entered the zone of imminent suppression and mortality. No action would allow forest stands to remain overstocked and individual tree vigor and growth would remain poor. Tree mortality represents a reduction in stand volume production, a loss of revenue, and poor forest health.

Douglas-fir dwarf mistletoe is found throughout the analysis area and cases of true fir dwarf mistletoe occur in the southern portion of the analysis area. Its presence contributed greatly to the stand replacing extreme fire behavior still evident in the East Antelope Fire of 2002. No action would allow the unchecked spread of disease to continue on the sites. Diseases such as true fir mistletoe and Douglas-fir dwarf mistletoe would persist and perpetuate the infection cycle on sites currently infected. These forest pathogens create openings of varied sizes allowing light to reach the forest floor and the understory reinitiation stage to begin. However, in the analysis area, disease-susceptible trees continue to recolonize these sites. The regeneration becomes infected and their likelihood of attaining large sizes would be low. The pathogen would survive on the site unless immune species occupy the gaps.

Without action, forest structure and species composition could not be controlled. On pine sites, that require at least 25% full sunlight, shade tolerant white fir and Douglas-fir would continue to encroach and stands would remain in the stem exclusion stage of development in the absence of disturbance. Out of all 76 ponderosa pine sampled, the current average ponderosa pine tree vigor rating is 18.47 grams of annual wood production per square meter of foliage. Trees with vigor ratings below 30 ($g/m^2/yr$) would succumb to attack from bark beetles of relatively low intensity (Christiansen et al., 1987; Waring and Pitman, 1985). The 10-year incremental growth data for ponderosa pine reveals a current rate of 1.05 inches per decade. As a general rule, stands where growth rates are greater than or equal to 1.5 inches of diameter growth per decade are less prone to pine bark beetle attack (USDA 1998). The current average relative density index for ponderosa pine stands is 0.823. Relative density indices between 0.55 and 1.00, bounds the zone of imminent competition-mortality (Drew and Flewelling, 1979). The data indicates that, based on Waring's vigor rating indices, last decade's growth rate, and relative density indices, ponderosa pine survival in the analysis area is threatened.

Because shade tolerant species (Douglas-fir and white fir) are growing on sites better suited to early seral species (ponderosa pine, oaks), the shade tolerant species exhibit poor vigor and requiring more moisture than the site can deliver, become easily stressed and succumb to density mortality or beetle kill. The average vigor rating index for Douglas-fir was 37.10 indicating that Douglas-fir is in danger of mortality from a beetle attack. A relative density index of 0.827 in Douglas-fir stands further indicates that Douglas-fir stands are exhibiting tree to tree competition and, rating above 0.55, are within the zone of competition induced mortality.

Without management action, individual trees including old-growth ponderosa pine, old-growth sugar pine, and old-growth Douglas-fir trees, with seedlings through poles within their dripline, would continue to die from competition for water. Thinning would bring stands out of the stem exclusion or closed-canopy stage and accelerate the development of conditions found in late seral forests (Hayes et al., 1997). Trees should develop large crowns, large diameter limbs, and deep fissures in the bark. Maguire, et al. (1991) found that large branches develop only on widely spaces trees or on trees adjacent to gaps or openings. Deep fissures in the bark are characteristic of large diameter Douglas-fir trees in old growth stands.

Shade intolerant pine and oak species would continue to decline in number from competition with encroaching shade tolerant white fir and Douglas-fir. Leaf area index would decline as live tree crowns decrease in size from tree competition. With large tree mortality, forest stand structure would gradually shift to the understory reinitiation stage. This is a transition phase when trees in the main canopy layer start to die, either singly or in small groups, from root diseases, lightning, wind-throw, and insects. This is ecologically significant in that resources previously used by the dead tree are reallocated to the surviving vegetation. These small diameter trees, instead of dying out, would continue developing into a dense unhealthy forest structure prone to a perpetual cycle of root disease infection, catastrophic fire, and eventual dieback from intense competition.

The relative densities also present a high fuel hazard across the landscape. The Medford District RMP describes the Forest Condition (Forest Health) Restoration Objective that requires management emphasis on treatments and harvests that restore stand condition and ecosystem productivity. It directs management actions to include density management and understory reduction operations that reduce competition, increased use of understory prescribed fire, and fertilization (USDI 1995). No action contradicts the Medford District Resource Management Plan forest condition objectives in regard to forest health.

Fire suppression has altered landscape structural densities and species composition. Without any form of density control, including the crown bulk density of older stands that contribute to stand replacing fires, slow tree growth and poor vigor would result in individual tree and stand mortality. A decrease in stand vigor is expected with continued overstocking and increasing stand age. In regard to species and biological diversity, forested stands in the analysis area have become predisposed to stand replacing fires and insect and disease epidemics. When left undisturbed, stands continue to grow and produce new seedlings, although in unhealthy and dense conditions. Douglas-fir, a shade tolerant species continues to occupy densely populated and thus shaded sites, even sites that previously saw far less numbers of Douglas-fir than exist today.

The amount of Douglas-fir dwarf mistletoe present in Southwest Oregon is at unprecedented levels (Goheen, 2010). This is due to a century of fire suppression on forestlands. Wildfires have functioned as a natural tool for thinning out the understories and removing dense pockets of forest. Without this tool, Douglas-fir has seen a sharp increase in numbers. The increase of Douglas-fir in southern Oregon coincides with the increased levels of dwarf mistletoe seen today. Without the cleansing effect of fire to densities of Douglas-fir seedlings, the pathogen is consequently perpetuating on the infected sites and spreading into previously uninfected stands.

Dense stands heighten tree to tree competition. Growing conditions become so stagnant (at or above stand density index of 0.55) that intense competition follows and the stand begins excluding the weakest trees. During competition trees commit their energy sources for survival above their competing neighbors. This exhaustive effort predisposes a tree to damage or mortality by incoming insects and diseases. In severe cases, entire stands are completely decimated by dwarf mistletoe, insects, and/or fire. Future silvicultural options diminish when severe stand mortality results. On the other hand, hardwoods, shrubs, and forbs species would become more abundant and provide forage and hiding cover for big game animals and habitat for species preferring these habitat types.

Pine species would continue to decrease in number if openings are not created for these shade intolerant species. The more shade tolerant Douglas-fir and white fir would continue to encroach into the forest and species diversity would decline.

Where dense forest stands persist overtime, canopy cover would remain at 69 to 100 percent. When tree mortality is singular or in small patches, canopy cover may approach 40 to 70 percent. In pockets of mortality, canopy cover would range from 0 to 40 percent. Without controlling the relative densities, some forest stands would naturally fall below 60 percent canopy cover. Fire hazard would increase with the abundance of dead vegetation and ladder fuels, and would be at maximum levels.

b. Alternative 2

The silvicultural objectives for harvest are as follows: 1) Reduce stand density to increase tree growth, quality, and vigor of the remaining trees; 2) Create diversified stand structure (height, age, and diameter classes) and old-growth stand characteristics; 3) Increase growing space and decrease competition for large or legacy pine, oak, and cedar. (preserve existing genotypes which are physiologically better adapted to fire disturbance).

Trees would be marked for thinning within proposed treatment units by BLM personnel, with oversight from the Ashland Resource Area's silviculturist and wildlife biologist, to ensure that treatment units are marked according to the silvicultural prescriptions.

SELECTIVE THINNING (ST)

Northern Spotted Owl Nesting, Roosting, Foraging Habitat (NRF)

Select forest stands (Table 2-2) that are currently providing for northern spotted owl nesting, roosting, and foraging habitat would be thinned to maintain and in some cases promote NRF habitat function. The complex forest structure that forms NRF habitat consists of dead down wood, snags, dense canopy, multi-storied stands, or mid-canopy habitat. However, southwest Oregon NRF habitat varies greatly and one or more of these habitat components might be lacking or even absent. Vegetative features of NRF habitat in southwest Oregon are typified by mixed-conifer habitat, recurrent fire history, and patchy habitat components. The silvicultural strategy here includes the use of selective thinning.

Selective thinning in NRF habitat is designed to accelerate the growth of large trees while maintaining a minimum of 60 percent canopy cover at the stand level. Canopy cover is the proportion of the forest floor covered by the vertical projection of tree crowns. Canopy cover is usually estimated with devices like the moosehorn, aerial photography, or remote imagery. Spacing of the residual (leave) trees would involve crown spacing off the healthiest dominant and co-dominant trees to achieve an average crown spacing range of 1-6 ft. (dripline to dripline) at the stand level. Trees targeted for removal should include those with crown ratios less than 30%, exhibit crown decline, narrow crown widths, and contribute least to the canopy layer. Trees would be individually selected for removal that demonstrate these characteristics, unless it compromises the required minimum canopy cover of 60%. Spacing of the residual trees would use the crown widths of the healthiest dominant and co-dominant trees to achieve an average relative density range of 0.35 to 0.55 (35 to 55%).

Northern Spotted Owl Dispersal Habitat (DSP)
Forest stands that are currently providing for northern spotted owl dispersal only habitat would be thinned to retain approximately 40 percent canopy cover to maintain the current distribution of dispersal habitat. Dispersal habitat is described as forested habitat greater than 40 years old with an average tree diameter of 11 inches, a canopy cover of about 40 percent or more, and flying space for owls in the understory.

Stands in DSP habitat that meet the above criteria would be selectively thinned to accelerate the growth of large trees while maintaining approximately 40 percent canopy cover at the stand level. Spacing of the residual (leave) trees would involve crown spacing off the healthiest dominant and co-dominant trees to achieve an average crown spacing range of 3-15 ft. (dripline to dripline)at the stand level. Trees targeted for removal should include those with crown ratios less than 30%, exhibit crown decline, narrow crown widths, and contribute least to the canopy layer. Trees would be individually selected for removal that demonstrate these characteristics, unless it compromises the required minimum canopy cover of 40%. Spacing of the residual trees would use the crown widths of the healthiest dominant and co-dominant trees to achieve an average relative density range of 0.25 to 0.45 (25 to 45%).

DENSITY MANAGEMENT (DM)

The primary objective of Density Management thinning is to improve tree vigor and growth for long-term forest production and to reduce the impacts of forest disease. Silvicultural prescriptions are based on site conditions that dictate forest types such as pine site, dry Douglas-fir, and mixed conifer. The silvicultural strategy here includes the use of density management.

This prescription is typically prescribed for uneven-aged stands for the primary purpose of widening the spacing of residual trees in order to promote the growth and structural development of the remaining stand. Many of these stands developed in conjunction with disturbance (fire, insects, harvest, etc.) and have several layers containing multiple species.

Spacing of the residual trees would use the basal area of the healthiest dominant and co-dominant trees to achieve an average relative density of 0.25 to 0.45 (25 to 45%). Basal area is the cross sectional area of all stems (measured at diameter breast height) per unit of measure.

***Pine Site Thinning*:** These stands may have developed a substantial component of Douglas-fir as a result of fire exclusion and stands have become overstocked with all condition classes of vegetation. These are areas with southerly or easterly aspects and shallow soils where pine species are best adapted. They are typically small in size and found on dry ridges and low elevations with Douglas-fir mortality occurring. The goal on these sites is the retention of existing large ponderosa pine and the subsequent development of young pine. The treatments would leave the best, healthiest pine and remove the majority of Douglas-fir trees to allow the pine to once again dominate the site.

- Leave 60-100 ft^2 basal area per acre of the largest healthiest species.
- Reduce competing vegetation from around healthy pines, oak, and incense cedar to ensure their survival.
- Protect exceptional hardwoods (oak trees 10 inches DBH and larger, madrone trees 16 inches DBH and larger with full live crown ratios of 30% or greater).
- Leave all codominant and dominant pine, cedar, and oak; suppressed individuals can be cut.

***Dry Douglas-fir Thinning*:** Dry Douglas-fir stands are typically found on west, southwest, east, and southeast aspects in Douglas-fir plant associations. Douglas-fir is the predominant conifer species and ponderosa pine is often present in the stands. Treatments proposed for these sites would be thinned to a basal area range of 80 to 120 ft^2(average 100) per acre. The larger healthier trees would be favored as leave trees. On dry ridges and sites in the "Douglas-fir - Poison oak" plant association, especially where manzanita is found, trees would be thinned to retain no more than 80 ft^2 basal area per acre.

***Mixed Conifer Thinning*:** These stands are comprised of a mix of tree species including Douglas fir, ponderosa pine, sugar pine, incense cedar, and white fir. Thinning objectives for mixed conifer stands are to improve tree vigor and growth, maintain a larger proportion of Douglas-fir species while maintaining the highest diversity of mixed conifer species for the stand. Treatments proposed for these sites would be thinned to a basal area range of 100 to140 ft^2 (average 120) per acre. Species composition of the forest must be considered as well as individual tree physiology. A minimum of 20 percent early seral species should be maintained in the mixed conifer forest stands as described by Franklin and Dyrness (1973). Therefore, selection of treatment trees would be based on 1) species; 2) tree dominance; 3) age class or diameter; and 4) individual tree characteristics. Suitable sugar pine, Douglas-fir, incense cedar, and ponderosa pine (disease free, non-chlorotic, sugar pine, Douglas-fir, incense cedar, and ponderosa pine with crown ratios ≥ 30%) would be favored for leave over white fir.

Disease Management

A single tree selection method is prescribed to salvage dead and dying trees and favor healthy pine and Douglas-fir overstory trees. Trees showing mistletoe infection and have live crown ratios below 30 percent would be selected for cut. These sites are exhibiting a deteriorating stand condition and are not currently providing a forest canopy greater than 40% canopy cover.

The Medford District RMP (USDI 1995) instructs "design silvicultural treatments so that within-stand endemic levels do not increase". The presence of mistletoe requires a variation in prescriptions with stand conditions in these areas requiring lower than 40% canopy cover (USDI 1995). This prescription applies to stands or parts of stands that already exhibit less than 40% canopy due to disease mortality. These stands exhibiting a deteriorating stand condition due to disease would be harvested leaving a residual overstory of 6-8 overstory TPA ≥ 20 inches dbh or the largest available diameters.

Effects of Management on Stand Growth and Vigor

Stands were modeled in a growth and yield modeling system called ORGANON (Hann, 1992). Developed at Oregon State University, College of Forestry, the model predicts forest growth outputs based on scientific formulas programmed into it. The Southwest Oregon variant was used to model stands in the Rio Climax Analysis Area. Results of predicted outputs can be viewed in Table 3-19. Similar stands of each vegetation type were studied to develop the prescriptions. Currently, the relative densities of stands throughout the analysis area are high. This is primarily due to the lack of large-scale natural disturbance, fire suppression, and lack of silvicultural treatments. Table 3-19 shows the growth of a pole conifer stand (5 to 11 inches DBH), mid-size conifer stands (11 to 21 inches DBH) and mature conifer stands (21+ inches DBH) with and without management intervention.

Table 3-19. ORGANON Modeled Stands; Thinned vs. Un-thinned and 20 Year Growth

UNIT # POLES MID MATURE	STAND AGE	CURRENT BA/AC (FT^2)	CURRENT TREES PER ACRE	CURRENT 10-YEAR INCREMENT (INCHES)	CURRENT RDI	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 20 YEARS UNTHINNED	PROJECTED RDI IN 20 YEARS THINNED
POLES								
124459**†	120	176	489	0.90	0.662	0.303	0.655	0.333
MID								
124458+†	137	217	862	0.60	0.875	0.342	0.762	0.359
120131**†	168	248	950	0.70	0.995	0.307	0.889	0.328
122794‡	131	235	351	0.80	0.781	0.382	0.809	0.439
120156** ✠	150	238	489	1.30	0.843	0.448	0.879	0.511
122076** ⌖	129	220	519	1.20	0.832	0.534	0.759	0.542
124011** ⌖	118	256	203	1.10	0.751	0.501	0.735	0.517
124012+⌖	139	298	671	1.10	1.000	0.536	0.989	0.587
120156+✠	137	239	552	0.70	0.865	0.346	0.769	0.368
MATURE								
122055+†	172	181	1003	1.10	0.782	0.309	0.827	0.331
122052+⌖	125	232	241	0.60	0.719	0.512	0.735	0.545

UNIT # POLES MID MATURE	STAND AGE	CURRENT BA/AC (FT^2)	CURRENT TREES PER ACRE	CURRENT 10-YEAR INCREMENT (INCHES)	CURRENT RDI	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 20 YEARS UNTHINNED	PROJECTED RDI IN 20 YEARS THINNED
124077‡✦	103	322	233	2.00	0.755	0.483	0.799	0.539
120156A‡	128	222	407	0.70	0.768	0.313	0.822	0.410
122321+✦	141	289	225	1.10	0.845	0.545	0.861	0.578
120333‡✦	115	327	200	1.10	0.913	0.532	0.927	0.570

✦ NRF PRESCRIPTION
⊠ DISPERSAL PRESCRIPTION
+ DF PAG (DRY DF SITE)
** PP PAG (PINE SITE)
‡ DF PAG (MIXED CONIFER SITE)
† UNIT DROPPED FROM COMMERCIAL TREATMENT

Table 3-20 displays the difference between no action and a treatment that maintains on average 60% canopy cover. No action exhibits tree loss through competition mortality versus trees removed and utilized through timber harvesting under a science-based silvicultural prescription.

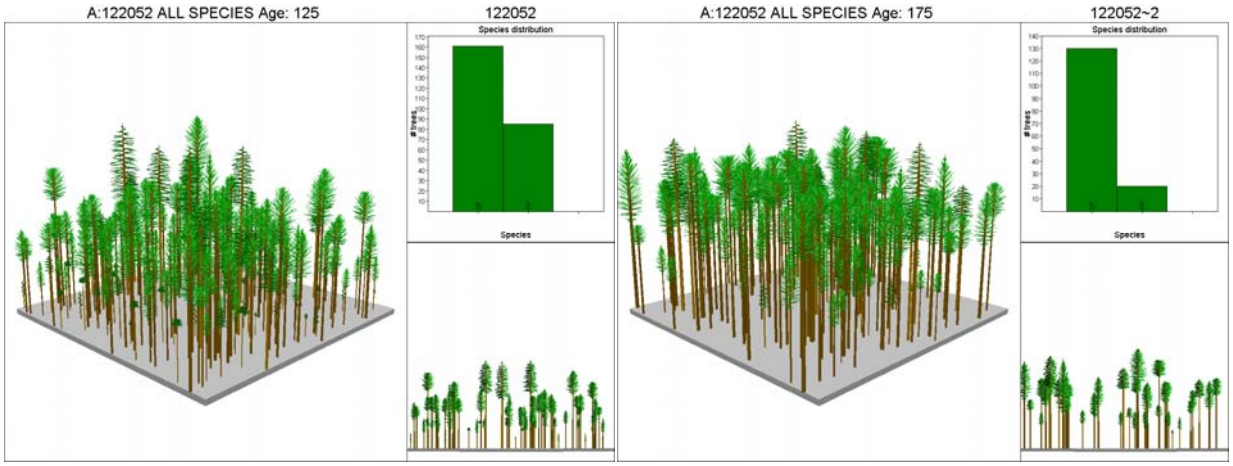
Table 3-20. Description of Stand 122052 With and Without Treatment of Maintain NRF Habitat

Existing Stand: 122052 (Mature Stand)						
Stand Age	Trees Per Acre	Basal Area	Relative Density Index	Canopy Cover	Quadratic Mean Diameter	Mean Live Crown Ratio
125	241	232	.719	91.8	13.3	.347

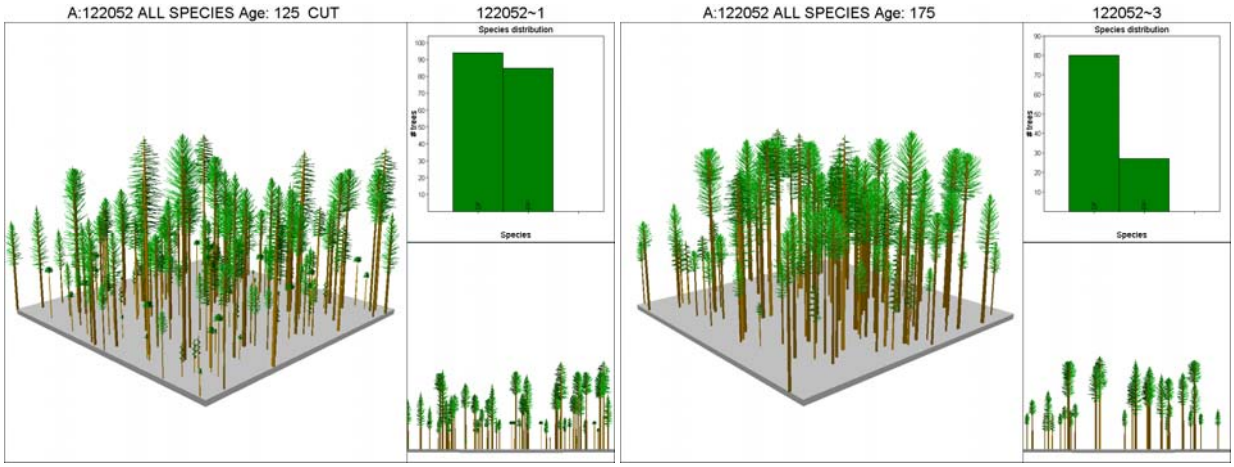
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality							Growth of Stand if Thinned to Maintain 60% Canopy Cover					
Stand Age	TPA	BA	RDI	Canopy Cover	QMD	Mean Live Crown Ratio	TPA	BA	RDI	Canopy Cover	QMD	Mean Live Crown Ratio
135	201	244	.722	100	14.9	.357	145	176	.521	82	14.9	.408
145	179	257	.735	100	16.2	.353	130	192	.545	100	16.5	.414
155	165	268	.749	100	17.3	.343	119	207	.569	100	17.8	.404
165	154	279	.762	100	18.2	.334	112	220	.592	100	19.1	.392
175	145	289	.774	100	19.1	.325	105	239	.613	100	20.2	.381

The Stand Visualization System (SVS) illustrates the prescriptions to portray what existing forest stands look like today and after application of the proposed prescriptions (USDA and University of Washington, 1995). ORGANON plot data was input into the SVS program for the simulations. The following images represent the current and projected post-harvest condition of stand 122052 (Figure 3-3).

Figure 3-3. Rio Climax Stand 122052



(a): Original Stand Condition **(b): 50-Year Untreated Stand Condition**



(c): Post Harvest Stand Condition **(d): 50-Year Post Harvest Stand Condition**

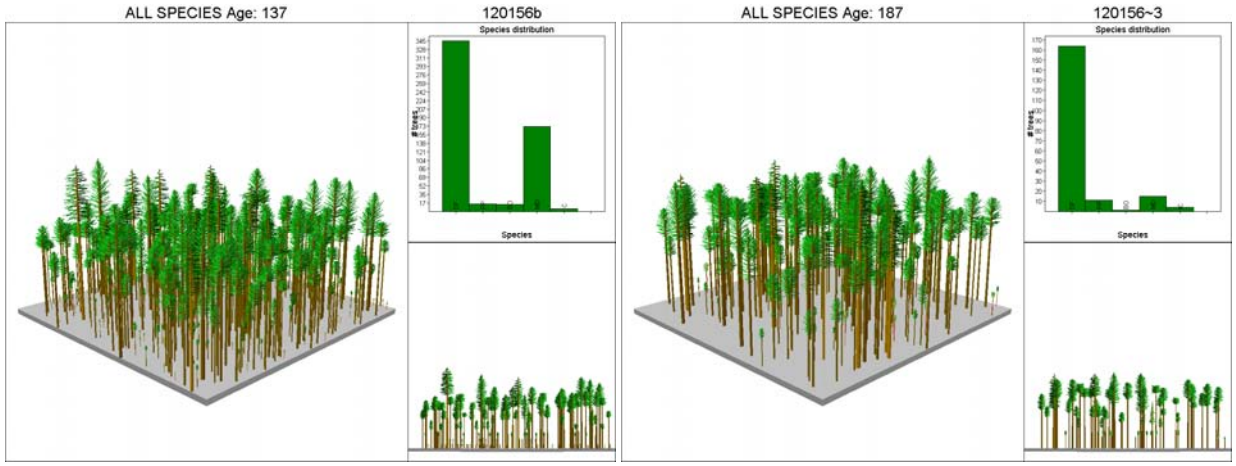
Table 3-21 displays the difference between no action and a treatment that maintains on average 40% canopy cover and compares the difference between the treated and untreated condition of stand 120156. The original stand exhibited a RDI of 0.865 (a RDI from 0.55 to 1.00 bounds the zone of imminent mortality and suppression) a RDI of 0.550 marks the threshold for competition mortality. The untreated stand, 50 years later, projects a reduction in trees per acre each decade resulting from competition induced mortality. Each decade compounds the competition as a result of uncontrolled densities. However, in comparison, the fewer numbers of trees lost per acre per decade occurs in the treated stand due to a prescription that lowers the RDI from 0.865 to 0.346. After 50 years, the untreated stand holds 195 TPA at a stand RDI of 0.716. In contrast, the 50 year treated stand holds 76 trees per acre at a stand RDI of 0.419 (still below the threshold of 0.550; anything at 0.55 and greater results in mortality from competition between trees for limited resources).

Table 3-21. Description of Stand 120156 With and Without Treatment of Maintain DSP Habitat

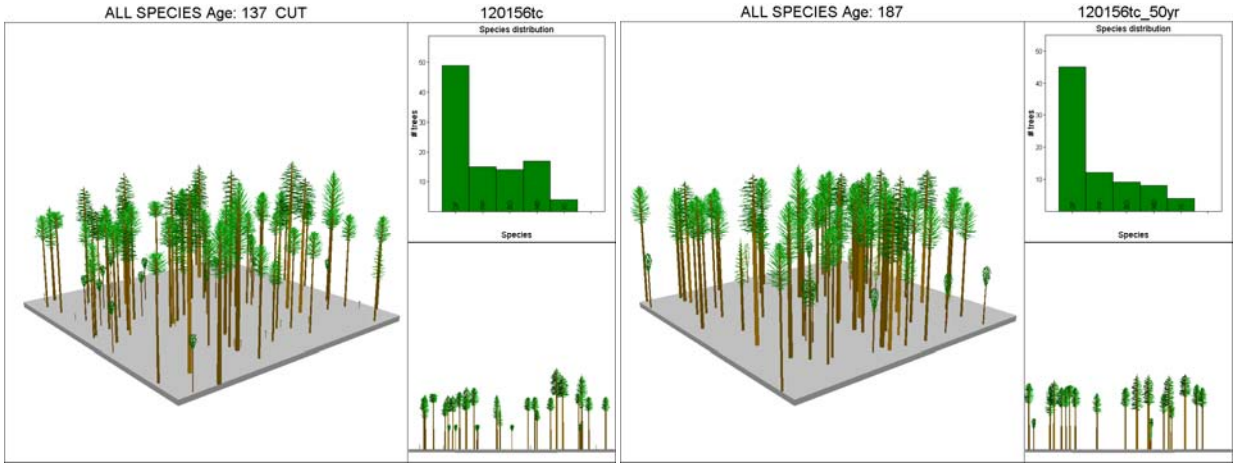
Existing Stand: 120156 (Mid Seral Stand)												
Stand Age	Trees Per Acre	Basal Area	Relative Density Index	Canopy Cover	Quadratic Mean Diameter						Mean Live Crown Ratio	
137	552	239	.865	100	8.9						.259	
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality							Growth of Stand if Thinned to Maintain 40% Canopy Cover					
Stand Age	TPA	BA	RDI	Canopy Cover	QMD	Mean Live Crown Ratio	TPA	BA	RDI	Canopy Cover	QMD	Mean Live Crown Ratio
147	405	236	.807	100	10.3	.270	88	123	.352	55	16.0	.366
157	319	237	.769	100	11.7	.274	84	131	.368	67	16.9	.395
167	262	238	.744	100	12.9	.276	81	140	.385	81	17.8	.402
177	223	241	.728	100	14.1	.278	79	149	.402	93	18.6	.393
187	195	244	.716	100	15.1	.278	76	158	.419	97	19.5	.381

Figures 3-4 illustrates the pre and post-harvest stand conditions of a midDry Douglas-fir stand in the Douglas-fir plant series (Stand 120156, T37S-R02E-Sec.29). Currently, the stand has 552 TPA, a relative density index of 0.865, a mean live crown ratio of 0.259 percent, and a species composition of 76% Douglas-fir, 15% Pacific madrone, 4% ponderosa pine, 4% black oak and 1% incense cedar. There are currently 343 understory TPA (<8 inches DBH) composed of Pacific madrone (52%), Douglas-fir (39%) and black oak (9%) with no pine species or incense cedar recorded in the understory (Figure 3-4(a)).

Figure 3-4. Rio Climax Stand 120156



(a): Original Stand Condition **(b): 50-Year Untreated Stand Condition**



(c): Post Harvest Stand Condition **(d): 50-Year Post Harvest Stand Condition**

The stand immediately after harvest produces an outcome that lowers the RDI to 0.346 (Figure 3-4(c)). Immediately following harvest the stand exhibits a projected 99 TPA with a basal area of 116 ft² per acre. The species composition after harvest projects 50% Douglas-fir, 17% Pacific madrone, 15% ponderosa pine, 14% black oak and 4% incense cedar. Openings created from thinning would allow suitable growing conditions for shade intolerant oak and pine species to regenerate, thereby increasing species diversity within the stand.

This alternative includes 948 acres of various levels of commercial harvest, representing 6% of the BLM lands in the analysis area. Under this alternative only 15% of the forest land base in the analysis area is proposed for commercial treatment. This amount constitutes 2.4% of the land base (5,409 acres of forestland in the analysis area are not being treated commercially). A total of 3,611 acres of Riparian Reserves, northern spotted owl cores, and other reserves for plants and animals in the analysis area would not be treated. Other untreated forested stands include those that lack sufficient conifer stocking to meet a feasible sale under guidelines for maintaining northern spotted owl habitat. Forest stands in reserve areas would remain in poor vigor and tree mortality can be expected in the future. Canopy cover for these stands would decrease with time thus degrading some types of habitat. This also decreases the effectiveness of fuels hazard reduction.

Tree species diversity would continue to decline without treatments to maintain shade intolerant species such as pine. The effects would be as described above in the No-Action Alternative. Mortality of untreated pine stands as a result of competition against Douglas-fir and white fir could cause increasing levels of bark beetle species that could infect adjacent forest stands. Bark beetles are opportunistic creatures that have the ability to detect the chemical signature that a non-vigorous tree emits when it is weakened by competition, drought, disease, or a combination of all three. Leaving these acres untreated would also decrease the effectiveness of fuels hazard reduction in adjacent treated stands. Leaving diseased forest land untreated could increase the radial spread of dwarf mistletoe as susceptible shade tolerant species such as Douglas-fir and white fir continue occupying these sites. After initial hosts die out, re-colonization of susceptible species occurs readily in the analysis area. This would subsequently perpetuate the dwarf mistletoe parasite on the site and its damaging impacts would widen further.

If surrounding private lands are clear-cut, forest stands on BLM-administered lands would leave patches of forest with variable density treatments that would help the landscape in providing long term forest complexity which is the result of variability. Surrounding BLM lands would be managed with similar prescriptions to assure forest health. Additionally, minimizing the spread of insects and fire to adjacent lands would reduce cumulative effects of insects and fire. These effects would be beneficial to forest stands, rather than detrimental.

Pre-commercial thinning and fuel hazard reduction treatments are proposed on 632 acres, representing 4% of the land base in the analysis area under this alternative. Approximately 445 acres of forest stands with proposed commercial treatment would also be thinned pre-commercially. Additionally,187 acres of fuel hazard reduction treatments are prescribed in stands outside of proposed commercial harvest units. Thus, the total footprint of all non-commercial vegetation treatments for this alternative is 632 acres or 1.6% of the analysis area. The excess, small diameter conifer trees less than 8 inches DBH would be cut from under the drip lines of old-growth trees to assure their survival. Elsewhere, the excess tree stems would be thinned to a desired stocking level to improve the growth and vigor of the remaining trees. Pre-commercial thinning would also help to accelerate the development of vertical stand structure and reduce hazardous ladder fuels. These treatments are designed to increase drought resistant conifer and hardwood species such as ponderosa pine, black oak and incense cedar. Maintaining these drought resistant species ensures the resiliencies of forest stands during cycles of drought.

c. Alternative 3

The stand level effects described in Alternative 2 are the same for this alternative, with some differences in the landscape level effects. This alternative includes 801 acres of various levels of commercial harvest, representing 6% of the land base in the analysis area. Under this alternative only 13% of the forestland base in the analysis area is proposed for commercial treatment. This amount constitutes 2% (5,556 acres of forestland in the Analysis Area are not being treated commercially). Pre-commercial thinning and fuel hazard reduction treatments are proposed on 632 acres, representing 4% of the land base in the analysis area under this alternative. Approximately 445 acres of forest stands with proposed commercial treatment would also be thinned pre-commercially. Additionally, 187 acres of fuel hazard reduction treatment proposals are in stands outside of proposed commercial harvest units. Thus, the total footprint of all non-commercial vegetation treatments on BLM lands for this alternative is 632 acres or 1.4% of the analysis area. Since the proposal for fuel hazard reduction and pre-commercial thinning is less in this alternative the total footprint for these vegetation treatments are less than the proposed acres in Alternative 2.

Through recovery of past harvest units and management activities emphasizing thinning to increase growth rates, there would be more mature size class retention (84 acres) than the acres of mature projected for Alternative 2. None of the actions proposed under this alternative would affect the long-term productivity of forest lands in the analysis area. Forest stands in the analysis area would continue to be in mostly mid and mature size classes since this alternative only proposes 801acres of commercial harvest.

In harvest units that have been excluded from treatment under this alternative, there is a lost opportunity to thin some of the more dense stands within the analysis area. Since these younger stands typically are found in the stem exclusion or just starting to transition into the understory re-initiation phase, stand development into a mature size class would be delayed by the deferral of treatment. The longer these stands are deferred from thinning, individual tree mortality from the lack of growing space / site resources would increase relative to the stocking in each stand.

d. Consideration of the 2005 Black Report

Although not specifically submitted during scoping for the Rio Climax Forest Management Project, the 2005 Report *Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests"*, also known as the Black Report, is often submitted by some commenters to support their opinion that there is no evidence that logging can control bark beetles or defoliators once an outbreak occurs and in the long run could increase the likelihood of epidemics. The Black Report was reviewed by Forest Health Protection Entomologists from Region 6 of the U.S. Forest Service in November 2005, who concluded that the report contained many erroneous statements that were not even supported by the report's cited literature and included many citations taken out of their proper context. The Black Report was reviewed by BLM silviculturists who concur with the findings reported by Region 6 Forest Service entomologists. Many papers cited in the report support BLMs approach to managing forests to prevent bark beetle epidemics.

A recent paper, "*The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of western and southern United States* (Fettig et al., In Press), reviews tree and forest stand factors associated with bark beetle infestations and analyzes the effectiveness of vegetation management practices for mitigating the negative impacts of bark beetles on forests. The review draws from the examination of 498 scientific publications concerning the topic referenced above and other related topics. Fettig et al. reports that native tree-killing bark beetles are a natural component of forest ecosystems and periodic outbreaks will occur as long as susceptible forests and favorable climatic conditions exist. Recent epidemics of some native forest insects have exceeded historical records and management to reduce stand or landscape-level susceptibility must address factors related to tree density. Increased competition among trees for water, growing space, and nutrients causes trees to become stressed and compromises their resistance mechanisms, thus increasing their susceptibility to bark beetle attacks.

The report concludes that while gaps do exist in information available for some forest cover types and common bark beetle species, thinning as a preventive measure to reduce the amount of bark-beetle caused tree mortality and its effectiveness is supported by scientific literature for most forest cover types including ponderosa pine and Douglas fir forests, which are the primary focus of concern for bark beetle infestations in the Rio Climax analysis area.

e. Consideration of Douglas-fir Dwarf Mistletoe as a Beneficial Disturbance Agent

Douglas-fir dwarf mistletoe (*Arceuthobium douglassii*) is a parasitic plant that infects Douglas-fir and is widespread in Southern Oregon dry forests. It is one of the primary diseases besides root rot that affects the growth and health of Douglas-fir. Douglas fir dwarf mistletoe evolved with its host species over the past 10,000 years. The benefits of dwarf mistletoe as wildlife habitat and a food source are well known (Mathiasen, 1996). Not only does the presence of mistletoe contribute to stand diversity through the creation of gaps, structural irregularity and contribute to the accumulation of snags and down wood, it also serves as habitat for a variety of mammals, birds and arthropods. In particular, in the Siskiyou Mountains, large witch's brooms serve as nest platforms for spotted owls and raptors. There is evidence that groups of mistletoe infected trees are the most likely areas for spotted owls to nest in the white fir and Douglas-fir forests of the Siskiyou Mountains (Marshall ,2003; Mallams & Goheen, 2005).

Dry Douglas fir stands (Douglas-fir/poison oak) and pine-oak stands historically, were shaped by frequent fire and because of fire suppression the number of Douglas-fir trees is far in excess of historical ranges (Brown, Agee et al. 2004; North, Chen et al. 2004). The proposed forest management project does not attempt to eradicate dwarf mistletoe from the landscape; rather it attempts to minimize it in specific areas so that the objectives of Matrix lands as defined by the Medford District Resource Management Plan can be attained. Management efforts are focused towards minimizing the impacts of Douglas-fir dwarf mistletoe by maximizing tree species diversity and by reducing canopy layering. Stands composed of mixed tree species of all size classes provide barriers that inhibit the horizontal and vertical spread of mistletoe. Ponderosa pine, sugar pine, incense cedar, white fir and hardwoods are not susceptible to Douglas-fir dwarf mistletoe. Suppressed and intermediate size classes of Douglas-fir are targeted for removal, reducing the canopy height structure and reducing the potential for the vertical spread of mistletoe.

With or without management activities, dwarf mistletoe will continue to be a stand and landscape feature on lands managed by the BLM. About 60-70 percent (approximately 550,000 to 600,000 acres) of BLM-administered lands on the Medford District are not proposed for timber management activities. Because the vast majority of BLM-administered lands are not allocated to intensive or restricted forest management, it is expected that Douglas-fir mistletoe would occur at natural rates and levels within those areas. On the remaining 30 to 40 percent of BLM-administered lands designated as Matrix to provide a sustainable supply of timber. The acres proposed in this forest management project are part of the planned annual timber harvest acres.

H. FIRE & FUELS

This section discloses effects of forest management activities such as prescribed fire, thinning, logging, and fuels reduction treatments, and from activities associated with the construction and use of roads. Smoke impacts, as a result of prescribed fire, are discussed in “Air Quality”.

1. Affected Environment

The landscapes that comprise the project area evolved with frequent fires affecting the vegetation and other key components of the ecosystem. Since the establishment of Euro-settlement in this area human relations and interactions with these landscapes have affected many of the processes that had previously played a large part in the evolution of the site. Of these interactions one management decision that has affected one of the evolutionary processes has been that of fire exclusion.

Fire is recognized as a key natural disturbance process throughout Southwest Oregon (Atzet and Wheeler, 1982). Human-caused and lightning fires have been a source of disturbance to the landscape for thousands of years. Native Americans influenced vegetation patterns for over a thousand years by igniting fires to enhance values that were important to their culture (Pullen, 1996). Early settlers to this area used fire to improve grazing and farming and to expose rock and soil for mining. Fire has played an important role in influencing successional processes.

Historically, frequent, low intensity fires maintained dry Douglas-fir and pine forest types in more open conditions than exist today (Agee, 1993). Frequent, low intensity fires served as a thinning mechanism, thereby, naturally regulating the density of the forests. A more open crown structure would have allowed fire to travel more rapidly across the site with intensities that were short-lived. The light flashy surface fuels (grasses, shrubs, and conifer/hardwood litter), the repeated reduction of conifer reproduction underneath the overstory, and the repeated consumption of large fuels and duff build-up, would have reduced the post-fire effects (also described as fire severity) found on these sites historically. The qualities of the open crown structure would also provide better avenues for the heat intensity to vent out of the site without scorching the crowns to the lethal limit. However, there is evidence that stand replacement fires did occur historically, but they likely affected a smaller proportion of the landscape in comparison to wildfire incidents experienced across the Pacific Northwest over the last two decades.

a. Fire Regimes

Climate and topography combine to create the fire regime found throughout the project area. Fire regime refers to the frequency, severity and extent of fires occurring in an area. Agee (1993) suggests that variable fire history, complex geology, land use history and steep environmental gradients of Douglas-fir hardwood forests of southwest Oregon and Northern California Siskiyous prevents generalizations about fire and its ecological effects (Agee 1993 p. 283-284). This is also true for the lower to mid elevations of the Rio Climax project area which is characterized by steep terrain, Douglas-fir and pine forest types, and a history of anthropogenic fire use. However, plant association groups are a credible link to historical ecological process, including fire regimes that occurred on sites in the past (Franklin and Agee, 2003). Historical fire regimes and the departure from them, correlate's to the change from historical to current vegetative structure. The change in vegetation also helps to describe the difference in fuel loading (dead fuels and live in the form of increased vegetation) from historical to current conditions.

These changes in vegetation and fuel conditions help to determine the expected change in fire behavior and its effects. This difference in many respects is attributed to fire exclusion, but also includes all human practices that would affect the extent, severity, or frequency of fire events compared to historical accounts. These practices include road building, livestock grazing, and some logging practices as well as fire suppression.

Three historic fire regimes are found within the analysis area (Schmidt et al., In press):

<u>Fire Regime 1</u>: 0-35 years fire return interval, Low Severity
Typical climax plant communities include ponderosa pine, pine-oak woodlands, and oak woodlands. Large stand-replacing fire can occur under certain weather conditions, but are rare events (i.e. every 200 years).

<u>Fire Regime 2</u>: 0-35 years fire return interval, High Severity
This regime includes true grasslands and savannahs with typical return intervals of less than 10 years and ceanothus and Oregon chaparral with typical return intervals of 10-25 years. Fire severity is generally high to moderate.

<u>Fire Regime 3</u>: < 50 years fire return interval, Mixed Severity
Typical plant communities include mixed conifer and dry Douglas-fir forests. Lower severity fire tends to predominate in many events. This regime usually results in heterogeneous landscapes. Large, stand-replacing fires may occur but are usually rare events.

The acres proposed for treatment under the Rio Climax Forest Management Project are classified as Fire Regime 3. Mixed-severity fire regimes are characterized by mosaics of frequent, low severity and infrequent but high severity, and therefore are more difficult to describe due to complexities that result in a mosaics of fire effects.

Several studies that model climatic change into the next century also caution land managers in the Pacific Northwest to plan for increased temperatures and possibly some increase in winter moisture in the form of rain over the coming years in the Pacific Northwest (The JISAO Climate Impact Group- Mote et al. 2003; Drought and Pacific Decadal Oscillation Linked to Fire Occurrence in the Pacific Northwest Hessl 2004; Preparing for Climatic Change: The Water, Salmon, and Forests of the Pacific Northwest- Mote et al. 2003). These forecasts would indicate and suggest that climatic factors may, in the future, have a more dramatic impact on wildland fire extent and severity. With increases in warmer winter moisture to inspire vegetation growth along with warmer and dryer conditions in the summer months what is considered to be extreme drought conditions now, could easily be experienced with Pacific Decadal Oscillations (PDO) or El Nino Southern Oscillation (ENSO) in the first half of this century.

Change in ecosystem structure and spatial distribution is expected to be a product from this climatic variation and wildland fire will be one of the agents that causes the changes in the ecosystems. One option land managers have to affect the change, protect private property, and ecosystems are through silvicultural and fuels management treatments.

b. Condition Class

The process for making an assessment on how much fire exclusion along with other management activities has affected an ecosystem is through classifying the current condition of the site based on a reference usually pre-dating when fire exclusion became an influence. Condition class descriptions are used to describe these affected ecosystems. Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of components such as species composition, structural stage, stand age, and canopy closure. There are three condition classes:

Condition Class 1 - Fire regimes are within or near an historic range. The risk of losing key ecosystem components is low. Vegetation species composition and structure are intact and functioning within an historical range.

Condition Class 2 - Fire regimes have been moderately altered from their historical range (more than one return interval). This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns.

Condition Class 3 - Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. This change results in dramatic changes to fire size, frequency, severity, or landscape patterns.

The forest stands proposed for treatment, primarily Dry Douglas-fir, mixed conifer and pine stands (Fire Regime 3), are in condition class 2 and 3. Stand densities are very dense in some areas due to the absence of fire.

c. Past Actions and Events Affecting the Fire Environment

Past actions that have cumulatively contributed to the current wildfire behavior and potential include timber harvesting, fuels reduction, and fire suppression. Dense forest stands and episodic drought conditions have resulted in high tree mortality, especially in the areas of Pine and Dry Douglas-fir stands. This has resulted in increased fuel loads in these areas. Road building and land development (on private lands) have contributed to the current level of risk by expanding human influence further into the wildlands. Fire history recorded over the past 20 years in southwest Oregon indicate a trend of more large fires which burn at higher intensities in vegetation types associated with low to mixed severity fire regimes.

Fire Suppression

Human-caused and lightning fires have been a source of disturbance to the landscape for thousands of years. Native Americans influenced vegetation patterns for over a thousand years by igniting fires to enhance values that were important to their culture (Pullen, 1996). Early settlers to this area used fire to improve grazing and farming and to expose rock and soil for mining. Fire has played an important role in influencing successional processes. Historically, large fires were a common occurrence in the area; based on fire scars and vegetative patterns fires were of varying severities.

Historically, frequent, low intensity fires maintained the low to mid elevation forests in more open conditions, which were dominated by large-diameter trees. In the early 1900s, uncontrolled fires were considered to be detrimental to forests. Suppression of all fires became a major goal of land management agencies.

In ecosystems that historically burned frequently, particularly the ponderosa pine and the dry mixed-conifer forest types found in the lower and mid elevation areas of the Medford District BLM (Sensenig, 2002; Huff and Agee, 2000), the exclusion of fire combined with periods of higher than normal precipitation has promoted increases in fuel quantity and changes in fuel continuity and arrangement. As a result of the absence of fire, there has been a build-up fuels and a change to more fire-prone vegetative conditions. This is particularly true for ponderosa pine, dry Douglas-fir, and mixed-conifer forest types.

Trees facing more intense competition often become weakened and are highly susceptible to insect epidemics and tree pathogens. Increased tree mortality contributes to increased dead and down fuel loadings and increased fire behavior. The additional surface fuels provide for longer duration heat intensity (residence time), which in turn affects the severity with which the site burns, and the increased canopy closure along with the lower canopy heights allow for more scorching in the canopy and when environmental conditions are conducive to crown fire initiation and sustained crown fire runs. High intensity fires can damage soils and can impact riparian vegetation as well.

Ponderosa pine trees that thrive in fire prone environments are being shaded out by the more shade tolerant Douglas-fir or white fir species in the absence of fire. As a result, more fire resilient pine species are declining across the landscape. Trees growing at lower densities, as in ponderosa pine stands, tend to be more vigorous and fire resilient.

For sites that have a less frequent fire regime display much the same fuel quantity and arrangement increase and possibly may burn with similarity in patch-size and intensity to their historical pattern under some weather conditions and with more severe characteristics and larger patch size under severe fire weather conditions.

Logging

Commercial timber harvesting has occurred in the Rio Climax analysis area on BLM managed lands since the 1940s. The intensity and acres harvested increased in the 1970s and 1980s, and decreased again in the 1990s (USDI 1997: 53). Past harvest techniques such as clearcutting or overstory removal, which results in stands of young, more flammable trees contributed to the current fire hazard ratings for the fire analysis area.

d. Fire Risk

Fire risk is the probability of when a fire will occur within a given area. Historical records show that lightning and human caused fires are common in the project area. Activities within this area such as increased development of homes in the wildland urban interface, dispersed camp sites, recreational use, and major travel corridors add to the risk component for the possibility of a fire occurring from human causes. The time frame most conducive for fires to occur in the project area is from July through September.

Information from the Oregon Department of Forestry database from 1960 to 2010 show a total of 174 fires occurred throughout the project area. Lightning accounted for 42 percent of the total fires and human caused fires accounted for 58 percent. Only 14 percent or 25 fires started on BLM managed lands. Lightning accounted for 19 of the 25 fires that started on BLM land. Seventy-seven (77) percent of the fires in the project area were less than one acre in size. One fire was greater than 1,000 acres in size which started on private property.

e. Fire Hazard

Fire hazard assesses vegetation by type, arrangement, volume, condition and location. These characteristics combine to determine the threat of fire ignition, the spread of a fire and the difficulty of fire control. Fire hazard is a useful tool in the planning process because it helps in the identification of broad areas within a watershed that could benefit from fuels management treatment. Hazard ratings were developed for the project area and reflect the results of past human and natural disturbances.

In general the existing fuel profile within the project area represents a moderate to high resistance to control under average climatic conditions. The following table summarizes the percent of acres of all the BLM land in each fire hazard rating category for the entire project area. This data is from the Jackson County Fire Risk Analysis. All the units proposed for treatment under Alternatives 2 and 3 are moderate to high fire hazard.

Table 3-22. Fire Hazard Rating Category for the Rio Climax Fire Analysis Area

Fire Hazard Rating	Percentage by Hazard Category
Low hazard	31%
Moderate hazard	57%
High hazard	12%

f. Fire Suppression Responsibility

The Bureau of Land Management has a master cooperative fire protection agreement with the Oregon Department of Forestry (ODF). This agreement gives the responsibility of fire protection of all lands within the project area to the Oregon Department of Forestry. This contract directs ODF to take immediate action to control and suppress all fires. Their primary objective is to minimize total acres burned while providing for fire fighter safety. The agreement requires ODF to control 94 percent of all fires before they exceed 10 acres in size.

Due to ownership patterns and political constraints in southwest Oregon, the use of wildfire to meet resource objectives is not possible. There are stipulations within the protection agreement with ODF that allows BLM to designate areas that require special fire management activities during suppression efforts in order to insure damage to resources are minimized. It is recognized that restrictions could increase the cost of suppression which the Bureau of Land Management would incur and would require a modification of the contract. During suppression activities conducted on BLM lands the following guidelines would be followed:

BLM resource advisors will be dispatched to fires which occur on BLM lands. These resource advisors are utilized to ensure that suppression forces are aware of all sensitive areas and to insure damage to resources is minimized from suppression efforts.

When feasible, existing roads or trails will be used as a starting point for burn-out or backfire operations designed to stop fire spread. Backfires will be designed to minimize fire effects on habitat. Natural barriers will be used whenever possible and fires will be allowed to burn to them.

In the construction of fire lines, minimum width and depth will be used to stop the spread of fire. The use of dozers should be minimized and resource advisors will be consulted when appropriate. Live fuels will be cut or limbed only to the extent needed to stop fire spread. Rehabilitation of fire lines will be considered.

The felling of snags and live trees will only occur when they pose a safety hazard or will cause a fire to spread across the fire line.

The construction of helispots should be minimized. Past locations or natural openings should be used when possible. Helispots will not be constructed within riparian reserves, or areas of special concern.

Retardant or foam will not be dropped on surface waters or on occupied spotted owl nests.

Resource advisors will determine rehabilitation needs and standards in order to reduce the impacts associated with fire suppression efforts.

2. Environmental Effects

a. Alternative 1

Because no new management is proposed under this alternative, the effects described reflect current conditions and trends that are shaped by ongoing management and events unrelated to the Rio Climax Project described under the Affected Environment. This section will highlight key findings related to the question "What would it mean to not meet the objective of fire hazard reduction.

The current trend of increasing stand density which results in increased mortality to the timbered stands would continue. The transition from ponderosa pine stands to dense fir stands would also continue at the lower elevations within the project area. Trees growing under these conditions often become weakened and are highly susceptible to insect epidemics and tree pathogens. High numbers of younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods.

The proposed acres for commercial thinning under Alternative 2 (948) or the acres under Alternative 3 (801), all of which are in condition classes 2 and 3, would not be treated so the fuels reduction objectives for these areas would not be accomplished. Without treatment the condition class of these stands would continue to deteriorate to a condition class 3.

With no forest management actions, there would be no temporary increase in surface fuels from timber harvest activities. Although there would be no harvest created slash, the existing surface, ladder, and canopy fuels would remain untreated. Ponderosa pine, mixed conifer and dry Douglas-fir forests in the lower to mid elevations of the project area would have a higher potential for large scale stand replacing fires in comparison to the proposed action. These forest types are experiencing fires today that are uncharacteristic of historic fires (Agee and Skinner, 2005).

The majority of the BLM managed land in the project area would remain in moderate to high fire hazard resulting in a continued high chance that when a wildfire occurs, a large portion of the burn would exhibit high severity fire effects. Under the No-action Alternative, high fire hazard would remain in the project area, with a higher potential than an action alternative for increased fire behavior if predicted climate changes (discussed above) do occur.

With no forest management, changes in canopy closure would occur only as a result of natural events such as insect infestation, windstorms, mortality from competition/drought, and wildfire. Where natural disturbances create more open stand conditions there would be more wind and solar radiation resulting in a drier microclimate compared to closed canopy stands. A drier microclimate generally contributes to more severe fire behavior. Under the No-Action Alternative, there would be no treatment of existing surface, ladder or crown fuels to help mitigate the effects of microclimate changes caused by natural disturbances. Ladder, surface fuels and aerial fuels (crown density) would also increase within these stands. Increasing stand densities and fuel loadings would increase the chance of more acres that would burn in high intensity fires within the project area. Fire fighter safety would continue to be an issue as well as the potential of resource damage.

Fire suppression would continue because there are no policies in place or being proposed that will allow fires to burn naturally within the project area. The entire project area is within the Wildland Urban Interface (WUI) and is a priority for fire suppression especially in close proximity to homes. BLM's 1995 RMP assumes that all suitable forested lands on industrial forest land ownership would be logged at about 60 year tree-growing rotations, although, there are no private industrial lands that are known to be scheduled for timber harvest at this time. Any private land timber harvest would meet Oregon Department of Forestry standards for post-harvest fuels reduction. Defensible space and driveway treatments would likely continue by private land owners, but the amount is unknown. As a result of ongoing programs to implement defensible space around structures, driveways and roads for potential escape/evacuation routes, the risk of structure and human loss during wildfire events continually decreases.

Sixty nine (69) percent of the fire analysis area would remain in moderate to high fire hazard resulting in a continued high chance that when a wildfire occurs, a large portion of the fire would exhibit high severity fire effects. As fire is continually excluded and stand densities continue to increase, coupled with predicted climatological changes, the chance for higher proportions of high severity fire effects increases.

Based on trends in the last 35 years, humans will continue to be responsible for the majority of wildfires (58 percent). Most of the human-caused fires will continue to be associated within about 300 feet of roads.

b. Alternatives 2 and 3

Discussions for the proposed actions reflect the direct and indirect impacts of the activities associated with the action alternatives. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable.

Fire Severity

The current science in determining extent and severity of wildland fire is based on three environmental variables, weather, topography and fuels (Rothermel, 1972; Albini, 1976). Management activities on landscapes and within ecosystems seeking to affect wildland fire extent and severity have focused on treating of fuels for obvious reasons. Forest fuels (including live and dead material), can be changed in terms of fire behavior and fire effects characteristics by silvicultural and fuels treatments (Agee, 1996; Weatherspoon, 1996), fire exclusion practices, and natural events.

Weather and topographic effects on fire behavior and severity are interrelated with the amount and distribution of fuels on a site with respect to the aspect, steepness of slope, and position on slope, along with atmospheric elements of temperature, relative humidity, in relation to fuel moisture, and windspeed and direction. When the environmental and atmospheric conditions are conducive to drying fuels and/or heating them to the ignition point during a fire, they are referred to as available fuels. The interrelationship between slope and wind in relation to the amount and arrangement of available fuel is critical in terms of allowing a fire to spread and increase in intensity. Without fuel loading becoming available to burn in a fire due to the effects of extreme weather there is no adverse effects to the vegetation or other site qualities. For example in some desert areas where vegetation is sparse and extreme fire weather is the norm (high temps, low RH, windy unstable atmospheric conditions) fires often don't spread except under unusual wind conditions, due to the lack of continuous fuels. Thinning treatments proposed under these alternatives are based not on restoring historical conditions, but on meeting the objectives of Matrix land allocation.

Activity Fuels / Surface Fuels

Timber harvest can increase fire severity, if not accompanied by adequate reduction of fuels, by increasing dead surface fuels (SNEP, pp 61-72). Treatments designed to reduce canopy fuels through density management, increase and decrease fire hazard simultaneously. Slash generated from the commercial thinning of timber stands, if not treated, would create surface fuels that would be greater than current levels. The existing surface fire behavior fuel model in the majority of stands proposed for commercial thinning are represented by a Timber Group fire behavior fuel model. Fuel amounts are measured in tons per acre for different size material. Material up to 3 inches in diameter has the greatest influence on the rate of spread and flame length of a fire, which has direct impacts on fire suppression efforts.

It is anticipated that fuel loadings (material 3 inches and less) after logging would be temporarily increased by approximately 3-11 tons to the acre prior to the scheduled fuel disposal activities to be completed. This would change the existing fuel model of most of the timbered stands to a Logging Slash Group which in turn would create higher rates of spread and greater flame lengths in the event of a wildfire.

However, despite the temporary increase in ground fuels, research indicates that a reduction in crown fuels outweighs any increase in surface fire hazard (Omi and Martinson, 2002). This temporary increase in surface fuels is usually less than one year (but can be up to 2 years) for that is the time period that it takes to implement the fuel treatments to dispose of the surface and ladder fuels in these stands.

Utilizing the modeling tool BEHAVE, with the parameters of a 6 mph wind speed and one hour fuels moisture of 6 percent , flame lengths in a slash fuel model are four feet compared to a one foot flame length in a timber litter model. Direct attack can be used under both of these scenarios. The rate of spread of a fire increases by 5 chains per hour in a slash fuel model. The size of a fire in a one hour period for a fire that is not suppressed would be 0.3 acres in a timber fuel type versus two acres in a slash fuel model.

Fuels treatments for stands that are commercially harvested are proposed for treatment within one year after a unit is harvested. Treatments would take place where slash three inches in size and less exceeds 5 tons per acre. Treatments should ensure that under most climate conditions, flame lengths would be less than three feet allowing for direct attack of a wildfire. The reduction of this material, along with reduced fire ladders and canopy fuels from forest thinning, would reduce fire behavior such as flame length, rate of spread and fire duration. With the reduction of flame length and fire duration the chance of a crown fire initiating in treated stands would be greatly reduced. Also, mortality of the smaller diameter conifers would be reduced. Thinning treatments may be followed with prescribed burns. The reduction in stand density would make it possible to use prescribed fire as a tool to further reduce fire hazard in these stands. The reduction of flame length in treated stands would also increase the chance that direct attack of a wildfire could occur which would reduce acres burned in the event of a wildfire.

In a study on the effects of thinning on fire behavior, Graham and others (1999) concluded that "depending on intensity, thinning from below and possibly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species." Thinning accompanied by removal of thinning residues and slash and followed by periodic prescribed burning are effective (Omi and Martinson, 2002; Pollet and Omi, 2002; Agee, 1993; Graham, 1999; VanWagtendonk, 1996). Treatments that result in forests with a lower density and larger trees show lower potential for crown fire initiation and propagation and for less severe fire effects (Pollet and Omi, 2002).

Anecdotal observations should not be applied the same as rigorously tested scientific study, but they can be use to report and interpret trends. Anecdotal evidence on the Squires fire, which occurred in Southern Oregon, showed that treatments to reduce fire behavior may have merit. Fire weather conditions during the Squires Peak Fire, as measured by the Energy Release Component Indices, was in the 89th to 90th percentile during the Squires fire event as measured by the Star and Provolt RAWS stations. This percentile is recognized as high but not extreme fire weather conditions. Even though winds were reported the evening the fire reached the treated area in the Kin's Wood project area, fire behavior decreased when it reached the treated area. Mortality to the residual stand was minimal due to the decreased fire behavior.

Fire Resiliency

A forest that is fire-resilient has characteristics that allow it to readily recover from a fire event. A forest's resiliency to fire can be increased by applying fire safe principles. This means managing surface fuels to limit the flame length, removing ladder fuels to keep flames from transcending to tree crowns where trees have no defense against fire; decreasing crown density making less probable for a crown fire to move from tree-tree; and keeping large diameter trees that are more fire resistant (Agee and Skinner, 2005; Agee, 1996; Agee, 1993).

The implementation of these alternatives would promote fire resilient forest stands by thinning from below, removing suppressed, diseased, and/or over crowded intermediate and co-dominant trees while retaining the larger co-dominant and dominant trees within treated stands. Forest thinning prescriptions would result in a reduction in ladder fuels, an increase in the height to the base of tree crowns, and the reduction of crown bulk density (canopy fuels). All of these are important factors in reducing the potential for initiating and sustaining a crown fire in these stands (Omi and Martinson, 2002) (Agee, 1996) (Agee and Skinner, 2005).

Thinning from below, removing the smaller diameter trees within a stand, would increase the average tree diameters as soon as treatments are completed. Over time, tree diameters would continue to increase with the growth of the residual stand. Larger diameter trees are more tolerant to surface fires so there would be less tree mortality in the event of a surface fire. Commercial thinning would also favor more fire tolerant species such as pine. Lowering basal area through thinning and prescribed fire can increase the long term vigor in the residual trees within a stand (Huff and Agee, 2000).

While the silvicultural prescriptions and objectives vary by prescription type, they are all designed to retain healthy large trees (see Chapter 2). The maintenance of pine species on dry Douglas fir and pine sites contributes to the fire resiliency of forest stands. The larger the ponderosa pine, the greater its resilience to fire due to increasing bark thickness (Agee, 1993; Agee, 1996). Its bark is one of the key defense mechanisms against mortality from low intensity fire. Thus, removal of larger non-pine species, in this context, actually improves the ecological role of fire and subsequent fire resiliency of the stand. Although, some large trees would be removed due to insect attacks, to improve the survival of large fire resistant pine species (by reducing competition for moisture and growing spaces), to encourage the regeneration of fire resilient pine species, and for logging operations (landings and cable corridors) the fire resilience of the project area as a whole is improved due to the overall reduction in fire hazard within treatment units.

In the study Patterns of Fire Severity and Forest Conditions in the Western Klamath Mountains, California, Odion et al. (2004) found closed canopy forests had less high-severity fire than open canopy forests and non-forest vegetation types. Based on this finding, they also concluded that a long absence of fire is also a predictor of low severity fire effects. However, this study used no local and specific weather data except for an acknowledgement that a multi-year drought preceded the 1987 wildfires. The well-known inversion conditions during these fires may have had a distinctive effect on the way these landscapes burned (Martin 2005, Pers. Comm.).

Weatherspoon and Skinner (1995), who studied the same fires and area, also reported lower fire severity in uncut forests, and stated their finding was likely attributable to the absence of activity fuels and the relatively closed canopy conditions which reduces wind speeds and fuels drying of fuels. They admitted some findings to be less than conclusive due to the lack of local weather information from the time of the fires, reporting that the reconstruction of the highly variable weather conditions was not possible due to the smoky inversions and shortages of people during the first few days of the fire when much of the area burned. However, their findings emphasized the need for effective fuels treatments after management actions. They found partial cut stands with some fuels treatment suffered less damage than partial cut stands with no treatment.

Changes in Micro-climate and Effectiveness of Fuels Treatments

Management of forest stands can result in altered micro climates (Agee, 1996). Increasing spacing between the canopies of trees can contribute to increased wind speeds, increased temperatures, drying of topsoil and vegetation (Countryman, 1955) (Countryman, 1972), and increased shrub and forb growth (Agee, 1996). A more open stand allows more wind and solar radiation resulting in a drier microclimate compared to a closed stand. A drier microclimate generally contributes to more severe fire behavior.

The degree of effects of microclimate change on fire behavior is highly dependent on stand conditions after treatment, mitigation to offset the effects of microclimate change, and the degree of openness. For example, Pollet and Omi (2002) found that more open stands had significantly less fire severity, while Weatherspoon and Skinner (1995) found greater fire severity. In Pollet and Omi's study, more open stands had significantly less fire severity compared to the more densely stocked untreated stands. The degree of openness in the studied treated stands may not have been sufficient to increase fire activity. Weatherspoon and Skinner found commercially thinned stands in a mixed-conifer forest in the South Fork Trinity River watershed of the Klamath NF in northwest CA burned more intensely and suffered higher levels of tree mortality than unlogged areas (Weatherspoon and Skinner, 1995). The partial cuts they examined were typically overstory removals, where large (mature and old growth) trees were removed leaving smaller trees. The study simply validates that smaller trees, due to thinner bark and crowns closer to the ground, will suffer more damage than large trees. Logging slash was not treated in the study areas. The proposed actions for this project propose to treat slash generated by the treatments and forest thinning would harvest some commercial sized ladder fuels.

Moisture content of live vegetation is an important consideration. The moisture content of live fuels compared to fine dead and down fuels is generally much greater. Where overstory canopy reduction results in the growth of live understory vegetation could contribute to reduced or increased surface fire behavior. Live fuels with higher moisture content can have a dampening effect on fire behavior compared to dead fine fuels (Agee et al., 2002; Agee, 1996). Cured grasses and forbs can increase fire line intensity (Agee, 1996); however, due to project design where ladder fuels have been removed and crown base heights increased, the risk of crown fire initiation and fire severity is reduced (Agee, 1996; Omi and Martinson, 2002; VanWagtendonk, 1996).

Effects of Canopy Reduction on Fuel Moistures

Silvicultural prescriptions proposed for stands under Alternatives 2 and 3 vary on how much canopy cover would remain after commercial thinning occurs. Under Alternative 2, fifty two percent of the acres would have a canopy cover of 60% or greater. An additional twenty eight percent of the acres would have a canopy cover of 40% or greater. In Alternative 3, sixty three percent of the acres would have a canopy cover of 60% or greater and the remaining forty percent of the acres would have a canopy cover of 40% or greater.

Estimates of fuel moisture can be made from the measured ambient air temperatures and relative humidity within a stand. The following example is used to demonstrate the effects of canopy cover on fuel moistures. An ambient air temperature of 90 to 109 degrees and a relative humidity of 15 to 19 percent would result in a 3% fuel moisture for 1-hour time lag fuels. The fuel moisture of 10-hour fuels would be 5%; and the 100-hour fuel moisture would be 7%.

Corrections to fuel moistures are then needed to account for slope, aspect, time of day, month, and percent shading. Percent shading is calculated by using greater than 50% shading (shaded) or less than 50% shading (exposed). Cloud cover as well as timber overstory (canopy closure) is utilized in calculating percent shading.

Utilizing the example from above (1 hour time lag fuels at 3%) to correct fuel moisture on a site that has the following attributes would add 3% to the fuel moisture for a total of 6%.

- north slope
-slope greater than 31%
-12:00 pm in August
- shading greater than 50%
- no cloud cover

Utilizing the same parameters but for an area that has shading that is less than 50% would add 4% for a fine fuel moisture of 7%. The difference between the two sites is 1% which would have minimal impacts to fire behavior.

Fall Versus Spring Underburning

Future maintenance of all areas treated in the project area would be needed in order to maintain low fuel loadings and species dependent on fire. Underburning is the preferred method for maintaining these areas. The season in which underburning is implemented is based on achieving hazard reduction objectives while minimizing impacts to the site. Fall underburning is utilized when fuel loadings are low enough to allow for a low intensity burn similar to that which was historically common in these fire regimes. Due to the long absence of fire, fuel loadings in most cases are too high to initially burn a unit in the fall.

The surface fuel loading in a unit dictates fire intensity. A common method to reduce fuel loadings before underburning is implemented is to use manual treatment (cutting, hand piling and burning). Even after manual treatments surface fuel levels in the 1, 10 and 100 hour fuels (1/4" to 3") are often too high to accomplish a low intensity fall burn. When this is the case, underburning is done in the spring.

Burning in the fall with high surface fuel loadings would have adverse impacts to numerous resources due to fires being of higher intensity. Large down woody debris consumption is higher in the fall. Duff consumption is higher and soil heating tends to be higher. Mortality to the residual stand as well as other vegetation is higher due to higher intensity fires low live fuel moisture. Snag retention is difficult due to the low dead fuel moistures and higher fire intensity. With higher fire intensities and lower live and dead fuel moistures the risk of escape is greatly increased.

Prescriptions are developed for spring burning to consume the smaller fuels (1/4" - 3") and retain the majority of large down woody debris due to the higher dead fuel moistures. Soil moisture is also higher in the spring so duff consumption is also minimal. Burning under these conditions keep fire intensity low, so impacts to the residual vegetation is minimal and the chance of escape is also minimized. Visual observations of areas that have been underburned in the spring in the Ashland Resource Area over the past decade have not shown any adverse impacts to the site.

Other activities associated with underburning such as fireline construction and mop-up operations after the burn have minimal impacts to the site. Firelines are 1 to 2 feet in width and are waterbarred to minimize soil erosion. Re-growth of vegetation on the firelines normally occurs within one growing season. Mop-up operations are normally limited to a 100 foot perimeter around a burned unit. Soil disturbance is scattered in localized areas within this perimeter. Because prescribed fire would occur in the spring if fall burning conditions might result in unwanted intensities, damage from prescribed fire would be minimal due to higher moisture levels, and benefits from prescribed fire would be maximized.

Any areas planned for fuels treatment may be reexamined by resource specialists at any stage of treatment to determine if the planned fuels treatment is still applicable. At the discretion of resource specialists, planned treatments may be changed to better meet the objectives outlined in this EA. Proposed changes would be limited to treatments and their anticipated effects analyzed under this EA.

I. BOTANY

1. Introduction

Analysis regarding botanical resources within the Rio Climax Forest Management Project has been conducted at the 6th Field subwatershed level, and includes the following subwatersheds in their entirety: Lake Creek-Little Butte Creek, Upper Antelope Creek and Lower Antelope Creek subwatersheds. All references to the “Rio Climax analysis area” refer to the combined area of these subwatersheds.

Bureau Special Status Plants, Lichens, and Fungi (SSP) include species that are listed as threatened or endangered under the Endangered Species Act (ESA), proposed or candidates for listing, State listed, and Bureau designated Sensitive species.

For these species, the BLM implements recovery plans, conservation strategies, and approved project design criteria of biological opinions, and ensures that actions authorized, funded, or carried out by the BLM promotes their conservation and reduces the likelihood and need for their future listing under the ESA.

On July 25, 2007, the Oregon State Office Instruction Memorandum No. OR-2007-072 updated the State Director's Special Status Species List to incorporate the *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl*and to include species additions and deletions from the application of the most recent scientific data. This list was finalized with the February 7, 2008 Instruction Memorandum No. OR-2008-038.

This project will meet the provisions of 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 (not including subsequent Annual Species Reviews). Details of the project surveys are described below.

2. Affected Environment

A portion of the Rio Climax analysis area is within the ranges of *Fritillaria gentneri*, *Limnanthes floccosa* ssp. *grandiflora*, and *Lomatium cookii* species listed under the Endangered Species Act with ranges on the Medford District. However, all units proposed for activity are outside of the range of *F. gentneri, L, floccosa* ssp. *grandiflora*, and *L. cookii*.

The Rio Climax analysis area is entirely outside the range of Federally Endangered *Arabis macdonaldiana*,). Range maps were updated with the Biological Assessment/Letter of Concurrence for the Effects of Proposed FY 2009-2013 Forest Management Activities on Federally Listed Species and Designated Critical Habitat on September 25, 2008 (USDI BLM 2008) (USDI FWS 2008). Any sites of listed, proposed, or candidate plants found outside their defined range would have been reported. Table 3-23 lists the SSP found within the Rio Climax Project that border proposed treatment units or haul routes.

Surveys for all species on the Medford SSP list (current at the time of survey) were conducted in 2010. Surveys were conducted using the intuitive controlled survey method. This method includes a complete survey in habitats with the highest potential for locating Sensitive species. Surveys are completed by walking routes that cover a representative cross section (approximately 80%) of all major topographic (slopes, draws, benches, ridges) and special features (wet areas, rock outcrops, ridges, riparian areas, serpentine, etc.) of each unit. In areas of high potential habitat, a more thorough and intensive survey is made. Field work is conducted during the stage of plant phenological development that assures visibility of characteristics necessary for accurate identification of special status plant species. Multiple visits may be required in some habitats for certain species to ensure that the phenological development is such that accurate identification is possible. Vascular plant surveys are conducted from April 15 through September 1. Nonvascular plant surveys may occur in any season. Timing of fieldwork takes into consideration seasonal climate, elevation, aspect, target species and suitable habitat.

a. Vascular and Non-Vascular Plants

Surveys have documented 30 occurrences of 11 Bureau Special Status and 2001 Survey and Manage plant species within the Rio Climax analysis area that occur within 100 feet of roadsides and within 100 meters of proposed units.

Table 3-23. Sensitive Status Plant Species In or Adjacent to Analysis Units or Roads

Scientific Name	Common Name	Lifeform	2001 Survey & Manage Status*	2007 Heritage Rank**	ORBIC List***	Federal Status+	ODA Status++	2008 BLM Status	Sites
Carex serrotodens	Saw-tooth sedge	Vascular	--	G5/S3	4	--	--	SEN	2
Chaenotheca ferruginea	Rusty pin lichen	Lichen	B	G4G5/S3	4	--	--	--	3
Cheilanthes intertexta	Coastal lipfern	Vascular	--	G5/S1	2	--	--	SEN	2
Cimicifuga elata	Tall bugbane	Vascular	--	G4T4/S4	4	--	C	SEN	6
Cypripedium montanum	Mountain lady's slipper	Vascular	C	G4/S3S4	4	--	--	SEN	2
Illiamna latibracteata	California globe mallow	Vascular	--	G3/S2	2	--	--	SEN	1
Leptogium teretiusculum	Little jellyskin lichen	Lichen	E	G4G5Q/ S2?	3	--	--	STR	5
Limnanthes floccosa ssp. Bellingeriana	Woolly meadowfoam	Vascular	--	G4T2/S2	1	SOC	C	SEN	8
Nemacladus capillaris	Slender nemacladus	Vascular	--	G4/S1	2	--	--	SEN	2
Dendriscocaulon intricatulum	Dendriscocaulon lichen	Lichen	B	G3/S4	--	--	--	--	1

***Survey and Manage: as determined by the 2001 amendment to the 1994 Northwest Forest Plan Record of Decision for Survey and Manage, Protection Buffers and related mitigation measures.**

B= Rare, and all known sites are managed. Pre-disturbance surveys are not practical.

C = Uncommon, and not all known sites or populations are likely to be necessary for reasonable assurance of persistence, as indicated by several factors. Pre-disturbance surveys are practical.

E=Rare, status undetermined. Manage all known sites while category assignment is being determined.

SEN = Sensitive (USDI Oregon State Director's List)

STR = Strategic (USDI Oregon State Director's List)

****Heritage Rank: an international system for ranking rare, threatened, and endangered species**

G = Global Rank

S = State Rank

1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrence.

2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.

3 = Rare, uncommon, or threatened but not immediately imperiled, typically with 21-100 occurrences.

4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.

5 = Demonstrably widespread, abundant and secure.

? = Not yet ranked or assigned rank is uncertain.

*****ORBIC List: Oregon Biodiversity Information Center maintains extensive databases of Oregon biodiversity, concentrating on rare and endangered plants, animals, and ecosystems.**

1=taxa which are threatened or endangered throughout their range or which are presumed extinct.

2=taxa which are threatened, endangered, or possibly extirpated from Oregon but are stable or more common elsewhere.

3=taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.

4=taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered.

+Federal Status

SOC=Species of Concern, for which additional information is needed to support a proposal to list under the Endangered Species Act.

++ODA Status: Oregon Department of Agriculture

C=Candidate for (State) listing as Threatened or Endangered by the ODA.

b. Special Status Species Plants Within or Adjacent to Treatment Units and Haul Roads

Carex serratodens is a native perennial that is found in California, Oregon and Arizona. Considered to be relatively rare in southwest Oregon, it reaches the northernmost extension of its range in Jackson, Josephine, and Douglas Counties. It usually occurs in moist meadows, hillsides, and seeps, in sun or more often in partial shade, often on serpentine substrates, at low to moderate elevations (Wilson et al., 2008). There are 2 documented sites of the species in the Rio Climax treatment area occurring within 100 feet of roads or 100 meters of project units.

Chaenotheca ferruginea is a black stubble or pin lichen. Its typical substrate is the sheltered bark or wood of large old trees. In the project area, it is found in late seral Douglas-fir forests on the trunks and bases of Incense cedar and Douglas-fir. *Chaenotheca ferruginea* is globally widespread in cool to temperate areas. In 2007 the Oregon Natural Heritage Information Center dropped this species from all lists as it was deemed too common. There are 3 known sites within or adjacent to roads and treatment units.

*Cheilanthes intertexta*is a native perennial rhizomatous fern that is found in rock crevices or bases of rocks in California and Oregon. It is considered critically imperilled in Oregon being known only from Jackson and Douglas Counties. There are 2 known sites within and adjacent to treatment units or along haul routes.

Cimicifuga elata is a native perennial bugbane that is found in mixed conifer forest and forest openings at elevations 1100-5500 feet. It is a candidate for listing by the State of Oregon. Currently, the morphological and DNA traits are being examined to determine the appropriateness of splitting this species into two varieties. A report completed in 2008 determined that *C. elata var. alpestris* (in comparison with a second variety, *var. elata*) is the variety found in Jackson County, and more specifically, in the Sampson Cove analysis area. Type localities used in the study's research design include the large populations in section T38S R02E S17 (Kaye, 2008). Differences in management recommendations or protection status of the two *Cimicifuga elata* varieties have yet to be determined; all known population of *C. elata* continue to be managed as a single species. In the Rio Climax analysis area, some populations occur in previously managed conifer stands. There are 6 known sites adjacent to (within 100 feet of) roads or within treatment units within the Rio Climax analysis area.

Cypripedium montanum is an orchid known from Washington, Oregon and California. It has small and scattered populations that are declining. Effects of logging, collection for horticultural use, loss of habitat on private land, and lack of fire have reduced populations and habitat. The loss of small, isolated populations due to activities such as timber harvest, road and trail construction, soil and litter disturbance, and a decrease of canopy closure to less than 60 percent have been identified as threats to this species (DOI/USFS 2004). There are 2 known sites occurring within 100 feet of roads or 100 meters of project units.

Illiamna latibracteata is a large perennial herb in the mallow family that grows in coniferous forest known from northern California and southern Oregon. There is 1 known site within the Rio Climax treatment area.

Leptogium teretiusculum is a lichen that is strongly associated with mixed conifer and primarily hardwood stands in Oregon. There are 5 known sites within the Rio Climax treatment area.

Limnanthes floccosa ssp. Bellingeriana is a perennial forb that grows in the full sun in vernally wet meadows or vernal pools, generally found on basalt scablands in Jackson and Klamath Counties in Oregon and in Shasta County in California. There are 8 populations within the treatment area of Rio Climax.

Nemacladus capillaris is an annual forb that grows on dry slopes or burned areas in Jackson County Oregon, and is more common in Coast Ranges, Sierra Nevada foothills, and Great Basin and desert province in California. There are 2 known sites in meadow plant communities within the Rio Climax treatment area.

Dendriscocaulon intricatulum is a lichen that grows in coniferous forests known from southeast Alaska through British Columbia; it reaches the apparent southern limit of its range in California. The main threats to this species include; removing colonized substrates and altering microclimate. There is 1 known site within the Rio Climax treatment area

c. Fungi

Of the 20 species of fungi that are on the Medford District Sensitive Species list, 19 are Survey and Manage species whose status determines that pre-disturbance surveys are impractical and not required; one species is a hypogeous (underground) fungus, as are other of the previously referenced fungi, where pre-disturbance surveys would be impractical. Oregon State Office Information Bulletin No. OR-2004-145 reaffirmed this, stating that Bureau policy (BLM Manual Section 6840) would be met by known site protection and large-scale inventory work (strategic surveys) through fiscal year 2004.

Surveys have documented no fungi sites located 100 feet from roads in the analysis area, or 100 meters from proposed units. Suitable habitat is present for other species on the Medford District Sensitive Species list (Table 3-24).

Table 3-24. Medford District Sensitive Fungi Species with Habitat in the Analysis Area

Scientific Name	2001 S&M Status*	2007 Heritage Rank**	ORBIC List***	NWFP Sites
Boletus pulcherrimus	B	G2G3/S2	1	23
Dermocybe humboldtensis	D	G1G2/S1	1	4
Gastroboletus vividus	B	G2?/S1	1	5
Gomphus kauffmanii	B	G2G4/S3?	1	74
Gymnomyces fragrans		G2G3/S1S3	3	2
Helvella crassitunicata	B	G3/S2	1	29
Leucogaster citrinus	B	G3G4/S3S4	2	48
Otidea smithii	B	G2/S2	3	10
Phaeocollybia californica	B	G2?/S2?	3	44
Phaeocollybia olivacea	B	n/a	1	115
Phaeocollybia oregonensis	B	G2?/S2?	n/a	15
Phaeocollybia pseudofestiva	B	G3/S3?	1	49
Pseudorhizina californica		G4/S2	3	42
Ramaria largentii	B	G3/S2?	2	20
Ramaria spinulosa var. *diminutiva*	B	GUT2/S1?	3	1
Rhizopogon chamalelotinus	B	G2G3/S1S2	1	1
Rhizopogon clavitisporus		G2G3/S1S2	2	3
Rhizopogon ellipsosporus	B	G2G3/S1S2	2	5
Rhizopogon exiguus	B	G2G3/S1S2	2	3
Sowerbyella rhenana	B	G3G4/S3	2	66

***Survey and Manage: as determined by the 2001 amendment to the 1994 Northwest Forest Plan Record of Decision for Survey and Manage, Protection Buffers and related mitigation measures.**

A= Rare, and all known sites are managed. Current and future known sites will be managed according to the Management Recommendation for the species. Minimize inadvertent loss of undiscovered sites. Pre-disturbance surveys are practical.
B= Rare, and all known sites are managed. Pre-disturbance surveys are not practical.
C = Uncommon, and not all known sites or populations are likely to be necessary for reasonable assurance of persistence, as indicated by several factors. Pre-disturbance surveys are practical.
D= Uncommon. Manage all known sites until high-priority sites can be determined. Pre-disturbance surveys are not practical or not necessary.
E=Rare, status undetermined. Manage all known sites while category assignment is being determined.

F= Uncommon, or Concern for Persistence Unknown. Management of known sites NOT required because species are uncommon, not rare. Until reassignment of species to a new category or removal from list occurs, inadvertent loss of some sites is not likely to change the level of rarity.

****Heritage Rank: an international system for ranking rare, threatened, and endangered species**

G = Global Rank
S = State Rank
1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.
3 = Rare, uncommon, or threatened but not immediately imperiled, typically with 21-100 occurrences.
4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.
5 = Demonstrably widespread, abundant and secure.
? = Not yet ranked or assigned rank is uncertain.

*****ORBIC List: Oregon Biodiversity Information Center maintains extensive databases of Oregon biodiversity, concentrating on rare and endangered plants, animals, and ecosystems.**

1=taxa which are threatened or endangered throughout their range or which are presumed extinct.
2=taxa which are threatened, endangered, or possibly extirpated from Oregon but are stable or more common elsewhere.
3=taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
4=taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered.

3. Environmental Effects

This section discusses the direct and indirect effects of implementing each of the alternatives and the impacts it would have on botanical resources. This section also discusses any cumulative effects considering the range of alternatives plus the effects of other actions that are currently happening or will be happening in the foreseeable future.

a. Alternative 1

Special Status Plants

The analysis area includes areas of varying stand and understory density, due to a history of previous land management activity. Stands with a prior harvest history and subsequent fuels reduction and silvicultural treatments have low- to-moderate shrub cover and tree seedling and sapling cover, resulting in relatively open understories, light ground cover, and filtered light. Under Alternative 1, there would be no increase in fire risk or fire hazard in those areas with previous management activity. Habitat for SSP in these areas would continue to be in good standing for the reasonably foreseeable future.

Without vegetation treatment, Special Status Plants and lichen populations would decline over time due to the slow degradation of suitable habitat through increase of low-growing shrub cover, increased seedling and sapling cover, and increased canopy cover. Through fire suppression, the plant communities will continue to become overly dense, decadent thickets with increased competition for resources. Fire risk and fire hazard would remain higher in those areas with unnaturally high fuel loading and fuels structure. A resulting high-intensity fire in this area would destroy the habitat and directly kill existing SSP populations.

b. Alternatives 2 and 3 - Special Status/Survey &Manage Plants and Fungi

The following documents the analysis of effects to botanical resources resulting from the implementation of Alternative 2 and 3 (see Chapter 2 for details).

The greatest threats to plant community health resulting from project activity would be soil disturbance that could result in nonnative/noxious weed introduction into areas previously not infested, and the potential loss of canopy cover for those species dependent on filtered light and/or higher moisture levels for survival. Soil compaction would also be a mechanism for habitat loss and degradation for SSP.

Commercial Timber Harvest, Pre-Commercial Thinning and Follow-Up Fuels Treatments
Known SSP sites in units would be protected either by no-treatment buffers or seasonal restrictions, or a combination of both. Trees proposed for cutting outside of the buffer areas would be directionally felled away from the buffers to prevent unintended soil disturbance or damage to plant populations. No-treatment buffers would be large enough to suit the individual needs of species to ensure that changes in moisture regime, canopy cover, light filtration and population continuity would be appropriate to meet SSP protection objectives. However, while no-treatment buffers would provide the maximum protection from site disturbance related to project activity, habitat conditions within the buffer would deteriorate over time as a result of increased forest density without some form of management. Risk for long-term fire hazard could also increase over time.

Pre-disturbance surveys for the 20 Sensitive Medford District fungi species (or fungi of related type) are impractical and not required, as determined by the Northwest Forest Plan. Pre-disturbance surveys are impractical because these species are difficult to identify and/or their occurrence is sporadic or unpredictable. All 20 species are associated with a forest component found in the analysis area; i.e., habitat exists in the analysis area to support these species. Most fungi on this list are mycorrhizal (associated with specific host trees) and depend on wind and/or animals to spread the spores. For these 20 fungi, species specific information on connectivity and habitat requirements, range (including occurrences within the analysis area), and disturbance effects is incomplete. Therefore, there is no information that would lead to a finding that Alternative 2 would have any effect on any of these 20 species.

Under Alternative 2, there would be no effect on documented sites of SSP located in Riparian Reserves due to implementation of PDFs described in Chapter 2 which prohibit activity from taking place within the established reserves.

Roads and Landings
In the Rio Climax analysis area, construction of six new road segments, with a total length of 2.75 miles is proposed under alternative 2 and construction of three new road segments, with a total of 1.25 miles is proposed under alternative 3. Under Alternative 3, one new landing, with an estimated size of ¼ acre, would be incorporated into the design at the end of road 38-2E-09.1 to accommodate helicopter access. There are no sites of SSP in the areas proposed for new road construction and landing. Road construction is proposed on private and BLM land in coniferous forest, oak woodland, and grassland plant communities. Closure of the roads after project activity is complete is intended to prevent the area in and around the site from potential OHV use that can arise with the creation of new road systems on public and private lands. However, prior observations across the Medford District have indicated that barriers (i.e., ditches and berms, fallen logs, boulders, visual barriers), gates and partial obliteration do not always prevent unauthorized land use and travel once a new road is constructed. To reduce the likelihood of unauthorized use, road construction and road closure would occur the same season of use. There are no sites of SSP that would be affected by the construction of the roads or landing, and therefore, no effect with the implementation of Alternative 2.

Roads used as haul routes would be maintained as needed (ditch cleaning, spot rocking, etc.) to ensure adequate protection (see Chapter 2). These roads are existing and need treatments that would enable large equipment to travel through (i.e., blading to shape the surface, rocking, repair and installation of drain dips). In addition to the road maintenance and improvements listed above BLM would renovate less than a mile of road on private land. Previously closed roads that have been identified and analyzed for use would be blocked to preclude vehicle use upon completion of harvest activities.

All disturbance activity would occur in the existing road prism, and there would be no effect on known SSP sites. Prior to disturbance activity, all known noxious weed sites located on haul routes or road proposed for improvements would be treated to prevent further spread of plant material and/or weed seed.

c. Cumulative Effects

The condition of the local landscape and its associated subwatersheds relies heavily on privately-owned land and activities that affect its habitat condition.

Grazing

The Rio Climax analysis area includes 7 active BLM grazing allotments (Lake Creek Spring, Lake Creek Summer, Yankee Creek Reservoir, Canal, Brownsboro, Antelope Road, and Grizzly). Of those 7 allotments, 4 leases (Yankee Creek Reservoir, Canal, Brownsboro, and Antelope Road) were renewed in 2008; three leases (Lake Creek Spring, Lake Creek Summer, and Grizzly) expired and are in varying stages of the lease renewal process. Cumulative effects within the Rio Climax analysis area due to the grazing will be addressed here. The Yankee Creek Reservoir, Canal, Brownsboro, and Antelope Road allotments are all small grazing allotments with a total of 98 combined AUMs. In addition, these four grazing allotments are two air miles or greater from the treatment units within the Rio Climax Project therefore, there are no cumulative effects to this project from the grazing that occurs on these allotments.

The Lake Creek Spring, Lake Creek Summer, and Grizzly allotments are comprised of 4,679; 5,561; and 5,167 acres respectively and have proposed treatment units within them. Proposed treatments within the allotments vary in treatment and stand type. The effects the livestock may be having on the landscape within the allotment are primarily focused in areas with perennial water and forage species. Livestock typically do not graze in forest stands and would not contribute to adverse cumulative impacts when combined with the effects of timber harvest. Forested areas bordering meadows are used by livestock for the shade they provide and trails and roads may be utilized as livestock travel through the allotment. Units 3-1 and 7-2 in the Grizzly allotment are mapped as having some areas of heavy and moderate average utilization respectively due to the close proximity to wet meadows and roads.

Two sites of SSP *Carex serrotodens*are adjacent to unit 11-1 and road 37-2E-7.1. *Carex serratodens* is a graminoid species, which are preferable to livestock for use as forage (Holecheck et al., 1982). Although livestock grazing may potentially impact these sites (trampling, grazing, soil disturbance); timber harvest proposed under Alternative 2 is not likely to contribute to an increased risk of impacts to these sites. The SSP sites are located outside of the unit, and/or are protected by project design features that limit equipment from operating outside of designated units or roads.

Livestock grazing is also expected to continue to contribute to the movement and introduction of noxious weed and nonnative plant species. Noxious weed control treatments are expected to be very limited in the areas managed by private holders, i.e., restricted to residential areas and federal projects conducted on private lands.

Private Land-Use Operations

Past or proposed timber harvest and other vegetation treatments on private land are not known. It is assumed that most timber harvest projects and other vegetation treatments on private land will have adverse effects on native plant communities (including SSP) due to timber removal prescriptions, logging methods, and less resource protection measures. Federal laws protecting endangered and special status plans do not apply to private land without a federal nexus.

Recreational Operations

Slope throughout the Rio Climax analysis area varies, areas with mild-to-moderate hillslopes are susceptible to unauthorized recreational uses (i.e., trail building, OHV use) due to fewer natural barriers on the landscape, which can lead to weed and nonnative species infestations and SSP habitat degradation. Areas of new road construction and re-opened roads are particularly vulnerable to increased OHV use.

The proposed 0.35 miles of road construction in 38S-2E-9 is not likely to have an increase in unauthorized use because the construction would occur in an area behind a locked gate. The proposed 0.50 miles of new road in 37S-1E-25 and 37S-2E-30 is primarily on private land in an area behind locked gates and an earth berm which prevents access by OHV. The proposed 1.5 miles of road construction in

37S-1E-17, the 0.16 miles in 37S-1E-21 and 0.19 miles on private land in section 22 are all behind a locked gate and there is no authorization of use or access for the public from private landowners. Field visits, summer 2011 indicate that the current barriers (gates, berms) in the areas where construction is proposed to occur and along the road system used to access the areas of proposed roads have been effective at precluding OHV use.

Temporary routes (short operator spurs) and roads that are proposed for re-opening to allow for harvest and hauling, and would be closed at the completion of the project as addressed in Chapter 2. The project area is not likely to receive an increase in unauthorized use as a result of project activity. Areas currently prone to unauthorized use could continue to be problematic due to the lack of natural barriers and/or the destruction of barriers installed to prevent vehicles on closed roads. For the roads re-opened for use during this project, BLM would work to improve barriers at the time of closure to prevent vehicle entry where past problems existed. Those roads (to be re-opened for the project) currently receiving little to no unauthorized OHV use would not likely receive increased use as these roads would be closed following project activities in a similar fashion as is currently in place. Because previously closed roads and all newly constructed roads would be adequately blocked, there are no effects from increased OHV use anticipated with the implementation of Alternative 2.

Past and Proposed Actions

Recent past and proposed federal timber sales and commercial/non-commercial vegetation projects in the Rio Climax analysis area considered under cumulative effects have mostly been for forest health and fuels reduction. These treatments attempt to remedy the effects of long-term fire suppression and, as such, are generally beneficial to native plant communities (including SSP). If left untreated, the chances for a stand-replacement, catastrophic fire are increased.

Effects to Special Status/Survey &Manage Plants and Fungi under Alternative 3 would not be measurably different from those noted in the narrative for Alternative 2. Alternative 3 would predict slightly less effects than Alternative 2, due to fewer acres of treatments and fewer miles of proposed roads.

J. NOXIOUS WEEDS AND INTRODUCED PLANTS

1. Affected Environment

a. Noxious Weeds

Analysis regarding known noxious weed populations within the Rio Climax Forest Management Project has been conducted at the 6th Field subwatershed level, and includes the following subwatersheds in their entirety: Lake Creek-Little Butte Creek, Upper Antelope Creek and Lower Antelope Creek. All references to the "Rio Climax analysis area" refer to the combined area of these subwatersheds.

Noxious weeds are generally nonnative plants that cause or are likely to cause economic or environmental harm or harm to human health. Introduced plants are species that are nonnative to the ecosystem under consideration. Introduced plants may adversely affect the proper functioning condition of the ecosystem. "Noxious Weed" describes any plant classified by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property.

There are a total of 103 documented noxious weed sites, comprised of 8 species, within the Rio Climax analysis area. There are 34 sites of 7different noxious weed species within or adjacent to (50 feet of haul route or 200 feet of unit) treatment areas and haul routes (Table 3-25)**.**All of the documented species are considered to be "B-Designated Weeds", as determined by the Oregon Department of Agriculture. Two of these species are also considered to be "T" species. There are no species from the federal noxious weed list in the analysis area.

Table 3-25. Noxious Weed Species and Occurrences in Rio Climax Analysis Area In or Adjacent to Treatment Areas

Scientific Name	Common Name	Documented Occurrences in HUC6	Documented Occurrences in treatment areas	ODA Designation*
Centaurea biebersteinii (syn. *C. stoebe, C. maculosa*)	spotted knapweed	1	--	B, T
Centaurea diffusa	diffuse knapweed	1	1	B
Centaurea solstitialis	yellow star-thistle	93	30	B, T
Circium arvense	Canada thistle	4	1	B
Circium vulgare	Bull thistle	unknown**	unknown**	B
Hypericum perforatum	St. Johnswort	unknown**	unknown**	B
Rubus armeniacus (syn. *R. discolor*)	Armenian (Himalayan) blackberry	4	2	B
Taeniatherum caput-medusae	Medusahead rye	unknown**	unknown**	B

***Oregon Department of Agriculture (ODA) Noxious Weed Control Program: provides a statewide leadership role for coordination and management of state listed noxious weeds.**

A= a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent.
B= a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties.
T= a priority noxious weed designated by the Oregon State Weed Board as a target for which the ODA will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the "A" or "B" list.

****The exact number of documented occurrences is unknown, due to under-reporting and a lower treatment priority.**

Oregon Department of Agriculture List B Noxious Weeds

Spotted knapweed (*Centaurea biebersteinii*,syn. *C. stoebe, C. maculosa*) is a native of Eurasia that easily invades areas with disturbance and causes a reduction in desirable plant communities. It can easily out-compete native plants for soil moisture and nutrients, and there is some evidence that knapweeds release chemical substances that can inhibit the growth and reproductive cycles of surrounding vegetation. The flowering period of this species can extend from June to October (Whitson et al., 1999). There are 79 documented sites of spotted knapweed on the Medford District BLM and 1 documented sites in the Rio Climax analysis area.

Diffuse knapweed (*Centaurea diffusa*) is a European native, first introduced to the Pacific Northwest in the early 1900s as a contaminant in alfalfa seed imported from Turkmenistan and/or Germany. A biennial, it flowers midsummer to fall. It will form dense stands on any open ground, easily out-competing more desirable forage species. The cost to treat established populations are often more expensive than the income potential of the land. It grows under a wide range of conditions, such as riparian areas, sand river shores, gravel banks, outcrops, rangelands and roadsides. There are 27 documented sites of diffuse knapweed on the Medford District, and 1 documented sites within the Rio Climax analysis area.

Yellow star-thistle (*Centaurea solstitialis*) is an annual or biennial with a deep taproot. The yellow flower heads have spines, producing 35-80+ seeds. Large plants can produce over 100,000 seeds. Seed dispersal is mainly via gravity with longer distances by birds, animals, humans, vehicles, and commercial crops. Seeds can remain viable in the soil seedbank for six to 10 years. Non-native honeybees are the main pollinator of yellow star-thistle, accounting for 50% of seed set. This weed is a native of Eurasia. It lowers forage value, increases farming and ranching costs, depletes soil moisture, displaces native plants, decreases plant diversity, and is toxic to horses. Successful control methods include chemical, biological, cultural, and mechanical (including pulling and mowing). There are 2,483 sites reported for the Medford District and 93 documented sites in the Rio Climax analysis area and 30 sites within 50 feet of haul routes or within 200 feet of treatment units.

Canada thistle (*Circium arvense*) is a colony-forming (primarily by asexual reproduction) perennial that is a native of Eurasia. This prickly rose-purple flowered plant can produce up to 1,500 wind transported seed per flowering shoot. Seed can remain viable in the soil for 20 years. Vegetative reproduction contributes to local spread and persistence. The large fibrous taproot can send out lateral roots as deep as three feet below the ground, from which shoots sprout up at frequent intervals. It also regenerates from root fragments less than one inch in length. Considered to be an aggressive weed, it thrives in areas with soil disturbance and is difficult to control. Flowering typically occurs during July and August (Whitson et al., 1999). There are 1,180 documented sites reported on the Medford District, and 4 documented sites within the Rio Climax analysis area. Detrimental effects attributed to the establishment of Canada thistle include displacement of native species, decrease of plant diversity, reduced forage, and it serves as an alternate host for insects and pathogenic microorganisms that attack various crops. Successful control methods include biological, chemical, cultural, and some limited success with mechanical methods.

Bull thistle (*Circium vulgare*) is a taprooted biennial with spiny stems, leaves, and inflorescences. Each flower head can produce up to 250 seeds. Most seed falls within six feet of the parent plant but is capable of long distance transport by wind and animals. Seed survival is very low, as is seedling and rosette survival. It is estimated to take 200 seeds to produce one flowering plant. Bull thistle seedlings are poor competitors and require bare mineral soil to survive. This weed is a native of Eurasia. There are 1,551 sites reported on the Medford District and no documented sites in the Rio Climax analysis area. However, this weed is under-documented within the GeoBOB weed database, as active control methods are not usually employed. Personal knowledge of the Botanist and recent records verify sites within the analysis area. Detrimental effects include displacement of native species, decrease of plant diversity, limits wildlife movement, and reduced forage. Bull thistle is eventually outcompeted by other vegetation for light, moisture, and nutrients.

Common St. Johnswort (*Hypericum perforatum*) is a perennial forb with extensive creeping rhizomes introduced from Eurasia as an ornamental plant. It is both a toxic and invasive weed. It can form dense stands in meadows, pastures, rangelands, disturbed sites, and along roads. It is toxic to livestock but also has human medicinal value. This weed is dramatically under-reported on the Medford District and active control methods, other than the release and monitoring of biological control agents, are not usually employed. Personal knowledge of the Botanist and recent records verify numerous sites within the Rio Climax analysis area, on both federal and privately-owned lands. Detrimental effects include displacement of native species, decrease of plant diversity, and reduced forage. Successful control methods include biological and chemical.

Himalayan (Armenian) blackberry (*Rubus armeniacus,* syn. *R. discolor*) is a perennial that blooms June to August. It is considered by the Oregon Department of Agriculture to be the most widespread and economically disruptive of all the noxious weeds in Western Oregon. An aggressive competitor, it effectively displaces native plant species, dominates riparian habitats upon introduction, and has a significant economic impact on right-of-way maintenance, agriculture, park maintenance and forest production. Capable of both sexual and asexual reproduction, it is able to quickly spread across landscapes or to jump great distances and create new infestations. Often, as plants reach an appropriate height, stem tips will bend down to the ground and establish a root system. Rhizomes also utilize adventitious rootstalks to enable the plant to spread from a single nutrient source. Long-term control methods are required for effective eradication. There are 676 documented sites of Himalayan blackberry on the Medford District; however, this species is under-reported due to the magnitude of occurrences and improbability of eradication in this area. There are 2 documented sites of Himalayan blackberry in the Rio Climax analysis area.

Medusahead rye (*Taeniatherum caput-medusae*) is a grass that is native to the Mediterranean region of Eurasia, and was introduced to the United States in the late 1800s. The first recorded occurrence of the medusahead rye in Oregon was in Douglas County in 1887, and it can now be found throughout the West. An annual, it usually blooms May to June. Known for its ability to out-compete other grasses by extracting the majority of soil moisture before native perennial grasses have begun their growing season, it is also rich in silica and quickly becomes unpalatable as early as late spring.

The stiff awns and hard florets can injure eyes and mouths of grazing animals. Medusahead rye also changes the temperature and moisture dynamics of the soil, which can greatly reduce seed germination of other species, and can create increased fuel for wildfires. Control methods usually involve chemical treatment; currently, there is no known biological control that can effectively manage for this species. There are 11 documented sites on the Medford District; however, medusahead rye is underreported District-wide and active control methods are not currently being used for management. Medusahead rye is documented in multiple areas throughout the Rio Climax analysis area, on both BLM and adjacent private lands in semi-wet and dry meadows.

b. Introduced Species

Introduced plants are species that are nonnative to the ecosystem under consideration. Introduced plants may adversely affect the proper functioning condition of the ecosystem. Although not listed on the ODA Noxious Weed list, introduced species pose a threat to natural plant communities in the Rio Climax analysis area. Recorded surveys indicate that there are many non-native species located within the analysis area (Table 3-26).

Table 3-26. Noxious Weeds and Introduced Plants within Rio Climax Analysis Area

Scientific Name	Common Name	Lifeform	ODA List*
Agrostis tenuis	colonial bentgrass	graminoid	
Aira caryophylla	silver hairgrass	graminoid	
Arrhenatherum elatius	tall oatgrass	graminoid	
Avena fatua	wild oat	graminoid	
Bromus diandrus	ripgut brome	graminoid	
Bromus hordeaceus	soft brome	graminoid	
Bromus laevipes	woodland brome	graminoid	
Bromus tectorum	cheatgrass	graminoid	
Centaurea cyanus	bachelor's buttons	forb	
Centaurea solstitialis	yellow star-thistle	forb	B, T
Centaurea stoebe var. *micrantha*	spotted knapweed	forb	B, T
Cerastium fontanum ssp *vulgare*	big chickweed	forb	
Cerastium glomeratum	sticky chickweed	forb	
Circium arvense	Canada thistle	graminoid	B
Circium vulgare	bull thistle	forb	B
Crepis capillaris	smooth hawksbeard	forb	
Cynosurus echinatus	bristly dogstail	graminoid	
Daucus carota	Queen Anne's lace	forb	
Dipsacus fullonum	Fuller's teasel	forb	
Elytrigia intermedia	intermediate wheatgrass	graminoid	
Holcus lanatus	common velvetgrass	graminoid	
Hypericum perforatum	St. Johnswort	forb	B
Lactuca serriola	prickly lettuce	forb	
Lepidium campestre	field pepperweed	forb	
Matricaria discoidea	disc mayweed	forb	
Phleum pratense	timothy	graminoid	
Plantago lanceolata	narrowleaf plantain	forb	
Poa bulbosa	bulbous bluegrass	graminoid	
*Poa pratensis**	Kentucky bluegrass	graminoid	
Polygonum arenastrum	oval-leaf knotweed	forb	
Ranunculs repens	creeping buttercup	forb	
Rubus discolor	Himalayan blackberry	forb	B
Rumex acetocella	common sheep sorrel	forb	

Scientific Name	Common Name	Lifeform	ODA List*
Rumex crispus	curly dock	forb	
Taeniatherum caput-medusae	medusahead	graminoid	B
Taraxacum officinale	dandelion	forb	
Torilis arvensis	spreading hedgeparsley	forb	
Tragapogon dubius	yellow salsify	forb	
Tragapogon porrifolius	salsify	forb	
Trifolium repens	white lawn clover	forb	
Verbascum blattaria	moth mullein	forb	
Verbascum thapsus	wooly mullein	forb	
Vulpia myuros	rattail fescue	graminoid	

***Naturalized Introduced**

2. Environmental Effects

a. Alternative 1

Noxious Weeds and Introduced Plants

Without vegetation treatment, there would be no increase in disturbed ground and no increase in forest and woodlands with lessened canopy cover. Both are conditions that would enhance the opportunities for weed establishment. Weed populations, where other mechanisms of spread do not exist would be limited to existing weed sites and spread would be limited to adjacent areas. New weed establishments would be limited to existing disturbed areas and areas of open canopy.

Noxious weed inventory and treatment would continue to occur. Treatments are scheduled by priority and occur based on the potential of the weed population to cause economic or environmental harm or harm to human health and as funding is available.

The potential remains for a stand replacement fire that would produce early seral habitat conditions that are favorable for weed and invasive nonnative plant establishment.

b. Alternatives 2 and 3

Noxious Weeds and Introduced Plants

Vegetation treatment would increase the amount of disturbed ground and areas of less canopy cover. Both of these conditions favor noxious weeds and invasive introduced plant establishment.

The creation of skid trails and areas of lighter vegetation cover would further increase the risk presented to plant communities from off-road vehicle use, due to the further removal of natural barriers and increased accessibility in areas where slope is mild-to-moderate. The BLM recently closed about 16 miles of roads/OHV trails in the analysis area reducing access points for OHVs. Additionally, reopened roads and all newly constructed roads would be adequately blocked and closures monitored following operations. Therefore, no significant effects from increased OHV use are anticipated with the implementation of Alternative 2.

Project Design Features as described in Chapter 2 are incorporated into the Proposed Action to minimize the spread of noxious weeds and invasive introduced plant species. Noxious weeds would not be spread as a direct result of executing this alternative with the implementation of the Project Design Features. However, weed seed can be transported into the analysis area by human actions not associated with the project and also by wind, water, and animals.

Weed Risk Assessment Field Review and Field Reconnaissance Results

Surveys for all species on the Medford Weed list were conducted in 2007 through 2010. Surveys were not conducted on private land but general occurrences were noted as casual observations. Noxious weeds are found throughout the analysis area on BLM and adjacent private lands. Noxious weed populations in the analysis area and on BLM are mostly associated with roads.

Class "A" Weeds

Those noxious weeds that are exotic (not native) to the State or area, and are of limited distribution or are unrecorded in the State or area and pose a serious threat to agricultural crops and rangelands in the State. Class A weeds receive highest priority. Management emphasis is complete control. These weeds approximate the Oregon Department of Agriculture List A weeds. A record check and surveys of areas that may be affected by the proposed project resulted in zero sites.

Class "B" Weeds

Those noxious weeds that are non-native (exotic) plant species that are of limited distribution or unrecorded in a region of the State but are common in other regions of the State and have been identified by the BLM or State as potentially harmful. Class B weeds receive second highest priority. Management emphasis is to control the spread, decrease population size, and eventually eliminate the weed population when cost-effective technology is available. These weeds approximate the Oregon Department of Agriculture List B weeds. A record check and surveys of areas that may be affected by the proposed project resulted in at least 103 sites of 8 species (Table 3-27) below. Bull thistle, Himalayan blackberry, Medusahead rye, and common St. Johnswort are underreported on the Medford District.

Class "C" Weeds

Those noxious weed species (exotic or native) or undesirable plants not categorized in the previous categories. This classification receives the lowest priority. Management emphasis is to contain spread to present population size or decrease population to a manageable size.

The following species are located within the Rio Climax analysis area, and fill the following criteria: they are exotic, have a high frequency from recent survey lists, and have the potential to cause ecological damage.

Table 3-27. Weeds Occurrences in Rio Climax Analysis Area

Scientific Name	Common Name	Weed Class	# Sites Counted
Centaurea solstitialis	yellow star-thistle	B	93
Centaurea biebersteinii (syn. *C. stoebe, C. maculosa*)	spotted knapweed	B	1
Centaurea diffusa	diffuse knapweed	B	1
Circium arvense	Canada thistle	B	4
Circium vulgare	bull thistle	B	unknown*
Hypericum perforatum	St. Johnswort	B	unknown*
Rubus discolor	Himalayan blackberry	B	4
Taeniatherum caput-medusae	medusahead	B	unknown*
Bromus hordeaceus	soft brome	C	unknown*
Bromus tectorum	cheatgrass	C	unknown*
Cynosurus echinatus	bristly dogstail	C	unknown*
Poa bulbosa	bulbous bluegrass	C	unknown*
*Poa pratensis**	Kentucky bluegrass	C	unknown*
Ranunculs repens	creeping buttercup	C	unknown*

***Species are typically underreported and/or not cataloged accurately in the District weed database. Exact population numbers are not available.**

Risk Assessment Factors

The likelihood of noxious weed species spreading into and within the analysis (Table 3-28) area is low-moderate; the project includes elements of both low and moderate risk factors. There are small but numerous Class B and C weed populations immediately adjacent to and within project roads and units. Project Design Features (PDFs) are included that would prevent the spread of noxious weeds due to direct effects of the proposed project.

Weed populations within the affected area would be reduced for five years, per PDF and BLM Manual 9015. Weed spread and new establishments after five years are expected from unrelated seed transport mechanisms and relic populations. The budget to treat and monitor noxious weeds is not fixed for this project. There is no budget to treat Class C weeds; also, it is not permitted to use herbicides on Class C weeds. If the weeds are not treated due to insufficient budget or workforce, the likelihood of noxious weed species spreading into and within the analysis area would be high.

Table 3-28. Factor 1: Likelihood of Noxious Weed Species Spreading to Analysis Area

Level	Value	Description
None	0	Noxious weed species not located within or adjacent to the analysis area. Project activity is not likely to result in the establishment of noxious weed species in the analysis area.
Low	1	Noxious weed species present in areas adjacent to but not within the analysis area. Project activities can be implemented and prevent the spread of noxious weeds into the analysis area.
Moderate	5	Noxious weed species located immediately adjacent to or within the analysis area. Project activities are likely to result in some areas becoming infested with noxious weed species even when preventative management actions are followed. Control measures are essential to prevent the spread of Noxious weeds within the analysis area.
High	10	Heavy infestations of Noxious weeds are located within or immediately adjacent to the analysis area. Project activities, even with preventative management actions are likely to results in the establishment and spread of noxious weeds on disturbed sites throughout much of the analysis area.

The consequence of noxious weed establishment in the analysis area (Table 3-29) is moderate. The majority of the noxious weed populations in the affected areas are small and mostly associated with roads. With additional ground disturbing activities (road construction/re-construction, road renovation, logging, burning) and operations that transport weed seed (log hauling, other road use), there is the potential to spread weeds into, within, and out of the analysis area. Also, unrelated activities can transport weed seed (e.g., wind, water, wildlife, hiking, OHV, etc.) into the newly disturbed areas. Weed infestations adversely affect a healthy functioning ecosystem.

Table 3-29. Factor 2: Consequence of Noxious Weed Establishment in Analysis Area

Level of Consequence	Value	Description of Possible Effects
Low to Nonexistent	1	None. No cumulative effects expected.
Moderate	5	Possible adverse effects on site and possible expansion of infestation within analysis area. Cumulative effects on native plant community are likely but limited.
High	10	Obvious adverse effects within the analysis area and probable expansion of noxious weed infestations to areas outside the analysis area. Adverse cumulative effects on native plant community are probable.

Risk Rating

Step 1 - Identify level of likelihood and consequence of adverse effects and assign values according to the following:

None-0 Low-1 Moderate-5 High-10

Step 2 - Multiply the level of Likelihood value (Table 3-28) by the Consequence value (Table 3-29) to determine Value.

Step 3 - Use the value resulting from Step 2 to determine Risk Rating and Action in Table 3-30 below.

Table 3-30. Risk Rating and Action

Value	Risk Rating	Action
0	None	Proceed as planned.
1-10	Low	Proceed as planned. Initiate control treatment on noxious weed populations that get established in the area.
25	Moderate	Develop preventative management measures for the proposed project to reduce the risk of introduction or spread of noxious weeds into the area. Preventative management measures should include modifying the project to include seeding the area to occupy disturbed sites with desirable species. Monitor area for at least 3 consecutive years and provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.
50-100	High	Project must be modified to reduce risk level through preventative management measures including seeding with desirable species to occupy disturbed sites and controlling existing infestations of noxious Weeds prior to project activity. Projects must also provide for control of newly established populations of Noxious weeds and follow-up treatment for previously treated infestations.

If weed work is funded, the **weed risk rating under Alternative 2 and 3 would be Low to Moderate**.

With suitable weed habitat increasing initially as a consequence of the action, total exclusion of new weed establishments is unattainable due to indirect effects. Particularly vulnerable areas would be new road construction (Alternative 2: 2.75 miles, Alternative 3: 1.25 miles), landings (less than ¼ acre each), road renovation sites (approximately 0.83 miles) as listed in Chapter 2 (Tables 2-4 & 2-8), yarding corridors, and openings created for mistletoe and pine areas (less than ¼ acre each). With adequate funding for vegetation inventory and weed treatment, existing noxious weed population sizes are expected to decrease and new establishments are expected to be minimized.

Effects to noxious weeds and introduced plants under Alternative 3 would not be measurably different from those noted in the narrative for Alternative 2. Alternative 3 would predict slightly less effects than Alternative 2, due to fewer miles of proposed roads and fewer acres of treatments.

K. RANGELAND RESOURCES/GRAZING

Approximately 274 acres of the treatment area are within the 5,561 acre Lake Creek Summer grazing allotment. The Lake Creek Summer grazing lease authorizes 182 cows from July 16-October 15 for a total of 550 Animal Unit Months (AUMs). An AUM is the amount of forage needed to support a cow and calf for one month. Approximately 92 acres of the treatment area are within the 4,679 acre Lake Creek Spring grazing allotment. The Lake Creek Spring grazing lease authorizes 173 cows from May 16-July 15 for a total of 347 AUMs. Approximately 173 acres of the treatment area are within the 5,167 acre Grizzly grazing allotment. The Grizzly grazing lease authorizes 94 cows from June 1-October 15 for a total of 378 AUMs. The remainder of the project area is outside grazing allotment boundaries. The grazing lease renewal process has been initiated on these three grazing allotments, an Environmental Analysis needs to be completed prior to a grazing decision and lease renewal.

1. Affected Environment

Cattle grazing commences annually at lower elevations (1,500 feet) on the generally south-facing slopes of the Lake Creek Spring grazing allotment and progresses to the higher elevations within the Lake Creek Summer grazing allotment. The vegetation is a mosaic of chaparral (*Ceanothus cuneatus*), prairie, mixed fir forest, and Oregon white oak (*Quercus garryana*) woodland. Native grasses, including Secund's bluegrass (*Poa secunda*), Roemer's fescue (*Festuca roemeri*), and California oatgrass (*Danthonia Californica*) grow across the elevational range, depending on local conditions of soil, topography, and shade. Annual and short-lived perennial weedy grasses, including medusahead (*Taeniatherum caput-medusae*), smooth brome (*Bromus hordeaceous*), dogstail (*Cynosurus echinatus*),and bulbous bluegrass (*Poa bulbosa*) grow throughout the allotments.

Vegetation in the Grizzly grazing allotment is primarily conifer forest (mixed fir and white fir) with areas of hardwood, shrubland, and grasslands. Cattle graze meadows and harvested forest openings within a matrix of varied conifer communities. The open meadows are primarily shrub and grass-dominated, with grass species including California oatgrass, Kentucky bluegrass (*Poa pratensis*), Roemer's fescue and bulbous bluegrass. Shrub species can include common snowberry (*Symphoricarpos albus*), rose spiraea (*Spiraea douglasii*) and currant (*Ribes sp.*). The conifer-dominated forests, comprised primarily of white fir, ponderosa pine, Douglas fir and incense cedar (*Abies concolor*, *Pinus ponderosa* and *Psuedotsuga menziesii*) generally have low-to-moderate levels of herbaceous species (forbs and grasses) present, and moderate-to-high shrub cover, depending both on age of the stand and the aspect.

2. Environmental Consequences

a. Alternative 1

The forested portions of these grazing allotments are seldom accessed by livestock resulting in utilization levels that are generally none-slight (0-10%) within the forest plant community. The AUM rates/carrying capacities that are approved in a grazing lease account for the 0-10% use in forested areas. If the proposed silvicultural treatments are not implemented forest stands would remain dense with little forage production and in some cases impenetrable to livestock. Because the Rio Climax Forest Management Project occurs in such a small area within the Lake Creek Spring, Lake Creek Summer, and Grizzly grazing allotments the effects on rangeland resources and the grazing lease would be undetectable.

b. Alternatives 2 and 3

The Rio Climax Forest Management Project would decrease stand density which would increase forage production by allowing more light to the forest floor for understory growth of herbaceous vegetation. In addition, grass seeding that would occur as part of project implementation would increase forage production at site specific locations and potentially be a seed source for expansion of native grasses in surrounding areas. There are no range improvements within or adjacent to any of the treatment units so no damage from livestock use in unauthorized areas from gates being left open or from range improvements that have been damaged and left in a non-functional condition is expected. Herding and salting of livestock into treated forest units and away from areas where concentrated livestock use is occurring would improve rangeland health. A combination of an increase in forage production and less dense forest stands would slightly improve rangeland resources within the Lake Creek Spring, Lake Creek Summer, and Grizzly grazing allotments.

Alternative 3 would have the same effect on grazing within the Lake Creek Spring, Lake Creek Summer, and Grizzly grazing allotments as Alternative 2.

L. CARBON STORAGE

1. Background

The purpose of the this section is to provide a basis for the decision maker to determine whether the proposed action or alternatives are likely to significantly impact the human environment with respect to greenhouse gas levels (i.e., atmospheric carbon levels). Changes in greenhouse gas levels affect global climate (Forster, et al. 2007, 129-234) which is incorporated here by reference, reviewed scientific information on greenhouse gas emissions and climate change and concluded that human-caused increases in greenhouse gas emissions are extremely likely to have exerted a substantial warming effect on global climate. Because forests store carbon, they affect the atmospheric concentrations of carbon dioxide, a greenhouse gas. Forest management can change the amount of carbon stored in a forest.

Scientific knowledge on the interrelationship between greenhouse gas levels and climate change is rapidly changing, and substantial uncertainties and several key limitations remain. One limitation is the inability of current science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. This limitation was identified by the U.S. Geological Survey in a May 14, 2008 memorandum to the U.S. Fish and Wildlife Service, which summarized the latest science on greenhouse gases. That memorandum is incorporated here by reference.

Definitions:

Forest ecosystem carbon pools – live trees, standing dead trees, understory vegetation, coarse woody debris, forest floor organic layer, and soil organic carbon (Smith, Heath, & Birdsey, 2006).

Disposition of carbon in harvested wood – defines where the carbon from harvested wood is stored and how it may be emitted (Smith, Heath, & Birdsey, 2006).

Products in use- End use products that have not been discarded or otherwise destroyed, examples include residential and nonresidential construction, wooden containers, and paper products.

Landfills- Discarded wood and paper placed in landfills where most carbon is stored long-term and only a small portion of the material is assumed to degrade, at a slow rate.

Emitted with energy capture - Combustion of wood productions with concomitant energy capture as carbon is emitted to the atmosphere.

Emitted without energy capture- Carbon in harvested wood emitted to the atmosphere through combustion or decay without concomitant energy recapture.

Sawlog- A log meeting minimum standards of diameter, length, and defect that is used in the manufacture of lumber.

Project Area – where action is proposed, such as the actual forest stands where thinning is proposed.

Pulpwood - Roundwood, whole-tree chips, or wood residues that are used for the production of paper, orientated stand board, particleboard or biomass for energy production.

Metric tonne (MT) - a measurement of weight. A tonne is equal to 2200 pounds.

2. Methodology

On July 16, 2009, the U.S. Department of the Interior withdrew the Records of Decision for the Western Oregon Plan Revision. The information contained in the Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management (USDI,

2008) is relevant since it examined recent and applicable science regarding climate change and carbon storage. That analysis concluded that effects of forest management on carbon storage could be analyzed by quantifying the change in carbon storage in live trees, storage in forests other than live trees, and storage in harvested wood. The discussion on Volume I, Pages 220-224; Volume II, Pages 537-543, and Volume III, Appendices, Pages 28-30 are relevant to the effects analysis for this project and are incorporated by reference.

The analysis of carbon stored in harvested wood in the 2008 FEIS used a factor for converting board feet of harvest wood to mass of carbon from Smith et al. 2006, p. 35. Based on information developed after the 2008 FEIS, this factor has been refined to better account for regionally-specific conditions and the fraction of harvested volume that is typically milled into solid wood products and into processed wood products.

Harvest volumes were converted to cubic feet, converted to pounds of biomass, and then to carbon content, yielding an overall conversion factor of 1,000 board feet = 1.326 tonnes of carbon. Of this total amount of carbon in harvested wood, 36.2% of harvest volume is considered as sawlogs and 63.8% as pulpwood (USDA, 1999) for evaluation using the storage rates over time from Smith et al. 2006, p. 27. The improved conversion factor is used in this analysis to evaluate the amount of carbon stored in harvested wood.

Information on the development of this conversion factor is on file in the BLM office and is available for review upon request and is incorporated here by reference (R. Hardt, personal communication, 11/6/09). For the Rio Climax project area, the conversion factor has been adjusted further to reflect the mixed species composition of the stands to be treated. Rather than using the Douglas-fir factor of 35 pounds of biomass per cubic foot, 32.75 pounds per cubic foot was used (mixed conifer and hardwood stands), with a conversion factor of 1,000 board feet = 1.098 tonnes of carbon.

3. Assumptions

- In the absence of large disturbance events (wildfire, severe blowdown or insect epidemics) carbon storage on about 70 percent of BLM-administered lands on the Medford District would increase. On the remaining 30 percent of BLM-administered lands designated as Matrix, the RMP/EIS assumes an annual timber harvest of 3000 acres. On those acres, timber harvesting would decrease carbon storage levels at varying rates and for varying lengths of time dependent upon the amount of vegetation removed and how quickly re-growth occurs. Because the vast majority of BLM-administered lands are not allocated to intensive or restricted forest management it is expected that continued vegetative growth on those lands would lead to more carbon capture and storage than the amount of carbon lost from timber harvesting, vegetative respiration or disturbance events.
- Douglas-fir is the dominant species that would be harvested. Ground based logging systems would be used with sawlogs the primary product.
- The carbon calculations are estimates based upon data from a representative stand of each silvicultural system proposed. The values are not absolute rather they are generalized estimates that allow a comparison between alternatives.
- Future management (regeneration harvest) may occur within the next 20-30 years in the proposed thinning and density management stands.
- The carbon storage and emission analysis period is based upon current stand age. For this project, a 20 year analysis period was used for selectivethinning-60%, selective thinning-40%, and density management treatments.
- Harvest operations (cutting, yarding and hauling) result in short term carbon emissions. For the Analysis Area for silviculture, an average harvest volume of 10,000 board feet per acre was used to estimate a total emission of about 45 tonnes of carbon from harvest operations (Salem District, 2010). This value is common to Alternatives 2 and 3.

4. Affected Environment

The 2008 FEIS described current information on predicted changes in regional climate (pp. 488-490), and is incorporated here by reference. That description concluded that the regional climate has become warmer and wetter with reduced snowpack, and continued change is likely. That description also concluded that changes in resource impacts as a result of climate change would be highly sensitive to specific changes in the amount and timing of precipitation, but specific changes in the amount and timing of precipitation are too uncertain to predict at this time. Because of this uncertainty about changes in precipitation, it is not possible to predict changes in vegetation types and condition, wildfire frequency and intensity, streamflow, and wildlife habitat. The analysis in this EA therefore does not attempt to predict changes in the project area due to existing or potential future changes in regional climate.

In the Rio Climax project area, mixed conifer, Douglas-fir, and ponderosa pine stands that are 60 to 150 years old are proposed for treatment. Within these forests, the quantity of stored carbon varies from stand to stand and is influenced by site quality and the amount, type and size of vegetation present. The current amount of vegetation defines the existing levels of on-site carbon and is considered the baseline amount that would be affected by management actions.

5. Environmental Consequences

a. Alternative 1

This alternative would not implement the Medford District RMP management direction for general forest and riparian management areas. No timber management actions would occur.

No forest vegetation would be removed; the current amount of on-site carbon would not be affected. In the long term it is expected that continued growth of forest vegetation would result in the increase of stored carbon. Limited reductions in carbon would happen as periodic mortality or decomposition from natural processes occurs. In the absence of catastrophic disturbance events, it is expected that continued forest growth would capture and store more carbon than would be lost from natural processes. The No-Action Alternative would result in 948 acres not being thinned. This would result in a net carbon storage increase of about 20,045 tonnes over the next 20 years.

Table 3-33. Alternative 1: Carbon Emissions and Storage – 20 year Analysis Period

Silvicultural Treatment	Acres	1 Emissions 2010-2030	2 Live tree storage current conditions 2010	3 Storage 20 year analysis period	4 Net change live trees	5 Harvested wood storage 2030	6 Total storage increase	7 Net Carbon (Storage or Emission)
ST-60%	352	0	27,456	36,960	9,504	0	9504	9,504
ST-40%	395	0	28,440	34,760	6,320	0	6,320	6,320
DM-NH	201	0	8,241	12,462	4,221	0	4,221	4,221
Total	948	0	64,137	84,182	20,045	0	20,045	20,045

- The average thinning stand age is about 110 years old. RMP direction provides for another entry when the stand reaches culmination of mean annual increment (CMAI). A 20 year analysis provides the timeframe until CMAI is reached
- A representative Selective Thinning /NFR 60% stand (T37S 1E Section 14, OI 002) was modeled in Organon (Hann 2003)to derive decadal cubic foot volume growth rates. The calculated value is applied as an average for all thinning stands. The thinning unit selected for analysis is 42 acres and has a current volume of 33,773 bdft/acre.
- A representative Selective Thinning /DSP 40% stand (T37S 2E Section 29, OI 029) was modeled in Organon (Hann 2003) to derive decadal cubic foot volume growth rates. The calculated value is

applied as an average for all thinning stands. The thinning unit selected for analysis is 16 acres and has a current volume of 31,324 bdft/acre.

- A representative Density Management/NH stand (T37S 2E Section 19, OI 005) was modeled in Organon (Hann 2003) to derive decadal cubic foot volume growth rates. The calculated value is applied as an average for all thinning stands. The thinning unit selected for analysis is 48 acres and has a current volume of 18,024 bdft/acre.

b. Alternative 2

This alternative implements the Medford District RMP management direction for general forest management areas. This alternative applies silvicultural treatments that would increase landscape resiliency to environmental disturbances and increase stand structural diversity. Dispersal and nesting, roosting, and foraging habitat within active spotted owl home ranges will be treated and maintained.

Table 3-34. Proposed Silvicultural Treatments in Alternative 2

Rio Climax Silvicultural Treatment	Treatment Acres
Selective Thinning(ST) – Nesting Roosting and Foraging 60%	352
Selective Thinning (ST) – Dispersal Habitat 40%	395
Density Management (DM) – Non-Habitat	201
Total	948

It is estimated that about 8,161 board feet per acre of harvested wood would be removed by selectively thinning to 60% canopy cover in NRF stands; 8,161 board feet contains approximately 10 tonnes of carbon. The amount of live tree carbon in selective thinning NRF stands would be reduced from approximately 78 tonnes per acre to 59 tonnes per acre, resulting in the transfer of 19 tonnes of live tree carbon to other pools (on-site dead woody debris, lumber, wood products discarded to landfills, biomass, pulpwood). A carbon analysis period of 20 years is used.

It is estimated that about 13,324 board feet per acre of harvested wood would be removed by selectively thinning to 40% canopy cover in DSP stands; 13,324 board feet contains approximately 17 tonnes of carbon. The amount of live tree carbon in selective thinning DSP stands would be reduced from approximately 72 tonnes per acre to 41 tonnes per acre, resulting in the transfer of 31 tonnes of live tree carbon to other pools (on-site dead woody debris, lumber, wood products discarded to landfills, biomass, pulpwood). A carbon analysis period of 20 years is used.

In Density Management-Non-Habitat stands, approximately 10,603 board feet per acre would be removed by treatment. Harvested wood in 10,603 board feet per acre contains about 13 tonnes of carbon. The average Density Management stand would be reduced from 41 tonnes per acre of live tree carbon to 17 tonnes per acre, resulting in a transfer of 24 tonnes of live tree carbon to other pools. A carbon analysis period of 20 years is used.

Of the total amount of carbon in harvested wood, 36.2 percent of the volume is utilized as sawlogs and the remaining 63.8 percent as pulpwood (USDA, 1999).

Harvested Wood Carbon Emissions

Selective Thinning/NRF (60%), 20 year analysis period:

Wood harvested from this treatment would have a short term (post-harvest to 10 years) carbon emission of 2.5 tonnes/acre. In the long-term (11-20 years), the carbon emitted is0.38 tonnes/acre. For the 20 year analysis period, carbon emissions from the harvested wood are about 2.9 tonnes/acre. The balance of the carbon, 7 tonnes/acre would remain stored in products still in use or in landfills, or emitted with energy capture.

Selective Thinning/DSP (40%), 20 year analysis period:
Wood harvested from this treatment would have a short-term (post-harvest to 10 years) carbon emission of about 4.5 tonnes/acre. In the long-term (11-20 years), the carbon emitted is 0.65 tonnes/acre. For the 20 year analysis period, carbon emissions from the harvested wood are about 5.2 tonnes/acre. The balance of the carbon, 12 tonnes/acre would remain stored in products still in use or in landfills, or emitted with energy capture.

Density Management/Non-Habitat, 20 year analysis period:
Wood harvested from this treatment would have a short term (post-harvest to 10 years) carbon emission of 3.2 tonnes/acre. In the long-term (11-20 years), the carbon emitted is 0.49 tonnes/acre. For the 20 year analysis period, carbon emissions from the harvested wood are about 3.7 tonnes/acre. The balance of the carbon, 10tonnes/acre would remain stored in products still in use or in landfills, or emitted with energy capture.

Carbon Dioxide Emission
The total carbon dioxide emitted during the 20 year analysis periods is considered negligible in the context of total U.S. carbon dioxide emissions of 6 billion metric tons (DOE, 2009).

Selective Thinning/NRF (60%) in this alternative would result in the emission of about 2.9 tonnes of carbon per acre or about 10 tonnes of carbon dioxide per acre[3] during the 20 year analysis period. Thinning 352 acres would result in the emission of 3,520tonnes of carbon dioxide. The carbon dioxide emission represents .00000059 percent of current U.S. emissions.

Selective Thinning/DSP (40%) in this alternative would result in the emission of about 5.2 tonnes of carbon per acre or about 17 tonnes of carbon dioxide per acre[2] during the 20 year analysis period. Thinning 395 acres would result in the emission of 6,715tonnes of carbon dioxide. The carbon dioxide emission represents .0000011 percent of current U.S. emissions.

Density Management/Non-Habitat in this alternative would result in the emission of about 3.7 tonnes of carbon per acre or about 13 tonnes of carbon dioxide per acre[3]during the 20 year analysis period. Harvesting of 201 acres would result in the emission of 2,613tonnes of carbon dioxide. The carbon dioxide emission represents .00000044 percent of current U.S. emissions.

Live Tree Carbon Storage
Continued forest growth following Selective Thinning/NRF (60%) would increase carbon storage approximately 725 cubic feet per acre per decade (Hann, 2003) which is equal to about 8.9 tonnes of stored carbon per acre per decade or 0.9 tonnes per year. Within 4 years after thinning the carbon emission level (2.9 tonnes/acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after about 25 years of tree growth.

Continued forest growth following Selective Thinning/DSP (40%) would increase carbon storage approximately 262 cubic feet per acre per decade (Hann, 2003) which is equal to about 3.2 tonnes of stored carbon per acre per decade or 0.32 tonnes per year. Within 17 years after thinning the carbon emission level (5.2 tonnes/acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after about 100 years of tree growth.

Continued forest growth following Density Management/Non-Habitat would increase carbon storage approximately 300 cubic feet per acre per decade (Hann, 2003) which is equal to about 3.7 tonnes of stored carbon per acre per decade or 0.37 tonnes per year. Within 10 years after thinning the carbon

[3] To convert carbon to carbon dioxide, multiply carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon).
[2] To convert carbon to carbon dioxide, multiply carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon).
[3] To convert carbon to carbon dioxide, multiply carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon).

emission level (3.7 tonnes/acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after about 75 years of tree growth.

Table 3-35. Alternative 2: Carbon Emissions and Storage – 20 year Analysis Period - Thinning

Silvicultural Treatment	Acres	Emissions 2010-2030	Live tree storage current conditions 2010	Storage 20 year analysis period	Net change live trees	Harvested wood storage 2030	Total storage increase	Net Carbon (Storage or Emission)
ST-60%	352	1021	27,456	28,512	1,056	2,464	3,520	2,499
ST-40%	395	2,054	28,440	20,935	-7,505	4,740	-2,765	-4,819
DM-NH	201	744	8,241	5,628	-2,613	2,010	-603	-1,347
Total	948	3,819	64,137	55,075	-9,062	9,214	152	-3,667

c. Alternative 3

This alternative implements the Medford District RMP management direction for general forest management areas similarly to Alternative 2 with less treatment acres proposed. This alternative applies the same silvicultural treatments as Alternative 2 without Density Management treatments.

Table 3-36. Proposed Silvicultural Treatments in Alternative 3

Silvicultural Treatment	Treatment Acres
Selective Thinning (ST) – Nesting Roosting and Foraging 60%	488
Selective Thinning (ST) – Dispersal Habitat 40%	313
Total	801

Selective Thinning/NRF (60%) and Selective Thinning/DSP (40%) for the 20 year analysis period for this alternative has the same harvested wood carbon emissions, carbon dioxide emissions and live tree carbon storage outputs as Alternative 2. However, total project acres for this alternative would be less than Alternative 2, thus total carbon storage or emissions would be less.

Table 3-37. Alternative 3: Carbon Emissions and Storage – 20 year Analysis Period - Thinning

Silvicultural Treatment	Acres	Emissions 2010-2030	Live tree storage current conditions 2010	Storage 20 year analysis period	Net change live trees	Harvested wood storage 2030	Total storage increase	Net Carbon (Storage or Emission)
ST-60%	488	1,415	38,064	39,528	1,464	3,416	16,592	13,176
ST-40%	313	1,628	22,536	27,544	5,008	3,756	-4,695	-6,323
Total	801	3,043	60,600	67,072	6,472	7,172	11,897	6,853

d. Summary – Comparison of Alternatives

The No-Action Alternative would result in greater net carbon storage over the 20 year analysis period than Alternative 2 by approximately 23,712 tonnes, and Alternative 3 by 13,192 tonnes.

Table 3-38. Comparison of Alternatives for Carbon Emissions and Storage -20 year Analysis Period

Alternatives	Acres	Emissions 2010-2030	Live tree storage current conditions 2010	Storage 20 year analysis period	Net change live trees	Harvested wood storage 2030	Total storage increase	Net Carbon (Storage or Emission)
1	948	0	64,137	84,182	20,045	0	20,045	20,045
2	948	3,819	64,137	55,075	-9,062	9,214	152	-3,667
3	801	3,043	60,600	67,072	6,472	7,172	11,897	6,853

M. OTHER EFFECTS

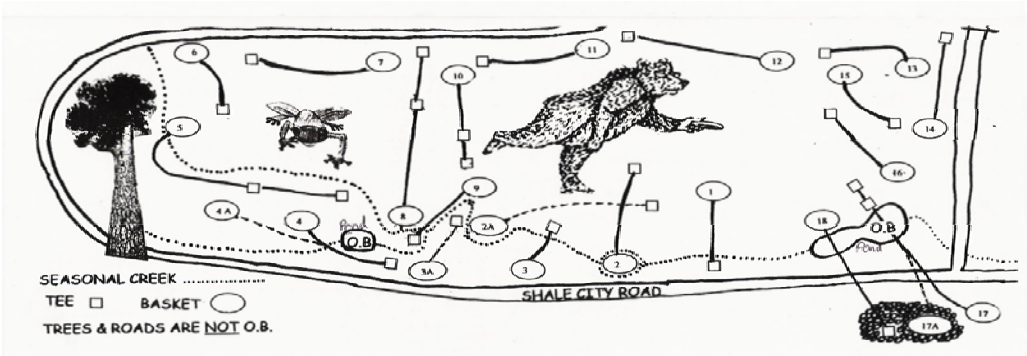
1. Recreation

Recreation within or in close proximity to most of the proposed sale units included in the Rio Climax Project consists of dispersed types of recreation. These areas are characterized as low use recreational areas where no developed or designated recreational sites or activities exist. Dispersed recreation in the project area includes hiking, horseback riding, disc golf throwing, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering.

Grizzly Peak Trail is a high elevation (5,922 feet) multi-use/non-motorized 5.5mile loop trail accessed by BLM road T38R02E9.2. From late spring through fall months, Grizzly Peak Trail offers hikers, mountain bikers, and equestrian users a ridge top view of the Rogue Valley and the City of Ashland. Late spring/early summer months also offer opportunities for the viewing of wildflowers. Wildlife such as birds of prey and large game can be viewed year round. During winter months, while access to the trailhead and parking area is limited, visitors utilize snowshoes and cross-country skis to access the trail. Grizzly Peak is estimated to receive over 7500 visitors yearly.

The Frog Creek Disc Golf Course at Shale City (Figure 3-5) is a heavily used, user-created, non-designated, disc golf course located in proximity to the Rio Climax project that is part of the dispersed recreation that takes place in the project area. The course receives heavy use during the months of June, July, August, and into September as the area is prone to snowfall which reduces accessibility during winter months.

Figure 3-5. Frog Creek Disc Golf Course



(http://www.dgcoursereview.com), disc golf course is partially within project unit

Cougar Ridge Disc Golf Course at Lake Creek is another user-created, un-designated disc golf course that is part of the dispersed recreation that takes place in the project area. The course receives low to moderate use during the months of June, July, August, and into September. Public access to the course is blocked by a seasonally closed gate during the wet months November 1 through June 1) to protect the area from unauthorized OHV activity.

Modifications to the landscape to support logging operations such as skids roads and yarder landings create access corridors for the public to areas which would otherwise be inaccessible by motorized vehicles. Approximately 2.75 miles of newly constructed roads are proposed in this project. Leaving these new roads open would provide for the potential increased of OHV use into new areas. Blocking these roads once the logging activities have concluded would reduce the potential for use by motorized vehicles including 4x4 trucks and OHVs. These roads may continue to be accessible to foot traffic including equestrian use but would be dependent on the type of blockage used to close the road. Because the use is dependent on user responsibility and their determination to access thinned stands, ripping skid roads and scattering large amounts of debris is the only way to assure non-use by motorized vehicles.

Associated recreation-related problems in the project area, particularly near Shale City Road, include trash dumping, large parties, underage drinking, and inappropriate target shooting resulting damage to natural resource and private and government property.

Impacts to dispersed recreation would be low and in the form of temporary road closures and encounters with haul truck and construction traffic during the time of road construction and logging operations on the ROW applicants lands. Depending on the proximity of users to the logging activities, some impacts to user experience in the form of noise my take place. To improve safety during hauling operations, the Shale City road would be signed by the operator to alert recreationists of the potential for encounters with haul trucks.

Hikers on the Grizzly Peak trail may experience some impacts from logging activities such as noise from chainsaws and large equipment and/or log truck traffic on Grizzly and Shale City Roads. The parking area and road would be signed to remind users of potential hazards from logging activities.

Indirect impacts to recreational users of the Cougar Ridge disc golf course at Lake Creek and the Frog Creek disc golf course would be low, and in the form of temporary road closures and encounters with log truck traffic during the time of logging operations. The road accessing Cougar Ridge (T37R01E7.1) is gated and closed from September to June to protect resources from potential unauthorized OHV use.

It is anticipated that only short term adverse impacts to the dispersed recreational user within the project area would occur during actual harvest or fuels management operations, when certain roads may be blocked by logging equipment or active falling operations. Logging and log haul would be restricted to between June 1 and October 15, although some variation in those dates is possible depending on weather and soil moisture, so the short term impacts described above would happen during that time period. Non-commercial and fuel treatments may occur before and after those dates, but the expected impact to the dispersed recreational user is minimal. However, there may be short periods of time when burning may preclude some recreational use due to safety concerns.

Additionally, smoke from prescribed burning may adversely affect recreational use of the Antelope and Lake Creek drainages, but the effects would be short term, and typically overnight, when residual smoke may subside into the valleys. Underburning is usually accomplished in early spring and late fall, before and after the peak recreational period. Pile burning is typically accomplished November through February when atmospheric conditions are favorable, and when recreational use is also in the off season. Long term, the recreational use is expected to return to the pre-project level.

2. Visual Resource Management

"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). Project units in the Rio Climax project area are classified as VRM Class III and IV (RMP Map 10).

> **Class III Objective**. The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
>
> **Class IV Objective**. The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

As with all proposed projects, it must be determined whether the potential visual impacts from a proposed ground-disturbing activity will meet the management objectives established for the area, or whether design adjustments would be required. A visual contrast rating process is used for this analysis, which involves comparing the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture. This process is described in BLM Handbook H-8431-1, Visual Resource Contrast Rating.

The characteristic landscape within the zone is typical of a highly managed and altered forest scene. Past activities such as extensive road building, complete conifer harvest and ranching on adjacent private lands, and extensive hardwood stands, meadows, and ranch land scattered throughout create a highly modified forest and valley landscape. The intermingled private lands with their associated developments and past harvest treatments provide a variety of visual contrast. Evidence of past wildfires in the area has also added variety to the landscape by providing openings in the vegetation. The village of Lake Creek, owned by Cascade Ranch, is located just outside the northeast edge of the project area. The main paved roads which provide access to the project area are South Fork Little Butte Creek Rd, Lake Creek Road, Antelope Road, and Shale City Road. Individual residences are scattered along these and other additional minor roads.

The key observations points for VRM analysis are from well-traveled public roads with views up and down the drainages. Other non-critical viewpoints are scattered throughout the area on various roads and off-highway vehicle (OHV) trails and are not subject to scenic viewing by the public due to their remote locations and difficulty of access. The proposed road construction would not increase visual contrasts in the area although some color and line form changes would be mildly noticeable to the observer.

The proposed units located on lands managed as Class III are primarily situated in three areas: South of Lake Creek Road, west of South Fork Little Butte Creek Road, and along Antelope Road. The units nearest to the village of Lake Creek are either fairly well screened from view by topography and vegetation or, where visible, are located in the background. The unit at the southeast end of the project area (9-1B), between Shale City Road and Antelope Road is partially visible from several areas along the Grizzly Peak Trail.

Table 3-39. VRM Class III Units

3-1(portion), 9-4 (portion), 11-1, 11-2, 11-3, 11-4, 11-5, 11-6, 13-1A, 13-2, 13-3, 13-6A, 13-6B, 13-6C, 13-6D, 13-6E, 13-8, 14-1 (portion), 17-1, 17-2 (portion), 17-3, 17-4, 17-6A (portion), 17-6B (portion), 17-6C (portion), 17-7A (portion), 17-7B (portion), 17-8 (portion), 17-9, 17-10, 17-11, 19-1, 19-2, 19-4A, 19-4D, 20-1, 25-1, 25-2, 25-3, 25-5, 27-1A (portion), 29-1, 29-2, 29-3, 29-4, 29-6B (portion), 29-6C, 29-6D, 29-6E (portion), 29-8, 29-9, 35-2 (portion), 35-7, 35-8, 9-3C (portion)

The majority of the proposed units managed as VRM Class IV are located away from main roads and local residences. A few of the units will be partially visible to travelers on the South Fork Little Butte Creek Road for short periods of time as they drive north or south on the road.

Table 3-40. VRM Class IV Units

3-1(portion), 7-1, 8-3, 8-4, 8-5, 9-2, 9-4 (portion), 14-1 (portion), 17-2 (portion), 17-6A (portion), 17-6B (portion), 17-6C (portion), 17-7A (portion), 17-7B (portion), 17-8 (portion), 27-1A (portion), 27-1C, 29-6B (portion), 29-6E (portion), 32-1, 35-2 (portion), 6-1A, 6-1B, 9-1A, 9-1B, 9-3A, 9-3B, 9-3C (portion)

Antelope Creek

The proposed treatment areas within Antelope Creek are classified as VRM III and IV, with Class III lands generally on the lower slopes where no treatment is proposed. The proposed harvest units are located on the upper slopes and ridgetops, and would not be readily apparent to a casual observer on Antelope Creek Road because of the canopy cover that would remain following harvest (40-60% canopy retention), and because of significant screening in the foreground. There would be little change in the visual contrast, except for cable yarding corridors in Unit 9-1B (VRM IV) which may be more apparent to a casual observer during the winter when a snowpack provides for more contrast. The proposed spur in 38-2E-9 would be screened by reserved conifers below the road. Proposed roads in 37-1E-17 would be screened by sub-ridges, and by remaining canopy in the proposed harvest units.

Lake Creek

The treatment areas within Lake Creek are located on moderately steep slopes in the middle and upper slopes and serve as a visual backdrop to an elongated, pastoral valley adjacent to South Fork Little Butte Creek Road and Lake Creek Roads. These treatment areas are classified as VRM III. Cascade Ranch owns much of the intermingled private lands and activities such as cattle ranching and timber harvest on those lands dominates the foreground. The upper portions of Lake Creek Road have substantial conifer screening in the foreground. A visual contrast rating was completed using key observation points on Hwy 140 and Lake Creek Road. The proposed harvest for these areas is commercial thinning and selection harvest leaving approximately 40-60% canopy cover. The relatively light harvest proposed would leave a modified viewshed that would not be apparent to the casual observer due to the level of retained canopy and little change in the visual contrast.

3. Air Quality

Prescribed burns are conducted within the limits of a Burn Plan, which describes prescription parameters so that acceptable and desired effects are obtained. Smoke produced from prescribed burning is the major air pollutant of concern.

Fuels management activities generate particulate pollutants in the process of treating natural and activity related fuels. Smoke from prescribed fire has the potential to effect air quality within the project area as well as the surrounding area. The use of prescribed fire for ecosystem restoration can produce enough fine particulate matter to be a public health and/or welfare concern.

Fine particulates in smoke can travel many miles downwind impacting air quality in local communities, causing a safety hazard on public roads, impairing visibility in class I areas, and/or causing a general nuisance to the public. If properly managed, most negative effects of prescribed fire smoke can be minimized or eliminated.

The National Ambient Air Quality Standards (NAAQS), set by the authority of the Clean Air Act (CAA), cover six "criteria" airborne pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone and particulate matter. The lead and sulfur content of forest fuels is negligible, so these two forms of air pollution are not a consideration in prescribed burning.

Prescribed burning does emit some carbon monoxide (CO), from 20 to 500 lb. per ton of fuel consumed. This would be a concern if there were other persistent large CO sources in the immediate vicinity. CO is such a reactive pollutant, however, that its impact is quickly dissipated by oxidation to carbon dioxide where emissions are moderate and irregular and there is no atmospheric confinement.

Burning also emits moderate amounts of volatile organic compounds (VOC) and minor amounts of nitrogen oxides (NOx). These are precursors to formation of ground level ozone. Here, fire-related emissions may be seen as important only when other persistent and much larger pollution sources already cause substantial nonattainment of NAAQS.

Particulate matter smaller than 10 micrometers (PM 10) is a term used to describe airborne solid and liquid particles. Because of its small size, PM 10 readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema.

The fate of PM emissions from prescribed burning is twofold. Most (usually more than 60%) of the emissions are 'lifted" by convection into the atmosphere where they are dissipated by horizontal and downward dispersion. The "unlifted" balance of the emissions (less than 40%) remain in intermittent contact with the ground. This impact is dissipated by dispersion, surface wind turbulence and particle deposition on vegetation and the ground. The risk of impact on the human environment differs between the two portions of smoke plume.

Smoke Aloft

Until recent decades, the impact of the lifted portion of smoke was ignored because it seemed to "just go away." These impacts are generally not realized until the mechanisms of dispersal bring the dispersed smoke back to ground level. Because the smoke has already dispersed over a broad area, the intensity of ground-level exposure is minimal. The duration of exposure may include the better part of a day, however, and the area of exposure may be large.

Ground Level Smoke

Unlike smoke aloft, the potential for ground level smoke to create a nuisance is immediate. This part of the smoke plume does not have enough heat to rise into the atmosphere. It stays in intermittent contact with the human environment and turbulent surface winds move it erratically. Also in comparison to smoke aloft, human exposure is more intense, relatively brief (a few hours) and limited to a smaller area. Smoke aloft is already dispersed before it returns to the human environment while ground level smoke must dissipate within that environment. Dissipation of ground level smoke is accomplished through dispersion and deposition of smoke particles on vegetation, soil and other objects.

Smoke Sensitive Receptor Area (SSRA)

The population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls in the past were in violation of the national ambient air quality standards for PM 10 and are classified as nonattainment for this pollutant. The nonattainment status of these communities was not attributable to prescribed burning. Major sources of particulate matter within the Medford/Ashland SSRA is smoke from woodstoves and dust and industrial sources.

The contribution to the nonattainment status of particulate matter from prescribed burning is less than 4% of the annual total for the Medford/Ashland air quality management area. Over the past ten years the

population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM 10.

The pollutant most associated with the Medford District's resource management activities is PM 10 found in smoke produced by prescribed fire. Monitoring in southwest Oregon consists of nephelometers (instrument designed to measure changes in visibility) in Grants Pass, Provolt, Illinois Valley, Ruch and eventually in Shady Cove. One medium volume sampler is collocated with the nephelometer at the Provolt site. The medium volume sampler measures the amount of PM 10 and smaller at ground level.

Administration of Smoke Producing Projects

The operational guidance for the Oregon Smoke Management Program is managed by the Oregon State Forester. The policy of the State Forester is to:

1. Regulate prescribed burning operations on forest land…
2. Achieve strict compliance with the smoke management plan…
3. Minimize emissions from prescribed burning…

For the purpose of maintaining air quality, the State Forester and the Department of Environmental Quality shall approve a plan for the purpose of managing smoke in areas they designate. The authority for the State administration is ORS 477.513(3)(a).

ORS468A.005 through 468A.085 provides the authority to DEQ to establish air quality standards including emission standards for the entire State or an area of the State. Under this authority the State Forester coordinates the administration and operation of the plan. The Forester also issues additional restrictions on prescribed burning in situations where air quality of the entire State or part thereof is, or would likely become adversely affected by smoke.

In compliance with the Oregon Smoke Management Plan, prescribed burning activities on the Medford District require pre-burn registration of all prescribed burn locations with the Oregon State Forester. Registration includes specific location, size of burn, topographic and fuel characteristics. Advisories or restrictions are received from the Forester on a daily basis concerning.

4. Cultural Resources

In accordance with the protocol for managing cultural resources on lads administered by the Bureau of Land Management (BLM) and the National Historic Preservation Act of 1966 (specifically section 106), as amended, a literature review and archaeological reconnaissance was conducted for the Rio Climax project area. Cultural resources recorded during the survey will be buffered and protected from project activities.

The project would not result in restricting access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites. No sites have been identified in the Project Area. Executive Order 13007 (Indian Sacred Sites) (Revised EA p. 3-126).

This project would have no effect on Indian Trust Resources as none exist in the Project Area.

5. Environmental Justice

This project was reviewed for the potential for disproportionately high or adverse effects on minority or low income populations; no adverse impacts to minority or low income populations would occur. Executive Order 12898 (Environmental Justice).

CHAPTER 4 - PUBLIC PARTICIPATION

A letter briefly describing the Proposed Action and inviting comments was mailed to adjacent landowners, interested individuals, organizations, and other agencies on February 16, 2011. The scoping letter requested that people contact the BLM using an attached Interest Response Form or by sending a comment letter if they wanted to be updated as the project progressed. A copy of this Environmental Assessment was sent to those individuals and organizations who responded to the scoping notice. The following organizations were among those who received a copy of the Rio Climax Forest Management Project Environmental Assessment.

Organizations and Agencies
American Forest Resource Council
Cascadia Wildlands Project
Center for Biological Diversity
Hannon Library Southern Oregon University
Klamath Siskiyou Wildlands Center
Oregon Department of Fish and Wildlife
Oregon Wild
Rogue Riverkeeper
Plum Creek Timber Co., Inc.

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RIO CLIMAX ENVIRONMENTAL ASSESSMENT (EA)

APPENDIX A

RESPONSE TO EA COMMENTS

APPENDIX A: - RESPONSE TO COMMENTS FOR THE RIO CLIMAX PROJECT ENVIRONMENTAL ASSESSMENT (EA)

Written comments received in response to the Rio Climax Forest Management Project EA were reviewed by the interdisciplinary team and responsible official and substantive comments are addressed below.

Substantive Comments are those that:

- Provide new information pertaining to the Proposed Action or an alternative;
- Identify a new relevant issue or expand on an existing issue;
- Identify a different way (alternative) to meet the purpose and need;
- Identify a specific flaw in the analysis;
- Ask a specific relevant question that can be meaningfully answered or referenced;
- Identify an additional source of credible research, which if utilized, could result in different effects.

Non-substantive comments are those that:

- Primarily focus on personal values or opinions;
- simply provide or identify a preference for an alternative considered;
- Restate existing management direction, laws, or policies that were utilized in the design and analysis of the project (or provide a personal interpretation of such);
- Provide comment that is considered outside of the scope of the analysis (not consistent or in compliance with current laws and policies, is not relevant to the specific project proposal, or is outside of the Responsible Officials decision space);
- Lack sufficient specificity to support a change in the analysis or permit a meaningful response, or are composed of general or vague statements not supported by real data or research.

RESPONSE TO COMMENTS

This section contains a summary of substantive comments received and the BLM's response to comments. Some comments listed below were received from more than one commenter. To avoid duplication, comment statements with similar content were summarized into one comment statement. The comments and responses are intended to be explanatory in nature and where applicable to guide the reader towards analysis or information contained in the Environmental Assessment (EA).

ROAD DENSITY

Comment 1: The Rio Climax NEPA analysis fails to account for this increased risk of temporary roads compared to permanent roads. The BLM cannot assume that temporary and new roads will have little environmental effect because they are "temporary." The BLM has shown no scientific evidence to support this assumption. Post project mitigation (temporary roads) does not address the immediate impacts to hydrology and soil health.

Response: As stated in the EA (Revised EA p. 2-38) temporary routes or roads would be obliterated following use. The techniques described are intended to preclude vehicle use and maintain effective drainage while vegetative recovery occurs over time. Subsequent physical (freeze-thaw) and biological (burrowing organisms, plant roots) facilitates revegetation and infiltration, thus minimizing adverse effects. BLM does not disagree nor contend that there are no impacts from temporary road construction. The EA acknowledges that sediment production from road use and construction may increase in the short term (Revised EA p. 3-21, 3-23 to 3-26). It also acknowledges the indirect effects attributed to use by

OHVs following harvest (Revised EA p. 3-21, 3-24). However, with obliteration of temporary routes, including blocking OHV access along the routes entire length, any adverse effects are expected to be minimal.

Comment 2: The cumulative impacts of "temporary" and permanent road construction, significant unregulated ORV use, landing construction and widespread tractor yarding on this highly impacted watershed must be fully disclosed in an EIS due to the ongoing significant impacts to hydrology (and soils) acknowledged in the EA, the WQRP and the WA.

Response: Cumulative actions must be considered in a single EIS if, when considered with other proposed actions, they will have significant cumulative impacts. A cumulative effects analysis was prepared for the Rio Climax project and the results disclosed in the EA; no significant cumulative effects were identified (see FONSI). The indicators used to assess potential cumulative impacts on water resources are primarily canopy cover and road density. Information necessary to conduct these analyses is includes an updated accounting of all roads, including OHV routes. Also accounted for are existing and proposed landings. Past tractor yarding was accounted for in the cumulative effects analysis through the development of a past harvest layer. The area affected by past harvest is quantified as percent compacted area and is described and summarized in the EA (Revised EA p. 3-7 to 3-8). Because this project would require designated skid trails and would utilize existing skid trails to the extent possible, the area compacted from this proposal is expected to not exceed 12 percent (Revised EA p. 3-10 to 3-11). It was determined that Alternative 2 would not reduce canopy cover below critical thresholds (<30 percent) within the analysis area, including in the transient snow zone, and would only have slight increases in area compacted due to the requirement of designated skid trails. Therefore, there would be little probability the proposal would modify magnitude and timing of peak or base flows (Revised EA p. 3-22).

As disclosed in the EA the potential for the Rio Climax Forest Management project to increase sediment production to streams is the primary concern for water resources; road construction and road use is the primary mechanism for sediment to enter waterways (Revised EA p. 3-21). Proposed new roads would be out-sloped to eliminated connectivity to streams and required Project Design Features would apply Best Management Practices to minimize the risk for increasing sedimentation from road construction and use. Required PDFs include: road and landing construction and road maintenance would not occur during the wet season (October 15th to June 1); bare soil due to road and landing construction/renovation would be protected and stabilized prior to fall rains to reduce soil erosion and sediment potential; fill slopes on all new roads and landings would be seeded with native or approved seed; slash would be windrowed at the base of newly-constructed fill slopes to catch sediment; temporary routes, also referred to as short operator spurs, would be obliterated at the completion of log haul and within the same season as constructed/opened; no hauling would occur on natural surfaced roads during the wet season (October 15th to June 1); hauling would be allowed between May 15th and November 15th on roads surfaced with at least 6 inches of pit-run rock or 8 inches of crushed rock. While a slight increase in short-term sedimentation is anticipated, with the implementation of required Project Design Features the Rio Climax Project would not contribute to significant cumulative effects in the analysis area (Revised EA p. 3-23). Furthermore, in response to public concerns with new road construction, new road construction in Riparian Reserves will be eliminated from the project in the forthcoming Decision Record, further reducing the risk for the project to contribute sediment to streams.

Comment 3: The EA fails to quantify the slight long-term increase in erosion (EA p. 3-11).

Response: The Rio Climax EA does quantify the estimated increase in erosion. The Revised EA (p. 3-11) states, "There would be a slight to moderate (15-50%) increase in erosion rates as a result of the combination of harvesting timber and fuel reduction activities (i.e., slashing, prescribed burning), which

would last about three to five years. A slight cumulative long-term increase in erosion rates would occur as a result of road building."

The Revised EA (p. 3-9) states, "Erosion rates from roads and landings on the Cascade geomorphological unit (similar to that of the analysis area) were reported to be about 9.36 $yd^3/ac/yr$ (Swanson and Dyrness (1975) in Amaranthus et al., 1985. p. 233). This total includes mass slope failures from roads and landings on unstable slopes in calculating the number. Because most of the newly proposed road construction would be located on stable slopes it is anticipated that, under average rainfall conditions, the erosion rates would be less than one-half of those reported by Swanson (<4 $yd^3/ac/yr$) the first few substantial storm events after construction and decrease down to about 3 times natural rates after 3 years."

In the Swanson study, the natural erosion rates in the Cascade Mountain Range were identified as 0.19 $yd^3/ac/yr$. As the EA identifies, the erosion rate associated with road construction is <4 $yd^3/ac/yr$ the first few years, and decreases down to about 3 times natural rates (about 0.6 $yd^3/ac/yr$) after 3 years. About 357 miles of existing roads occur within the analysis area (Revised EA p. 3-11) resulting in an estimated 857 $yd^3/ac/yr$ of eroded soil from roads across the nearly 40,000 acre analysis area. As 2.75 miles of new construction is proposed under the Rio Climax Forest Management Project, about 11 acres would be disturbed, which would result in approximately 6.6 $yd^3/ac/yr$ of eroded soil three years after construction. This represents only a slight increase (<1 percent increase) when added to the amount of eroded material from roads across the analysis area (RevisedEA p. 3-9).

As far as harvesting is concerned, the EA (Revised EA p. 3-10) states, "Although erosion rates would increase in the harvested units, most soil particles would not reach local waterways under normal rainfall conditions and return to near normal rates usually within 5 years as vegetative cover is re-established. In most operations, a major portion of the harvest area would remain essentially undisturbed. Even logging systems that cause the most disturbances seldom bare more than 30 percent of the soil surface. Since surface erosion depends primarily on extent and continuity of bare areas, soil loss is usually slight (Rice, 1972)."

Comment 4: Attached to these comments you will find the May 17, 2011 opinion of the 9th Circuit Court of Appeals in NEDC v Brown indicating that culverts and ditches on logging roads constitute a "point source" requiring a discharge permit under the Clean Waters Act. Does the BLM possess a Clean Water Act permit to allow for point source discharge from the new roads it intends to construct?

Response: A Clean Water Act (NPDES) permit is not required for this project. The recent court decision referenced specifically defines stormwater that is collected in a system of ditches, culverts, or channels, and is then discharged into a stream or river as a point source discharge. It further states that stormwater not collected or channeled but rather runs off and dissipates is not a discharge from a point source. The proposed new road construction does not meet the criteria as defined in the referenced recent court case as a point source requiring an NPDES permit. All new road construction is out-sloped by design (no roadside drainage ditches would be constructed), thus the road does not concentrate and convey water to a stream, but rather dissipates water so that there is no direct connection with any waterway.

Comment 5: Given that transportation management is a part of the purpose and need for the project, it is appropriate to incorporate and implement the findings and recommendations of the Little Butte Creek Watershed Analysis and the Water Quality Restoration Plan regarding reducing the current road density.

Please take this opportunity to work with the interested public to improve aquatic health and terrestrial wildlife connectivity by identifying and decommissioning BLM roads that are not needed for agency management activities.

Response: As discussed in the EA "[t]he existing transportation system for the Rio Climax Project Area is insufficient to provide economically feasible access to BLM-administered lands in need of forest management" and roads in the project area are in need of surface maintenance and drainage improvements to reduce road related sedimentation to streams (Revised EA p. 1-3). The stabilization of roads still needed for management and access is recognized in the Little Butte Watershed Analysis (Revised EA p. 3-23) and Lower Little Butte Watershed Restoration Plan (Revised EA p. 1-7) as important for reaching watershed recovery goals.

Surface improvements may include grading the road surface and or spot rocking where the road is soft or badly pot holed. Drainage improvements may include adding armored rolling dips, cross drain culverts, or cleaning existing structures and catch basins. Roadside drainage ditches would be maintained as needed, such as where ravel or debris has plugged the ditch to the extent that water is forced into the running surface of the road. Trees and shrubs would be pruned or cut to improve visibility and safety for vehicular use of the roads. Road construction and improvements are included in the Rio Climax Forest Management Project to improve road conditions and to access to areas in need of forest management.

As a result of discussions with Klamath-Siskiyou Wildlands Center, the BLM has a decided to include as part of the Decision for the Rio Climax Forest Management Project, the decommissioning of certain roads identified as opportunities for decommissioning in the EA (Revised EA p. 23). As a result, an estimated 0.5 miles of roads will be decommissioned once funding is acquired (estimated to occur around summer of 2013, but could occur sooner if funding becomes available). This work is in addition to the nearly 16 miles of jeep roads and OHV trails that were recently obliterated in the Rio Climax Analysis Area (Revised EA p. 3-23).

WATER QUALITY RESTOARATION PLAN & CLEAN WATER ACT

Comment 6: The EA discloses that increased road density, particularly in Riparian Reserves, can increase sediment delivery to streams in drainages already at elevated risk for cumulative effects. Illegal site-specific violations of Aquatic Conservation Strategy and Clean Water Act are not remedied simply because the agency believes the pollution discharge will be short-term or minor.

Response: The EA quantifies increases in road density, including within riparian reserves and acknowledges the potential adverse effects. It also goes on to state that all new road construction would occur high up in the drainages and no perennial channels would be affected (Revised EA p. 3-23). In addition, Project Design Features (PDFs) which apply Best Management Practices (BMPs) of the Resource Management Plan (RMP, Appendix D, pgs.158-162) would be implemented. One of those practices provides for outsloping of all new road construction thus eliminating connectivity with stream channels. BMPs are required by the Clean Water Act to reduce nonpoint source pollution to the maximum extent practicable. In addition, BMPs are considered the primary mechanisms to achieve Oregon water quality standards and will help meet Aquatic Conservation Strategy objectives. Through the implementation of Required Project Design Features and Best Management Practices, combined with the location of new road construction, the BLM discloses that any sediment delivery will be short term and minor (Revised EA p. 3-21 to 3-23) and that this project complies with both the Clean Water Act and the Aquatic Conservation Strategy. Furthermore, the forthcoming decision for the Rio Climax Forest Management Project will reduce road construction as originally proposed in Alternative 2 in order to address public concerns for road construction especially in Riparian Reserves.

Also see response to Comment 5 above discussing the stabilization of existing roads and planned road decommissioning.

INADEQUATE RANGE OF ALTERNATIVES

Comment 7: In our February 25, 2011 scoping comments regarding the Rio Climax project, our organizations specifically requested that the BLM develop and consider an action alternative that did not require the construction of new logging roads.

Response: The purpose and need of the Rio Climax Forest Management Project is to implement forest management to provide for long-term sustainable timber production consistent with the Medford District's 1995 and 2008 RMP (Revised EA p. 1-3). Suggestions for alternatives that would not meet the purpose and need articulated in the EA were not given detailed consideration. The rationale for eliminating actions or alternatives from detailed consideration is included in the EA Chapter 2, Section D, *Actions and Alternatives Considered but Eliminated from Detailed Analysis*. For example, the BLM specifically considered an alternative that would not have constructed roads. The cost to access units in Sections 9, 17, and 25 by helicopter rather than from newly constructed roads would have cost an estimated $395,000 dollars, $210,000 more than the cost of new road construction with tractor and cable yarding for the same units. Because the value of the timber (about $300,000) would not have covered the cost of helicopter yarding for units without road access, an alternative that did not consider new road construction was dropped from detailed analysis (RevisedEA p. 2-45 to 2-46). The EA was revised to include costs and values that supported the manager's decision to drop the *"no new road construction alternative"* from detailed analysis.

The BLM did consider a reduced road alternative (Alternative 3) in detail that considered the construction of 1.25 miles of new road construction compared to the 2.75 miles of new road construction considered under Alternative 2. This alternative reduced the amount of acreage treated (from 948 acres to 801 acres) due to reduced access and high cost of helicopter yarding (Revised EA p. 2-1 and 2-16).

The Ninth Circuit has rejected the argument that an EA requires consideration of more than two alternatives. See *Native Ecosystems Council v. Forest Service*, 428 F.3d 1233, 1246 (9th Cir. 2005). Further, in the *Morongo Band of Mission Indians v. Federal Aviation Admin*., 161 F.3d 569, 576 (9th Cir. 1998), the Ninth Circuit held that parties claiming a NEPA violation involving failure to consider a reasonable alternative must offer a specific, detailed counterproposal that has a chance of success. Also an agency does not have to consider alternatives that are not feasible, (See *Headwaters, Inc. v. BLM*, 914 F.2d 1174,1180-1181 (9th Cir. 1998)), and an agency does not have to consider alternatives that would not accomplish the purpose of the proposed project. See *City of Angoon v. Hodel* 803 F.2d 1016, 1021 (9th Cir 1986).

AQUATIC CONSERVATION STRATEGY OBJECTIVES

Comment 8: Given that the BLM acknowledges that implementation of the Rio Climax project will 1) contribute additional sediment into sediment impaired waterways, 2) remove riparian vegetation, 3) increase erosion, and 4) further fragment aquatic habitats, it is clear that the project will directly (and cumulatively) inhibit attainment of the objectives of the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan.

Response: Under BLM's 1995 RMP, the ACS requires that projects "not retard or prevent the attainment of Aquatic Conservation Strategy objectives." It does not require that improvements be made with every project implemented. Also, "evidence . . . that a project will result in some degradation does not, standing alone, constitute ACS noncompliance." *Bark v. BLM*, 643 F. Supp. 2d 1214, 1234-1235 (D. Or. 2009). Standards and Guidelines for Riparian Reserves envisioned that roads would be managed and developed within Riparian Reserves and provided direction for managing existing and planned roads to meet ACS objectives (RMP, p. 27-28; NWFP C-32). Standards and Guidelines "focus on meeting and not preventing attainment of Aquatic Conservation Strategy Objectives" (NWFP, B-10).

To meet ACS objectives the Rio Climax Project includes Project Design Features (PDFs) designed to maintain aquatic and riparian habitat at the drainage and watershed scale, beginning with designation of Riparian Reserves around all stream channels displaying evidence of annual scour and deposition, springs, seeps, wetlands, and unstable areas which are buffered from harvest and yarding. Specific PDFs beyond Riparian Reserve designation, which are implemented to protect water quality and aquatic habitat include, but are not limited to: No commercial harvest or use of skid trail would occur within Riparian Reserves; trees would be directionally felled away from Riparian Reserves and dry draws; skid trails would be water-barred according to BLM standards; main tractor skid trails would be blocked with an approved barricade and/or slash scattered to preclude OHV use where they intersect haul roads and at landings; road and landing construction and road maintenance would not occur during the wet season (October 15th to June 1); bare soil due to road and landing construction/renovation would be protected and stabilized prior to fall rains to reduce soil erosion and sediment potential; slash would be windrowed at the base of newly-constructed fill slopes to catch sediment; temporary operator spurs would be obliterated at the completion of log haul and within the same season as constructed/opened; no hauling would occur on natural surfaced roads during the wet season (October 15th to June 1); hauling between May 15th and November 15th would only occur on roads surfaced with at least 6 inches of pit-run rock or 8 inches of crushed rock; dust abatement would include water or lignin.

Furthermore, the acknowledgment of effects does not necessarily correlate to any meaningful or significant effect to aquatic habitat, which is discussed in the EA. For example, sediment delivery would occur in magnitudes or in a nature that would be very unlikely to have any meaningful impact to fish or their habitat; yes, riparian vegetation would be removed, but only around intermittent channels, thus, there would be no impacts to temperature (Revised EA p. 3-21, 3-24, and 3-45) and increased erosion in upland areas lacking connectivity to streams would have no mechanism to impact aquatic habitat.

Fragmentation of aquatic habitats would not occur as temporary bridges proposed for existing road/channel crossings (Revised EA p. 2-2) would allow for unhindered passage of all aquatic organisms. Furthermore, in response to public concerns over new road construction, new road construction in Riparian Reserves will be eliminated from the project in the forthcoming Decision Record.

The Rio Climax Forest Management Project EA details how each of the ACS objectives are met; the Rio Climax Project is consistent with the Aquatic Conservation Strategy (Revised EA p. 3-44 to 3-46).

Comment 9: BLM's EA fails to fully disclose and analyze the impacts of potential water drafting activities on in-stream flows. (Dust abatement and road construction)

Response: The Rio Climax project would not be drafting water from flowing stream channels in the Rio Climax analysis area. Any water needs for dust abatement or road construction would be fulfilled by impounded water sources with water rights for road work or purchased from a municipal source.

SOILS

Comment 10: Even without additional impacts of proposed tractor yarding and road construction the planning area is already out of compliance with the Medford District LRMP and NW Forest Plan soil compaction standards and guidelines…Both the Forest Plan and LRMP call for limiting soil compaction and degradation to less than 15 percent of harvest units.

Response: The Rio Climax Forest Management Project is in compliance with the Medford District Resource Management Plan for soil compaction. The Medford District ROD/RMP (1995) directs the use of "Best Management Practices" during all ground- and vegetation-disturbing activities (1995 RMP p.

44). It also states the 'While the goal of maintaining long-term soil productivity is inherent in all management practices, it is recognized that some minor losses in productivity could result due to surface disturbances (soil compaction, road construction, etc.) caused by management activities. Implementing best management practices and minimizing disturbances of fragile areas will keep losses to a minimum (see Appendix D)." There is no mention to limiting soil compaction and degradation to 15 percent of the harvest unit.

Appendix D (ROD p. 166) lists nine practices to implement in order to minimize soil productivity losses. One of these practices calls for limiting soil compaction to less than 12 percent of the harvest area in previously un-entered stands.

The Proposed Resource Management Plan (1994, p. 4-13) does give the definition of detrimental soil compaction as occurring at depths greater than two inches and is evidenced by an increase in soil density of 15 percent or more over undisturbed levels (USFS standard in Forest Service Manual Supplement 45, Section 2520.4). Other than that, there is not a 15 percent limitation in Medford District BLM Resource Management Plans.

Comment 11: The BLM makes no attempt to quantify the impacts to soils from existing skid trails in the Rio Climax EA.

Response: The EA did quantify the impacts to soils from skid trails and past harvesting. BLM prepared an inventory of past harvesting for the analysis area in order to assess current conditions as a starting point for the assessment of cumulative effects (Revised EA p. 3-7 to 3-8). As documented in the EA (Revised EA p. 3-8), "about 380 acres of the 948 acres proposed for harvest have had some type of timber harvest in the past" which was accomplished with tracked equipment. The EA also differentiated between tractor harvesting occurring prior to 1980 in the project area (prior to the requirement of designated skid trails) and post 1980 tractor harvesting, which required designated skid trails and limited compaction to about 12 percent of the harvested area. Prior to 1980, "it is estimated that unrestricted tractor logging resulted in about twenty-five percent of the area being compacted" (Revised EA p. 3-8). The EA focused the analysis of past timber harvest on those acres occurring since 1970, as this is the time period that would be most relevant when considering the impacts of past tractor harvesting and compaction on soils (although recovery periods can vary (see below). As disclosed in the EA, "[t]here have been approximately 233 acres harvested on BLM-administered land within the analysis area since 1990 and approximately 4,630 acres on private land during that time period. In the nearly 40,000-acre analysis area, it is estimated that approximately 2,175 acres of land have been compacted to some extent as a result of timber harvesting since 1970. Of these acres, about 75 acres have been compacted on BLM-administered land and about 2,100 on private land. It is difficult to predict compaction's effects on soil productivity because of all the variables, but McNabb and Froelich (1983) estimate that stand growth losses can range from 5 to 13 percent and compaction's effects can last 30 years. Lucklow and Gullen, in a compaction study of Arkansas forest, found evidence that old disturbance areas have partially self-mitigated since the previous harvest entry. The old disturbance compaction observed in this study was caused from harvest equipment activities that occurred at least 15-20 years earlier. Old disturbance areas are composed of secondary or primary skid trails and areas that received 1-2 equipment passes. They estimate it would take from 50-80 years for skid trail soil density levels to recover to near natural density levels. This estimated recovery period is in line with other findings. Perry (1964) estimated a 40-year recovery period for reduced infiltration rates on old compacted woods roads to approach natural rates on a southern Arkansas soil.

The Rio Climax Forest Management EA did assess and quantify the effects of past harvest/skid trails on soils, providing adequate information for an informed decision.

Comment 12: The Rio Climax EA acknowledges that "openings and new roads created by timber harvest operations may encourage increased use by OHVs, potentially further increasing sediment delivery levels to aquatic habitats," but the Rio Climax EA fails to quantify the ongoing and foreseeable increase in impacts to soils and aquatic values from OHV use that will be facilitated by proposed timber sale activities. Gated or barricaded closures are not reliable for preventing OHV use on closed roads; the BLM recognized this issue in their Deadman's Palm EA but claims road closure would mitigate impacts in the Rio Climax EA.

Response: The Deadman's Palm EA, wildlife section did recognize the challenges of maintaining road barricades, stating that barricades generally don't stop any OHV-type vehicle use. However, it should be noted that the Deadman's Palm EA was written in 2004 and since that time, BLM has increased efforts in addressing OHV related resource impacts. The BLM recently worked cooperatively with the Cascade Ranch to close about 16 miles of roads/OHV trails in the analysis area and reinforced gate closures with large rocks and woody debris to prevent OHV access around locked gates. Field visits, summer through fall 2011 indicate that the current barriers (gates, berms) in the areas where construction is proposed have been effective at precluding the majority of OHV use. Monitoring will continue to ensure closures are maintained and effective at precluding OHV use in closed areas.

FISHERIES

Comment 13. The Fisheries analysis contained in the Rio Climax EA rests on the faulty assumptions that "all harvest activities would occur outside of riparian reserves," and that "harvest and yarding operations would not take place in riparian reserves." The trees to be removed to facilitate this additional logging road construction will in fact be felled, yarded and hauled. The harvest, yarding, and hauling of these stands will in fact occur within the riparian reserve land use allocation. The EA neglects to quantify the impacts of these activities on fish habitat.

Response: The EA analysis broke the project into individual project elements, one of which was road construction. Road construction, an activity which of course includes the harvest and yarding of trees, is addressed under the analysis for new road construction in the Riparian Reserve discussion, and again under the ACS analysis. The effects to aquatic habitat from road construction stem from the disturbance associated with road construction and the addition of roads that would be hydrologically connected. The harvesting and yarding of trees from the reserve around intermittent streams was considered as part of the action of road construction and the effects clearly described in the EA. A BLM fish biologist quantified the effects to Riparian Reserves and aquatic habitat resulting from new road construction including the number of acres impacted, the potential effects to shade and future wood recruitment (none), and (short term small magnitude effects) to sediment levels.

In response to this comment, the EA was revised to clarify that harvesting and yarding trees was considered in the analysis of effects of road construction. Furthermore, in response to public concerns with new road construction, new road construction in Riparian Reserves will be eliminated from the project in the forthcoming Decision Record, further reducing the risk for the project to contribute sediment to streams.

CUMULATIVE IMPACTS

Comment 14: Rio Climax EA does not provide a thorough cumulative impacts analysis of the proposed logging in combination with private logging activities, and OHV damage. As acknowledged on page 3-23 of the EA, the watersheds proposed for entry in the Rio Climax timber sale "are at an elevated risk of cumulative effects."

On page 3-33 of the EA indicates that the BLM is aware that "clear cutting large swaths of forestland is still practiced on private lands in the watershed." Please note this direct and cumulative impacts of this activity are not quantified in the EA.

Response: As previously discussed, a cumulative effects analysis was prepared for the Rio Climax project and the results disclosed in the EA. The indicators used to assess potential cumulative impacts on water resources are primarily canopy cover and road density. Information necessary to conduct these analyses includes an updated accounting of all roads, including OHV routes. This information is accounted for in the road density tables (Revised EA p. 3-16, 3-23) and ensuing discussion (Revised EA p. 3-21 to 3-26). An accounting of past harvest on both private and public lands is used to assess canopy cover as it relates to increases in peak flows. These two metrics along with an accounting of reasonably foreseeable actions form the basis for assessing synergistic or cumulative effects within 7th field HUCs where management actions are proposed. A quantification and discussion of reasonably foreseeable harvest on private timberlands as it relates to potential adverse effects is also contained in the EA (Revised EA p. 3-19, 3-20, 3-22, and 3-25).

DWARF MISTLETOE

Comment 15: We urge BLM to manage for a complex forest and a wide range of forest values. Science tells us that mistletoe is a persistent part of infected stands and very difficult to eliminate and control.

Response: The ecological benefits of mistletoe to wildlife are discussed (Revised EA p. 3-49, 3-51, 3-55, 3-56, 3-62, and 3-84 to 3-85). Mistletoe is common throughout this project area, watershed and surrounding watersheds (Revised EA p. 3-73). The limited removal of select trees with mistletoe will not significantly change the availability of mistletoe structures for use by wildlife species in these areas.

As discussed in the EA "The proposed forest management project does not attempt to eradicate dwarf mistletoe from the landscape; rather it attempts to minimize it in specific areas so that the objectives of Matrix lands as defined by the Medford District Resource Management Plan can be attained. Management efforts are focused towards minimizing the impacts of Douglas-fir dwarf mistletoe by maximizing tree species diversity" (Revised EA p. 3-85). Forest stands with mixed species composition create barriers that help to reduce the spread of Douglas-fir dwarf mistletoe thus reducing its impacts on forest stands.

SILVICULTURE

Comment 16: Please note that on page 3-76 of the EA the BLM contends that "if surrounding private lands are clearcut, forest stands on BLM-administered lands would leave patches of forest with variable density treatments that would help the landscape in providing long term forest complexity…" (Emphasis added). Please reconcile this conclusion with the agency's stated intent to implement the 2008 ROD/RMP contained on page 1-5 of the EA. The WOPR ROD does not in fact call for the long-term retention of forest complexity in this landscape.

Please also reconcile the conclusion on page 3-82 with the statement on page 3-76 of the EA indicating that "the primary objective of thinning is to improve tree vigor for long-term forest production." Please note that long-term forest production (ie logging) and long term forest complexity are in no way the same thing.

Response*:* The EA describes that the project is designed to be consistent with both the 1995 and 2008 Medford District Resource Management Plans. The reinstatement of the 2008 Medford District Record of Decision and Resource Management Plan in and of itself does not constitute a reasonably foreseeable action. An action on BLM-administered lands in the analysis area becomes reasonable foreseeable at the time a formal proposal is made in response to an identified purpose and need. Generally this occurs when

formal public scoping is initiated. No projects have been proposed in the Rio Climax Analysis Area beyond those already discussed in the Rio Climax Forest Management Project EA. No projects in the analysis area are currently proposed that would be designed solely to conform to the timber management objectives of the Western Oregon Plan Revision.

Silvicultural prescriptions are designed to maintain large tree structure, coarse woody material, snags and 40 to 60 percent canopy cover, create diversified stand structure, and improve tree vigor and growth (Revised EA p. 2-30 to 2-33). Where multistoried canopy does not currently exist, thinning will likely encourage the development of a second or multi-layer canopies by allowing more light to reach the forest floor. Where understory layer has begun to develop, pre-commercial thinning of the understory and light thinning in the overstory will further the development of large tree structure and stand complexity.

NORTHERN SPOTTED OWLS

Comment 17: The public is largely precluded from providing timely and substantive comments regarding the potential impacts of the project on this ESA-listed species because the BLM has not produced a Biological Assessment, or received a Biological Opinion, prior to instigating the public commenting period for this project.

Response: Pursuant to the Endangered Species Act (ESA), formal consultation was completed with the US Fish and Wildlife Service. The AshPass Biological Assessment was prepared and sent to the U.S. Fish and Wildlife Service on August 19, 2011. The Service concluded in its October 7, 2011 Biological Opinion (#13420-2011-F-0206) that the District's proposed action is likely to adversely affect spotted owls (BO 13420-2011-F-0206, p. 45; Revised EA p. 3-55); however, the Rio Climax proposed action would not Jeopardize the continued existence of the northern spotted owl (BO 13420-2011-F-0206, p. 45; Revised EA p. 3-56). The AshPass Biological Assessment and Biological Opinion No. 13420-2011-F-0206) are posted to BLM's Medford District Website. The EA has been revised with information from the Biological Opinion (#13420-2011-F-0206) (Revised EA p. 3-56).

Comment 18: Page 3-54 of the EA indicates that the BLM hopes to downgrade up to 148 acres of Nesting, Roosting and Foraging (NRF) habitat within 10 historic NSO sites such that the project is "likely to adversely affect" this listed species. But the reproductive history, nesting status, and amount of likely "take" cannot be discerned from the EA.

Response: The EA was updated to disclose the three owl sites affected by the downgrading of nesting roosting and foraging habitat, along with the anticipated amount of incidental take anticipated as a result of habitat downgrade. The Revised EA also includes a status of the three affected owl sites (Revised EA p. 3-56).

DEER AND ELK

Comment 19: No attempt is made in the Rio Climax EA to quantify or disclose the impacts of proposed new road construction on deer and elk.

Additionally, please note that at page 3-65 of the EA the BLM concludes that "locked gates" will protect elk and deer populations from wasting energy on avoidance. However, the EA fails to address the effectiveness of road closures and the OHV use that is occurring behind locked gates that may be exacerbated and encouraged via the construction of more logging roads, skids trails and yarding corridors.

Response: The effects of roads deer and elk was discussed in the EA (p. 3-4). The EA was revised to address the relationship of new road construction to the Deer Winter Range area and the Elk Management Area and to describe the project design concerning road closures following operations (Revised EA p. 65 to 3-66).

The BLM recently obliterated about 16 miles of jeep roads and OHV trails in the analysis area (Revised EA p. 3-23) and placed large rocks and woody debris to prohibit OHV entry around locked gates located within the Rio Climax Analysis Area. Work continues to monitor OHV use and ensure closures are maintained. Required Project Design Features are included in the Rio Climax Project to close roads constructed for this project and to obliterate temporary spurs; PDFs include: construction of tank traps or berms; use of gates; scattering of logging debris to discourage entry; closing roads as soon as operations are completed; decommissioning temporary spurs the same season of use, and closing and camouflaging main skid trails where they intersect roads.

PACIFIC FISHER

Comment 20: The BLM cannot rely on harvested stands to provide "future" habitat given that 1) "the primary objective of thinning is to improve tree vigor for long term forest production" (EA page 3-76) such that these stands will be logged in the future, and 2) the agency intends to rely upon the land use allocations identified in the 2008 ROD/RMP (EA page 1-5). Hence the BLM does not intend to retain fisher habitat into the future.

Response: Silvicultural prescriptions for the Rio Climax Forest Management Project are designed to maintain large tree structure, coarse woody material, snags, and 60 percent canopy cover to provide northern spotted owl nesting, roosting, and foraging habitat on approximately 321 acres that are currently providing NRF habitat (Revised EA Table 2-2, p. 2-3 to 2-4). Northern spotted owl NRF habitat also provides adequate habitat for fisher (Revised EA p. 3-50). The amount of habitat downgraded (about 148 acres) as a result of the Rio Climax project represents less than three (3) percent of available habitat in the analysis area and about 90 percent of the habitat in the analysis area remains untreated (Revised EA p. 3-60).

The reinstatement of the 2008 Medford District Record of Decision and Resource Management Plan in and of itself does not constitute a reasonably foreseeable action. An action on BLM-administered lands in the analysis area becomes reasonable foreseeable at the time a formal proposal is made in response to an identified purpose and need. Generally this occurs when formal public scoping is initiated. No projects have been proposed in the Cottonwood Analysis Area beyond those already discussed in the Rio Climax Forest Management Project EA.

Comment 21: Please note that page 3-59 of the EA indicates that "some of this road construction will remove existing forest and contribute to the fragmentation of habitat used by the fisher," yet the extent and impacts of this habitat fragmentation are not quantified in the EA.

Response: Approximately 1 mile of road construction will take place in or adjacent to NRF habitat. The effects from this road construction on fisher are not quantifiable due to the small percentage of habitat available in the analysis area (<1 percent) that would be physically altered by this action (Revised EA p. 3-60).

LAND BIRDS

Comment 22*:* Rather than quantify or qualify the impacts of older forest logging and road construction on neotropical bird species of concern, the agency claims (EA page 3-63) without analysis that "untreated" late-successional forests will continue to provide "adequate habitat." Upon what is this assumption based?

Response: The untreated late successional forests within the project area do not differ measurably from the similar forests proposed for harvest. The percentage of such habitats proposed for treatment (<10% within the analysis area) leaves more than 90% of such habitat in their current condition. Use of these habitats by land birds would not be expected to change.

NOXIOUS WEEDS

Comment 23: The noxious weeds analysis contained in the EA largely ignores the impacts of OHV routes on weed spread and completely ignores the synergistic effects of building logging roads, yarding corridors and skid trail and the subsequent increase in OHV use and spread of noxious weeds.

Response: The EA did discuss the potential for the Rio Climax proposal to increase the spread of noxious weeds into and within the analysis area; the risk is low to moderate (Revised EA p. 3-110). As stated in the EA "The majority of the noxious weed populations in the affected areas are small and mostly associated with roads. With additional ground disturbing activities (road construction/re-construction, road renovation, logging, burning) and operations that transport weed seed (log hauling, other road use), there is the potential to spread weeds into, within, and out of the analysis area. Also, unrelated activities can transport weed seed (e.g., wind, water, wildlife, hiking, OHV, etc.) into the newly disturbed areas. Weed infestations adversely affect a healthy functioning ecosystem. With adequate funding for vegetation inventory and weed treatment, existing noxious weed population sizes are expected to decrease and new establishments are expected to be minimized" (Revised EA p. 3-110). The EA was updated to clarify that the area at risk to OHV use and weed spread could increase due to the removal of natural barriers (trees, shrubs, and natural downed woody debris) (Revised EA p. 107). However, required project design features would reduce the risk for off-road OHV use they include: construction of tank traps or berms; use of gates; scattering of logging debris to discourage entry; closing roads as soon as operations are completed; decommissioning temporary spurs the same season of use, and closing and camouflaging main skid trails where they intersect roads.

RECREATION

Comment 24: The Rio Climax EA fails to fully analyze and disclose the impacts of logging and hauling activities on forest visitors to the Grizzly Peak trailhead. How many log trucks does the agency anticipate using the road to the trailhead? What activities is the agency proposing at the parking lot for the trailhead?

Response: It is estimated that 30 to 40 loaded log trucks will pass the trailhead during the permitted time of operation. Through the proper mitigations, impacts to recreational users can be kept at a minimum. The access road (BLM 38S-2E-9.2) leading to Grizzly Peak Trailhead was chip sealed in 2010. Typically, roads which are chip sealed have little need for dust abatement and the overall maintenance needs are reduced providing a smooth and safe access road for users and hauling trucks. On road segments near the trailhead and parking area that have not been chip sealed, the following actions will be required for hauling; log truck speeds will be restricted near the trailhead to less than 10 mph, dust abatement will be applied near the trailhead as needed during hauling operations, installation of information and warning signs will be required at the parking area and along the access road, no hauling would be permitted on holidays or weekends to reduce recreation user impacts, parking areas would be designated and clearly defined to provide for clear and safe passage of log trucks.

Comment 25: We requested that BLM considered thinning in Riparian Reserves; by thinning the outer portions of the Riparian Reserves, residual trees will get bigger faster.

Response: Many considerations go into deciding whether or not to propose commercial thinning in Riparian Reserves. Under the 1995 RMP, the plan under which the Rio Climax project was designed, requires that silvicultural activities in Riparian Reserves benefit the conditions and function of Riparian Reserves. The cost of surveys and analysis needed to inventory and analyze the conditions of reserves is

one consideration that management must take into account when deciding whether or not to propose Riparian Reserve thinning. Riparian Reserve thinning was not proposed under the Rio Climax Forest Management Project primarily due to funding and time constraints. Future treatments in Riparian Reserves may be considered. The EA was updated to include this rationale for eliminating Riparian Reserve thinning from detailed analysis.

Comment 26: The EA explains, "The complex forest structure that forms NRF habitat consists of dead downed wood, snags, dense canopy, multi-storied stands or mid canopy. However SW Oregon NRF habitat varies greatly and one or more of these habitat components might be lacking or even absent." How can it be classified NRF habitat if the area is lacking one or more of these components?

Response: To be classified as NRF habitat it is not necessary that a particular forest stand possess all NRF characteristics. Some combination of characteristics (dead downed wood, snags, dense canopy, multi-storied stands or mid canopy) must be present, but not all are required.