Dear Interested Public:

The enclosed Environmental Assessment (EA) for the Plateau Thin Forest Management Project is available for public review. The public review period ends on August 11, 2010.

The Plateau Thin Forest Management Project involves harvesting trees in conifer forest stands on Bureau of Land Management (BLM) administered lands in the Upper Jenny Creek sub-watershed in the vicinity of Howard Prairie Reservoir. The Plateau Thin Forest Management Project Environmental Assessment analyzes the implementation of an estimated 2,113 acres of conifer forest treatments, which includes the treatment of harvest slash (activity fuels). An estimated 1,026 of the 2,113 acres are also proposed for pre-commercial thinning (thinning the understory trees that are generally less than 7 inches diameter). The BLM proposes to utilize and maintain about 26.5 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). About 0.7 miles of temporary spur roads would be reopened or constructed to minimum standards, and closed immediately following completion of operations.

In 2008, after extensive work had been completed to develop and analyze the Plateau Thin Project, the U.S. Fish and Wildlife Service issued a Recovery Plan for the Northern Spotted Owl (NSO). The recovery plan was subsequently challenged in Court, and efforts to revise the recovery plan are underway. In order to maintain future options in the Plateau Thin Project Area for aiding in the recovery of the northern spotted owl, I directed the project leader to develop mitigation for the northern spotted owl. In response, a subset of Alternative 2, described in Chapter 2 of the EA as a proposed mitigation measure, was identified that would generally avoid forest thinning within the home range radius of northern spotted owl sites. At this time, it is my intent to select the proposed mitigation measure for the northern spotted owl and move forward with timber harvest on 466 of the 2,113 acres of conifer forest thinning. This initial project is referred to as the Swinning Timber Sale. No new temporary spur roads would be constructed or reopened for this project. Additionally, this subset of units would also avoid forest thinning in stands identified as Recovery Action 32 stands. Recovery Action 32, developed under the 2008 Recovery Plan for the Northern Spotted Owl, recommends maintaining “substantially all of the older and more structurally complex multi-layered conifer forests on Federal lands outside of MOCAs” (Managed Owl Conservation Areas).

We welcome your comments on the content of the EA. We are particularly interested in comments that address one or more of the following: (1) new information that would affect the analysis, (2) information or evidence of flawed or incomplete analysis; (3) BLM’s determination that there are no significant impacts associated with the proposed action, and (4) alternatives to the Proposed Action that would respond to purpose and need. Specific comments are the most useful. Comments are due by 4:30 PM, August 11, 2010.
Before including your address, telephone number, email address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

All comments should be made in writing and mailed or delivered to Plateau Thin Project, Kristi Mastrofini, Ashland Resource Area, 3040 Biddle Road, Medford, OR 97504. Further information on this proposed project is available at the Medford District Office, 3040 Biddle Road, Medford, Oregon 97504 or by calling Kristi Mastrofini, Ashland Resource Area Planning, at (541) 618-2384.

Sincerely,

[Signature]

John Gerritsma
Field Manager
Ashland Resource Area

Enclosure
ENVIRONMENTAL ASSESSMENT

for

PLATEAU THIN FOREST MANAGEMENT PROJECT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
ASHLAND RESOURCE AREA

DOI-BLM-OR-M060-2010-0034-EA
EA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Plateau Thin Forest Management Project

EA NUMBER: DOI-BLM-OR-M060-2010-0034-EA

LOCATION: Jenny Creek Watershed, Upper Jenny Creek Sub-watershed

<table>
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<th>List of Preparers</th>
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<td>Ted Hass</td>
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CHAPTER 1: PURPOSE AND NEED FOR THE PROPOSED ACTION

A. INTRODUCTION


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 Plateau Thin proposal. 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?

This section provides a summary of BLM’s proposal for forest management. A more detailed description of BLM’s proposed action is included in Chapter 2, Alternatives. The 2,113-acre Plateau Thin project involves harvesting trees in conifer forest stands on BLM-administered lands in the Upper Jenny Creek sub-watershed. A BLM silviculturist prescribed forest thinning prescriptions, tailored to the various site conditions (i.e. elevation, aspect, soil conditions, etc.) found throughout the project area, to meet the needs described below. A more detailed summary of the various prescriptions is included in Chapter 2, Section B, 2, b.

The proposed thinning would be accomplished through a combination of commercial timber sale contract(s) and service contracts. An estimated 2,113 acres of conifer forest thinning would be accomplished through one or more commercial timber sales and/or stewardship contracts. Fuels created from commercial thinning (harvest slash) would be cut, hand-piled and burned. An estimated 1,026 of the 2,113 acres of commercial treatment units described above are also proposed for pre-commercial thinning (thinning the understory trees that are generally less than 7 inches diameter).

The BLM proposes to utilize and maintain about 26.5 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). About 0.7 miles of temporary routes would be reopened or constructed to minimum standards, and closed immediately following completion of operations.

The Plateau Thin Project is located within a 13,018-acre planning area within the Upper Jenny Creek sub-watershed. Of these acres, an estimated 5,966 acres are BLM-administered land; 5 acres are Forest Service-administered land; 2,913 acres are administered by the Bureau of Reclamation, and an estimated 4,134 acres are privately owned. The Public Land Survey System description for the proposed Plateau Thin Forest Management Project is: T. 38 S., R. 3 E., in sections 10-13, 22, 23, 25, and 26; T. 38 S., R. 4 E. in sections 7, 8, 17-20, 29, 30, and 32; T. 39 S., R. 3 E., in section 1; and T. 39 S., R. 4 E., in sections 5 and 6; W.M.; Jackson County, Oregon.

The project area is defined as the area where action is proposed. The planning area represents the overall area of consideration that was reviewed for the development of the Plateau Thin Forest Management Proposed Action. The current forest stand and road conditions in the planning area were assessed against the desired conditions based on the goals and objectives outlined in the BLM’s Medford District RMP.

Two alternatives were considered and analyzed in detail, a No-Action Alternative (Alternative 1) and the Proposed Action (Alternative 2). A detailed description of BLM’s Proposed Action is contained in Chapter 2, Alternatives.
C. WHY IS BLM PROPOSING THE PLATEAU THIN PROJECT?

The Plateau Thin project is designed to implement the Bureau of Land Management’s 1995 Medford District Record of Decision and Resource Management Plan (RMP) (USDI 1995) in the Plateau Thin Project Area. Management Actions/Directions set forth in the RMP provide direction for resource management on BLM-administered lands according to various land use allocations. This project proposal is designed to implement specific Management Actions/Direction for Timber Resources, Forest Health, and Roads Resource Programs for lands allocated as matrix land in the Plateau Thin Project Area.

Alternatives must meet the following objectives in order to receive consideration:

- Maintain and promote vigorously growing conifer forests and provide timber resources, in accord with sustained yield principles, on BLM-Administered Matrix lands;

- Provide a transportation system within the project area that serves the management of Matrix lands and other resource program areas.

The following discussion provides more detail concerning the need for forest and road management based on the RMP Management Actions/Direction that apply to matrix land allocation and current forest and road conditions:
1. 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 BLMA-Administered Matrix lands within the Plateau Thin planning area.

**Management Actions/Direction**

One of the applicable laws governing the major portion of BLM-administered lands in the Plateau Thin 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. The Medford District’s RMP is governed by the statutory mandate for O&C lands and declared an “annual sustained yield capacity” on the Matrix land allocated for timber production, which the O&C Act requires to be offered annually so long as it “can be sold at reasonable prices on a normal market.” Matrix lands (also described in the RMP as General Forest Management Area) within the Plateau Thin Project Area are to be managed for commodity production to assure a moderately high level of sustained timber productivity (RMP, Appendix E, p. 192); timber products produced from this area would be sold in support of the District’s Allowable Sale Quantity declared in the RMP (RMP p. 73).

**Existing Forest Stand Conditions & Silvicultural Treatment Objectives**

An estimated 1,861 acres of forest stands in the Plateau Thin planning area are selected for commercial thinning because they are overstocked and they meet the minimum harvest age and size for commercial thinning. As trees compete for limited water, nutrients, and growing space they become stressed and more susceptible to mortality from insects, forest pathogens, and drought. Organon (1992) was used to analyze data from representative stands throughout the project area.

Relative density index is one measurement used to quantify the densities of forest stands. Relative density index represents a ratio of the actual stand density to the maximum stand density attainable in a stand with the same mean tree volume. Imminent mortality and suppression is reached when the relative density index is 0.55 or greater (Drew and Flewelling 1979). At this point, forest stands begin to self thin. The average Relative Density Index for the Plateau Thin Project Area range from 0.496 to 0.906; the average for the project area is 0.588.

Thinning is needed to reduce the relative density index of stands within the project area to levels that would improve tree growth and vigor; a relative density index between 0.25 and 0.55, depending on site conditions and stand type. Basal Area (ft²/acre), another measurement used to define forest stand densities, is used to selectively thin forest stands to achieve the desired relative density index (Table 1-1).

<table>
<thead>
<tr>
<th>Stand Type</th>
<th>Desired Relative Density Index</th>
<th>Desired Basal Area per Acre</th>
<th>Desired species mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ponderosa pine</td>
<td>0.25-0.55</td>
<td>80-100 ft²</td>
<td>Ponderosa pine 65 to 81 percent, white fir 11 to 18 percent, Douglas-fir: 5 to 19 percent, incense cedar 2 to 10 percent, and sugar pine 0 to 5 percent.</td>
</tr>
<tr>
<td>Moist Douglas-fir</td>
<td>0.35-0.55</td>
<td>100-140 ft²</td>
<td>Predominantly Douglas-fir</td>
</tr>
<tr>
<td>Mixed Conifer</td>
<td>0.35-0.55</td>
<td>100-140 ft²</td>
<td>31 to 70 percent Douglas-fir; 9 to 24 percent ponderosa pine; 2 to 10 percent sugar pine; 2 to 12 percent incense cedar; 9 to 48 percent white fir; and 3 percent hardwoods.</td>
</tr>
<tr>
<td>White fir</td>
<td>0.35-0.55</td>
<td>120-160 ft²</td>
<td>63 to 76 percent white fir; 27 to 38 percent Douglas fir; 0 to 10 percent ponderosa pine; 0 to 5 percent sugar pine; 0 to 15 percent incense cedar; and 0 to 5 percent hardwoods.</td>
</tr>
</tbody>
</table>

Another 110 acres are selected for regeneration harvest. The objectives of regeneration harvest are to release the understory component by thinning overstory trees and to create multi-canopied forest stands with a variety of structures, age classes, and tree sizes. Regeneration harvest would leave 20 to 25 trees per acre that are 20 inches diameter or greater.
About 142 acres would be treated with Group Selection/Disease Control, which would target Laminated Root Rot, Armillaria Root Rot, Annosus Root Rot, and Dwarf Mistletoe. The treatment will include removing infected or symptomatic trees within groups or centers of infection while leaving all resistant species. In the project area, laminated (*Phellinus weirii*), Armillaria (*Armillaria ostoyae*), and annosus (*Heterobasidion annosum*) root diseases are readily infecting and killing white fir and Douglas-fir. These diseases expand radially at a rate of about 1 ft per year and can remain viable in large stumps for at least 50 to 60 years. *A. ostoyae* is most common in stressed trees and often associated with compacted soils, in poorly planted areas, and where trees have been wounded. This disease can create large openings where highly susceptible tree species never attain large sizes. In the project area white fir are the most susceptible and are readily infected and killed. *P. weirii* causes severe root and butt decay, growth loss, and mortality in both Douglas-fir and white fir. Western dwarf mistletoe (*Arceuthobium campylopodum*) and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) infections occur on few stands and partial stands in the project area. Infections are usually systemic and form bunched globose growths of branches called “witches’ brooms”. Heavy infections result in growth loss, wood quality reduction, top-killing, and mortality. Although the spread of the infection is slow, infected trees lose vigor and become increasingly susceptible to other infectious diseases and insect attack.

2. **Provide a transportation (road) system within the Plateau Thin Project Area that provides access for the management of resource program areas (RMP p. 86) including timber resources and rural interface areas, while reducing their effects on water, soils, fish, and wildlife.** There is a need to maintain roads used within the Plateau Thin Project Area and to reopen/construct temporary spur roads to provide access to project units.

*Existing road conditions and road treatment objectives*

The Medford District RMP provides direction for road management, “Develop and maintain a transportation system that serve the needs of users in an environmentally sound manner” (RMP p. 84). Roads throughout the project area are in need of maintenance to restore or improve road surfaces, culverts, and roadside drainage ditches in order to reduce road related erosion and sedimentation to stream courses. Road maintenance is planned under the Plateau Thin Project to meet the Medford District RMP direction for road management. Additionally three short temporary spur roads are proposed to provide access to two proposed treatment units.

**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 Plateau Thin Forest Management Project. The Ashland Resource Area Field Manager must decide whether to implement the Proposed Action as designed, make alterations to the Proposed Action, or whether to select the No-action Alternative. The decision will also include a determination whether or not the impacts of the Proposed 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/EIS (USDI 1994) and the Northwest Forest Plan EIS (USDA/USDI 1994), or otherwise determined to be insignificant, a Finding of No Significant Impact (FONSI) can be issued and a 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 and the NWFP SEIS, then a project specific EIS must be prepared.
In choosing the alternative that best meets the project objectives and needs described above, the Field Manager will also consider the extent to which each alternative responds to the decision factors listed below. The forthcoming decision record will document the Field Manager’s rationale for selecting a course of action based on the effects documented in the EA, and the extent to which each alternative:

1. **Contributes towards the Districts Allowable Sale Quantity.**

   The Plateau Thin Forest Management Project is 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 towards the District’s Allowable Sale Quantity.

2. **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).

3. **Meets the BLM’s obligation to protect resources consistent with existing laws, policy, and the direction of the 1995 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 Plateau Thin Proposed Action. The Section titled Land Use Conformance & 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**

1. **Conformance with Land Use Plans**

   **Conformance with Land Use Plans**

   The forest management proposal is designed to be in conformance with the 1995 Medford District Record of Decision and Resource Management Plan (RMP). The 1995 Medford District Resource Management Plan 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 later 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.


   On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in Conservation Northwest, et al. v. Rey, et al., No. 08-1067 (W.D. Wash.) (Coughenour, J.), granting Plaintiffs’ motion for partial summary judgment and finding a variety of NEPA violations in the BLM and USFS 2007 Record of Decision eliminating the Survey and Manage mitigation measure. Judge Coughenour deferred issuing a remedy in his December 17, 2009 order until further proceedings, and did not enjoin the BLM from proceeding with projects (including timber sales).

   This project may proceed even if the District Court sets aside or otherwise enjoins use of the 2007 Survey and Manage Record of Decision. This is because the Plateau Thin 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).

2. Statutes and Regulations

The Proposed Action and alternatives are in conformance with the direction given for the management of public lands in the Medford District by 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 or 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 & PLANS

1. Watershed Analysis (USDI 1995)

Watershed Analysis is a procedure used to characterize conditions, processes, and functions related to human, aquatic, riparian, and terrestrial features within a watershed. Watershed analyses are 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 analysis 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 Plateau Thin Project Area falls within the Jenny 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 Plateau Thin Forest Management Project, has been collected and is considered along with existing information provided by the 1995 Jenny Creek Watershed Analysis. Management Objectives and Recommendations provided by the watershed analysis were considered and addressed as they applied to the Plateau Thin proposal.

2. **Water Quality Restoration Plan for the Jenny Creek Watershed**

The BLM is recognized by Oregon Department of Environmental Quality (DEQ) as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM has signed a Memorandum of Agreement (MOA) with the DEQ that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations.

To comply with the BLM-DEQ Memorandum of Agreement, the BLM completed the Water Quality Restoration Plan (WQRP) for BLM-administered lands in the Jenny Creek Watershed (USDI 2008), within the Upper Klamath Subbasin. This document describes how the Bureau of Land Management (BLM) will meet Oregon water quality standards for 303(d) listed streams on BLM-administered lands within the Jenny Creek Key Watershed. The WQRP was submitted to the DEQ in May 2008. The DEQ has reviewed the BLM’s WQRP; however, they are holding any comments until after they issue the final Upper Klamath TMDL. The DEQ released the draft Upper Klamath Subbasin Total Maximum Daily Load (TMDL) for public review in February 2010 and extended the comment period until May 27, 2010.


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).

4. **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.

5. **Medford District Integrated Weed Management Plan of 1998**

The Medford District Integrated Weed Management Plan provides a proactive ecosystem-based approach to reduce populations of alien plant species to a level which will allow for the restoration of native plant species, and provide for overall ecosystem health.

G. **SCOPING AND ISSUES**

Scoping is the name for the process used to determine the scope of the environmental analysis to be conducted. 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.

Scoping has occurred for the Plateau Thin Project. The Plateau Thin Forest Management Project appeared in the Ashland Resource Area’s Schedule of Proposed Actions published in Medford’s
Messenger (BLM’s quarterly newsletter) beginning with the fall 2007 edition and continuing through the Spring 2009 edition; the project was resubmitted for the Summer 2010 edition. Letters were sent November 30, 2007 to interested organizations, community groups, other agencies, tribes, adjacent land owners, and other individuals. The letter described the purpose and need for the proposed action and included a detailed description and map of the activities proposed. Several letters of comment and/or interest were received by the BLM in response to this public outreach.

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. The issues listed below were identified as relevant to this project proposal. 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. This EA will also incorporate by reference, as appropriate, Best Management Practices from broader level NEPA analyses.

**Hydrologic Function and Water Quality**
The implementation of the proposed action could impact hydrologic function and water quality in the Jenny Creek Watershed.

- Logging (particularly tractor yarding) could increase soil compaction and alter hydrologic flow, including peak flow and low flow.
- There is potential for short-term effects to water quality from increased sediment produced from disturbance associated with the combination of temporary road reopening/construction, road maintenance, log hauling activities, and tractor logging. Planned road maintenance would contribute to overall improvement in watershed conditions; however, there could be short-term increases in sediment from roadbed and drainage ditch disturbance associated with road maintenance activities.
- Grizzly and Hoxie Creeks are within the project area and are listed under Oregon Department of Environmental Quality’s 303(d) list as water quality limited water bodies for summer water temperatures. This list is called the 303(d) list because of the section of the CWA that makes the requirement. Jenny Creek, about one and a half to two miles below the planning area, is listed for summer water temperatures and sediment.
- Non-point source pollution (sedimentation) from management activities has the potential to degrade the aquatic ecosystem (e.g., reduced water quality for trout).

**Potential for Impacts to Aquatic Habitat**
The Jenny Creek Watershed is also designated as a Tier 1 Key Watershed for the recovery of at risk stocks of fish; the majority of the project area is located above Howard Prairie Reservoir which impounds the waters of Grizzly Creek, Hoxie Creek, Willow Creek, Swinning Creek, and other unnamed tributaries.

There is concern that increased sedimentation from the implementation of the project proposal (see Potential for Impacts to Hydrologic Function and Water Quality above) could potentially impact fish and aquatic habitat for resident fish in the project area. Some commenters linked potential for sedimentation to streams to conditions of Riparian Reserves, and their ability to filter sediment, and location of road systems relative to streams.

**Potential for Impacts to Northern Spotted Owls and Their Habitat**
Activities associated with timber harvest would affect northern spotted owl nesting, roosting, foraging, and dispersal habitat.

Some people expressed concern for the condition and connectivity of northern spotted owl habitat at the landscape scale, both within and between adjacent Late-Successional Reserves.
Potential for Cumulative Effects on Watershed Condition

Timber harvest and associated activities, when combined with other past and reasonably foreseeable future actions, could contribute to adverse cumulative watershed effects (soils, water quality, hydrologic function, aquatic habitat) within the Jenny Creek Tier 1 Key Watershed.

Economics

The high costs associated with handling large amounts of small diameter commercial and noncommercial material could affect the overall economic feasibility of project implementation.

Site Productivity

Activities associated with timber harvest (tractor logging), temporary road opening/construction, and prescribed fire may have impacts on soils and site productivity from compaction, displacement, and change in organic matter and soil chemistry.

Terrestrial Wildlife

Timber harvesting could lead to reduction of forest stand structure, including canopy closure, snag densities, and downed coarse woody material in the Plateau Thin Project Area. Suggestions were received concerning maintenance of hardwoods, snags, and downed wood.

Changes in forest structure lead to changes in habitat distribution for a variety of wildlife species, including Bureau Special Status species. People responding to scoping requests specifically mentioned or requested information concerning bald eagles, ospreys, goshawks, rare birds, sandhill cranes, great gray owls, Pacific Fisher, and big game species such as deer and elk.

The Plateau Thin Planning Area is an important summer range and calving and fawning area for elk and black-tailed deer. Oregon Department of Fish and Wildlife (ODFW) suggests that research by Dr. John Cook has shown that late summer forage is limiting for a lactating cow elk. Biologists from ODFW also suggest maintaining large tree canopy cover to the highest level while still meeting stand health objectives; they feel large tree shade is important for maintaining soil moisture and big-game forage later in the summer season.

Botanical

Forest management and road construction activities have the potential to affect Bureau Special Status and Survey and Manage vascular plants, bryophytes, lichens, and fungi.

Forest management and logging can increase the risk of introduction and spread of noxious weeds. Vehicular travel is the highest risk factor for the introduction of noxious weeds. Some people who responded to notice of the proposed action expressed their concern for the effectiveness of standard project design features used to reduce the spread and introduction of noxious weeds.

Silviculture

Forest management activities may affect late-successional habitat and individual large trees. People expressed their concerns for maintenance of old-growth forests and large diameter tree structure.

Some people who responded to the notice of the proposed action disputed the effectiveness of thinning as a method to improve conifer forest resistance to insect epidemics and disease. Scott Hoffman Black (2005) was submitted to support claims that thinning is not effective in improving conifer forest resistance to insect epidemics and disease. This reference suggests 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.

Untreated slash could lead to an increase in bark beetle activity.

There is a concern timber harvest could spread annosus root disease; borax treatment to white fir stumps was suggested as a mitigating measure.
The relatively flat topography of the Dead Indian Plateau contributes to frost problems. Frost and pocket gopher damage to seedlings could affect the success of tree regeneration in the Plateau Thin Project Area.

Adjacent land owners expressed concern that opening up forest stands too much near the lake would encourage trespass on neighboring lands and could increase the potential for blowdown.

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

Some people expressed their concern that leaving untreated logging slash, even if only for a short period of time, could lead to increased wildfire behavior and increased risk of escape from initial attack.

Management of forest stands usually results in altered micro climates. Increasing spacing between the canopies of trees can contribute to increased wind speeds, increased temperatures, drying of topsoil and vegetation and increased shrub and forb growth. These changes in microclimates and vegetation structures can alter wildfire behavior and its effects on the land (fire severity).

Young tree plantations burn at high intensities and are more susceptible to severe fire effects especially where thinning slash remains untreated. The number and distribution of plantations can alter fire behavior and the stand and landscape scale.

Some comments were received suggesting that untreated forest stands with closed canopy conditions result in lower fire severity when burned by wildfire than open and non-forest vegetation conditions. This information was also correlated, by commentors, to a conclusion that long absence of fire is a predictor of low severity fire effects.

**Air Quality**
Particulate matter produced during the implementation of prescribed fire has the potential to adversely affect air quality.

**Visual Resources and Recreation**

There is concern for the resulting visual character (evidence of management) and attainment of Visual Resource Management Objectives.

Timber harvest operations could impact winter recreation use along the Table Mountain winter use trails system.

**Cultural Resources**
Timber harvest and road development and improvement activities could affect archaeological or historical sites.
CHAPTER 2. THE PROPOSED ACTION AND THE ALTERNATIVES

A. INTRODUCTION

This chapter describes the Proposed Action developed by the ID Team to achieve the objectives and needs identified in the Purpose and Need in Chapter 1. In addition, a “No Action” Alternative is presented to form a base line 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 the Proposed Action. The PDFs are included as features of the Proposed Action in the analysis of anticipated environmental impacts.

B. ALTERNATIVES ANALYZED IN DETAIL

1. Alternative 1 - No Action Alternative

The No-Action Alternative describes a baseline against which the effects of the Proposed Action 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 projects would be implemented, there would be no commercial cutting of trees, no temporary routes would be opened/constructed, and no roads would be maintained in association with this project proposal. The analysis of this No-Action Alternative answers the question: What would happen if BLM did not do this project?

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 proposed action would simply be dropped and the decision process aborted. Future harvesting, fuels reduction, and road management in this area would not be precluded and could be analyzed under a subsequent NEPA document.

2. Alternative 2 - Proposed Action

The Proposed Action is described in three sections. The first section (Section 2, a) provides a summary of the Proposed Action by treatment type and treatment method. The second section (Section 2, b), describes the silvicultural prescriptions and objectives. The third section (Section 2, c) harvest methods, fuels reduction and prescribed fire treatments. Section 3, Project Design Features, describes procedures for protecting resources required by the RMP for the proposed action.

a. Summary of the Proposed Action

Alternative 2, the Proposed Action, was developed to achieve the objectives described in Chapter 1, Purpose and Need. The Proposed Action would treat about 2,113 acres of forest stands using the various silvicultural prescriptions and treatment methods as described in Section 2 (b-d) of this Chapter. An estimated 1,026 acres are proposed for pre-commercial thinning, within the commercial treatment units described above.

Of the 2,113 acres proposed for commercial timber harvest, an estimated 873 acres are proposed for tractor harvesting, and 1,240 acres are proposed for mechanized timber harvesting. About 30 to 40 landing sites up to 0.5 acre in size are needed to accommodate mechanized harvesting. The majority of these landing sites occur on existing landings used for past harvest in the area and will be expanded up to 0.5 acre in size.

Biomass removal or post harvest fuels treatments (or a combination of both) would occur within commercial timber harvest units. Biomass material consists of branches, tops of trees, and small trees
thinned in the understory. Post harvest fuels reduction treatments will occur as described in Section 2c, Fuels Reduction and Pre-commercial Thinning.

About 0.7 miles of temporary routes/roads would be reopened or constructed to minimum standards to improve access to units 40 and 44 (Maps 2-1 and 2-2). Following timber hauling operations these roads would be adequately drained, the surface roughed up, and the entrance barricaded to close these roads to vehicle traffic. The amount of rock present in these areas prevents these routes from being mechanically decommissioned by ripping or subsoiling. An estimated 26.5 miles of existing roads would be utilized to access timber sale units. Maintenance would be completed as needed on these roads to ensure adequate water drainage, to maintain the road surface to ensure the protection of infrastructure investments, and to maintain watershed conditions. Road maintenance work involves spot rocking, cleaning ditches and culvert basins, and installing water dips. Table 2-3 provides a detailed road-by-road listing of proposed road work.

### Table 2-1. Summary of the Proposed Action-Alternative 2:

<table>
<thead>
<tr>
<th>Commercial Silvicultural Prescriptions</th>
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<tbody>
<tr>
<td>Moist Douglas-fir Thinning</td>
<td>3</td>
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<td>Pine Site Thinning</td>
<td>73</td>
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<tr>
<td>Mixed Conifer</td>
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<tr>
<td>White fir Thinning</td>
<td>226</td>
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<tr>
<td>Pole Thinning</td>
<td>36</td>
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<tr>
<td>Group Select – Disease Control</td>
<td>142</td>
</tr>
<tr>
<td>Regeneration Harvest (&gt; 20 trees per acre &gt; 20 inches dbh retained)</td>
<td>110</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>2,113</strong></td>
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### Table 2-2. Alternative 2 – Commercial Harvest Units by Silvicultural Prescription, Yarding System, Pre-commercial Thinning (Y/N), and Fuels Treatments

<table>
<thead>
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<th>Acres</th>
<th>Silvicultural Prescription</th>
<th>Yarding System</th>
<th>PCT</th>
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</table>

1 Unit acres reported in this table are based on Geographic Information System (GIS) data and rounded to nearest whole acre; unit acres may differ from those reported in individual timber sale contracts/prospectuses due to differences in electronic mapping software. Total acres may vary slightly from other tables displayed throughout the analysis file due to varying methods used for rounding data outputs. The acreage differences that may be detected are within less than (+/-) 1% of the total project acreage analyzed and would not contribute to any differences in effects reported.
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<th>Fuels Treatment</th>
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<tr>
<td>MDF – Moist Douglas-fir</td>
<td>CR - Crawler Tractor</td>
<td>HP – Handpile, cover &amp; Burn</td>
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<tr>
<td>Po - Poles</td>
<td>M – Mechanical Harvester</td>
<td>UB – Underburn</td>
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<tr>
<td>Pi – Pine Site Treatment</td>
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<td>SL – Slashing (understory thinning)</td>
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<td>R – Regeneration (&gt; 20 trees per acre retained)</td>
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<td>MC – Mixed Conifer</td>
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<td>WF – White Fir</td>
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<td>GSDC – Group Select Disease Control</td>
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Map 2-2. Plateau Thin Proposed Action (Alternative 2)
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<th>Existing Surface: Depth (inches) &amp; Type$^1$</th>
<th>Control$^2$</th>
<th>Proposed Improvements$^3$</th>
<th>Seasonal Restriction$^4$ (for log hauling)</th>
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### Existing Roads in the Project Area

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<th>Road Number</th>
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<th>Existing Surface: Depth (inches) &amp; Type¹</th>
<th>Control²</th>
<th>Proposed Improvements³</th>
<th>Seasonal Restriction⁴ (for log hauling)</th>
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<tr>
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<td>BST</td>
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<tr>
<td><strong>Total mileage:</strong></td>
<td><strong>26.5</strong></td>
<td></td>
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</table>

**Notations:**

1. **NAT** = Natural, **GRR** = Grid Rolled Rock, **PRR** = Pit Run Rock, **ASC** = Aggregate Surface Course, **ABC** = Aggregate Base Course, **BST** = Bituminous Surface Treatment

2. **BLM** = Bureau of Land Management, **PVT** = Private

3. **CWD** = Construct Water Dip

4. **0** = no restrictions; **1** = hauling restricted between 10/15 and 6/15; **2** = hauling restricted between 11/15 and 5/15

### b. Silvicultural Prescriptions & Objectives

The objectives of forest thinning are to:

- Increase early seral species and shade intolerant tree species (Douglas-fir, pine species, and incense cedar) in forest stands;
- Maintain and increase the growth rate of the existing early seral trees within the forest stands;
- Develop diverse forest structure by promoting a range of age classes, desired vertical and horizontal stand structures, and the desired species composition proportions while stimulating natural regeneration of early seral, shade intolerant tree species (Douglas-fir, pine species, and incense cedar);
- Reverse the trend of insect and forest pathogen impacts on the forest stands by increasing individual tree vigor and reestablishing disease resistant species;

*The following general guidance applies to Moist Douglas fir, Mixed Conifer, White Fir, and Pine Site Prescriptions types:*

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 composition, tree heights (crown classes), trees per acre, and the vigor of individual trees. Some diseased, forked-top trees, and dying and dead trees should remain.
Avoid the removal of old-growth trees. We define old-growth trees to have the following characteristics:

- Larger and older than the second growth trees in the present day 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.

Remove trees around singly spaced old-growth trees to create a 25 to 30-foot crown spacing. Any tree leaning against or with its crown entangled with the old-growth tree would not be cut to prevent damage to the old-growth tree or degradation of wildlife habitat.

Thin across diameter classes to retain uneven-aged composition.

Where well-stocked pockets of (>250 trees per acre) of shade intolerant sugar pine, ponderosa pine, cedar and Douglas-fir occur, thin overstory trees to reduce competition for light from overstory trees (42 to 47 foot bole spacing).

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

Large diameter hardwoods would be protected for stand diversity, structure, and wildlife by removing conifers from around hardwoods greater than ≥10 inches diameter breast height unless conifer removal could damage hardwoods.

Where pockets of root disease favor leaving disease resistant species over non-resistant species; remove symptomatic trees.

Where pockets of dwarf mistletoe occur remove trees with a mistletoe rating of 4 or greater (fig. 2-1).

**Moist Douglas-fir**

Moist Douglas-fir stands are found on warm atmospherically moist environments. One Moist Douglas-fir site is found in the Plateau Thin Project, and is comprised of 98 percent Douglas-fir. The prescription involves thinning from below which would remove the smaller diameter trees and allowing the larger, healthier trees to grow. The stand would be thinned to retain 100 to 140 ft² basal area² per acre (120 ft² basal area per acre average), equating to 3 to 15 foot spacing between tree crowns (crown-spacing). Trees with Douglas-fir dwarf mistletoe rating of 4 to 6 (2/3 to all of the crown infected, fig. 2-1) would be harvested.

---

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.
**Pine Site Prescription**

These stands have developed understories of shade tolerant white fir as a result of fire exclusion, which are often very dense. The objectives for these sites are to reduce stand densities to reduce the risk for bark beetle infestations and to promote the establishment of pine regeneration. Pine sites would be thinned across diameter classes to retain 80 to 100 \( \text{ft}^2 \) basal area per acre. Group selection openings (about 1/5-acre or 53 foot radius) would be created around individual old-growth ponderosa and sugar pine trees to encourage the establishment of pine regeneration. Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, and Douglas-fir.

**Mixed-Conifer**

These stands are comprised of a mix of tree species including Douglas fir, ponderosa pine, sugar pine, incense cedar and white fir. Mixed conifer forest stands would be thinned to:

- Favor leaving suitable (disease free and non-chlorotic) sugar pine, Douglas-fir, incense cedar, and ponderosa pine over white fir, retaining at least 20 percent early seral species;
- About 100 to 140 \( \text{ft}^2 \) basal area/acre (average 120) would be retained;
- Release Ponderosa and sugar pine by thinning around these trees to leave 3 to 15 foot crown spacing;
- Release large diameter or old growth ponderosa or sugar pine legacy trees by creating a group selection opening of 1/5 acre (53 foot radius from bole) in size.

**White fir**

White fir stands associated with the project area are relatively dry white fir sites and moisture is a limiting factor. The objectives for managing these sites are to reduce stand densities and competition for water and to increase the proportion of early seral species including sugar pine, ponderosa pine, incense cedar, and Douglas-fir, which are more drought tolerant species. Treatments proposed for these sites would be thinned to retain 120 to 160 \( \text{ft}^2 \) basal area per acre (average 140), thinning crowns to a 3 to 15 foot crown spacing between the tips of the branches of trees. Thinning would occur across all diameter classes to retain and promote structural diversity. Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.

**Pole stand thinning**

The project area includes two pine plantations, resulting from clear-cut harvesting in 1964, that are in need of commercial thinning. The stands would be thinned leaving 80 square feet of basal area to achieve a Relative Density Index of 0.350 after harvest. Trees less than 8 inches diameter would be thinned to a 14-foot spacing.

**Group Selection/Disease Control**

Diseases targeted are Laminated Root Rot, Armillaria Root Rot, Annosus Root Rot, and Dwarf Mistletoe. The treatment will include removing infected or symptomatic trees within groups or centers of infection while leaving all resistant species. In centers larger than 1 acre, at least 16 TPA would be left with an average of 42-52 feet bole spacing. Openings would be inter-planted with resistant species. The following provides more detail for the forest pathogens targeted.

**Laminated Root Rot Treatment (Phellinus weirrii):** Root disease infection centers would be harvested with group selection, leaving all resistant species within pockets and cutting all susceptible and symptomatic trees (White fir and Douglas-fir). Whenever a large infected area borders an uninfected stand with no root disease, a 50 foot buffer would be created where white fir and Douglas-fir trees would be removed and all resistant species (pine and incense cedar) would be retained to control root diseases from expanding into uninfected forest areas. If infected areas exceed 1 acre in size, 16 to 25 trees per acre (42-52 feet bole spacing) would be retained within the infected area while leaving all pine and incense cedar. Intermediate crown class trees with large crowns would be left when possible for structural diversity.
**Heterobasidion annosum (S-type) & Armillaria ostoyae Root Rot Treatment:** The objectives of treatment are to allow immune or resistant species to occupy root disease pockets over time until the inoculum dies out. If immune species occupy the site, the pathogen will eventually die after several decades and susceptible species may reoccupy the old root infection center and grow without influence of the disease. In root disease pockets, more resistant species (incense cedar, Douglas-fir, and pine species) would be favored for leave trees and susceptible trees would be marked for removal. If infected areas exceed 1 acre in size, 16 to 25 trees per acres would be retained within the infected area leaving all resistant species. Follow-up borax treatments would be applied to fresh stump surfaces after harvest to minimize spore germination and infection of *H. annosum*.

**Dwarf Mistletoe treatments:** The objective of harvest is to minimize the impact of the disease the long term conifer productivity within the stand and to ensure the future health and growth of conifer regeneration. Infected overstory trees with a dwarf mistletoe rating of 4 to 6 would be marked for removal. All healthy, resistant species, infected old-growth trees, and all trees 34 inches DBH and larger with a dwarf mistletoe rating of 1 and 2 (Figure 2-1) would be retained. One ½-acre patch of infected trees will remain for every 20-acres (an infected patch every 660 feet); priority areas for leave patches would be around infected old-growth trees or adjacent to riparian areas. A 35-foot crown spacing would be created between leave patches and adjacent uninfected forest stands.

![Figure 2-1. Dwarf Mistletoe Rating System. Source: The American Phytopathological Society, 2006.](image)
Regeneration Harvest

The objectives of regeneration harvest are to release understory conifers for future forest production by thinning overstory trees, and to create multiple-canopied stands or stands with late-successional characteristics. A variety of structures (leaning trees, forktop trees, groups of trees, etc.), different age classes, and a wide range of diameter classes are to be retained or created.

To achieve stand diversity, trees of all crown classes (suppressed to dominant) would be marked for removal leaving those with the best live crown ratios. Maximum crown spacing (from branch end to branch end) should range from 20 to 45 feet. Leave 20 to 25 TPA (47-52 feet bole spacing) ≥20 inches DBH. Seedlings through large pole-sized trees (6 to 10 inches DBH) would be left in openings created by thinning overstory trees. Leave trees that exhibit the most dominant old-growth characteristics. Typical leave trees will be the most vigorous dominant and codominant trees having the best live crown ratios (≥30%), straight boles, and healthy conical shaped crowns, although at least one forked tree/acre and one dead tree/acre should remain if available. Second growth trees may have to be left to meet crown spacing requirements when the older trees are widely spaced. Leave enough trees to prevent more than 45 feet between crowns. Favor leaving sugar pine, ponderosa pine, incense cedar and Douglas-fir, respectively.

c. 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 tractor or mechanical harvester yarding methods.

(1) Tractor Yarding: utilizes tractors to drag trees to landing locations. Tractor yarding only occurs on lands with less than 35% slope, although operations would be permitted on short pitches exceeding 35%. This method requires narrow skid trails (about 9 to 12 feet wide). Skid trail locations are approximately 150 feet apart, but vary depending on the site-specific terrain, and are pre-located and approved by the BLM sale administrator. Pre-located skid trails minimize the area of ground a tractor operates on, thus, minimizing soil disturbance.

(2) Mechanical harvester: Mechanical harvesting would be accomplished with a cut-to-length machine capable of severing, limbing to 3 inch top diameter, cutting to length, and bunching logs to the lead of designated skid trails. The harvester would be equipped with a telescoping arm 20 to 30 feet in length.

d. Fuels Reduction & Pre-commercial Thinning

Although fuels reduction is not the primary purpose for stand treatments proposed, fuels reduction is an important component and project design feature incorporated into the proposed action. This involves cutting and disposing of small diameter slash created from forest thinning. Fuels reduction treatments are accomplished by hand-cutting, piling and burning small diameter material, biomass removal, and underburning. Each of these treatments may be used as a stand-alone treatment or in combination. Post harvest evaluations would determine the extent and method of treatments needed (hand pile and burning or underburning,). The majority of units would be handpiled and burned.

Biomass removal involves what is called whole tree yarding. This is where the entire tree, including branches and tops, are yarded to log landings. The trees are then topped and limbed at the landings, and the resulting piles of slash are chipped and hauled away from the landings. Biomass utilization in some units would likely eliminate the need for follow-up hand piling and burning in those units.

Hand piling and burning involves cutting slash with chainsaws and handpiling and burning the material. Pile burning will usually be 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.

**Underburning** involves 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. 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. 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.

**Pre-commercial thinning** is proposed for to thin young conifer trees growing in the understory of forest stands planned for commercial harvest. The purpose of pre-commercial thinning is to reduce competition where understory conifers are growing in dense thickets in order to increase the growth rates and vigor of young trees. Pre-commercial thinning, when combined with post harvest activity fuels treatments, also provides fuels reduction benefits.

### 3. 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).

#### 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 exhaustive surveys within the Plateau Thin planning 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 Jenny Creek Watershed Analysis (USDI and USDA 1995:90-93). See Map 2-1 for Riparian Reserve locations for the Plateau Thin project area. Site specific widths for each Riparian Reserve have been mapped in GIS and would be implemented under the Proposed Action Alternative. Riparian Reserve widths in the Plateau Thin project area are as follows:

(1) Fish streams: from 320 to 400 feet slope distance on each side of the stream.
(2) Perennial nonfish-bearing streams: from 160 to 200 feet slope distance on each side of the stream.
(3) Intermittent nonfish-bearing streams: from 100 to 200 feet 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.

### 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.
(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.

**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. Irrigation ditches in the project area would be protected from damage and kept free from slash. *
(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 would be blocked with an approved barricade where they intersect haul roads. 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 15 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 15% by weight at a three inch depth or on a snow pack. 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 snow pack is sufficient to protect the soil. Tractor yarding or harvester-forwarder operations would be allowed to start when there is a minimum of twenty-four (24) 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 2: 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**

Objective 1: 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.

**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. *

Objective 2: Prevent Offsite Soil Erosion

(1) Landing construction and road maintenance would not occur during the wet season (October 15th to June 15th) 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 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 landings would be seeded with native or approved seed, fertilized, and mulched, except where rock occurs. *

(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), are identified and analyzed for use. If opened/constructed these temporary routes would be blocked and water-barred at the completion of log haul and within the same season as constructed/opened* Work would be done between June 15th to October 15th. *

(6) All natural surface roads would be closed during the wet season. *

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.

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 15th). 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 ¾ minus crushed rock.

(3) Winter hauling would be allowed on paved roads or any road when at least 4 inches of packed frozen snow is present on hauling roads. Snow plowing would maintain at least 4 inches of packed snow on hauling roads.

(4) Dust abatement would include water, lignin, or magnesium chloride.

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.
h. Oil and Hazardous Materials & Emergency Response

During operations described in the proposed action, 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.

i. Silviculture

Objective 1: Protect Residual Leave Trees
(1) In pine series forests, where the single tree and group selection methods are used, 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) 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.
(5) Treat cut stump surfaces with a registered borate fungicide (Sporax®) in specified units to reduce the potential for the spread of annosus.
(6) Leave a no-cut buffer adjacent to concentrated dispersed camping site located in T. 38 S., R. 3 E. in the SE/NW ¼ of Section 13 to prevent dispersed camping from spreading further into the forest stand.

Objective 2: Create growing sites and reduce competing vegetation for natural and planted seedlings
(1) In pine site and group select treatment units, where the single tree and group selection methods are used, treat logging slash and fuel loading to prepare suitable seedbeds for reproduction.

Objective 3: 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 that were released with the 15 to 25-foot crown space.

(3) White fir is extremely susceptible to fungal attacks and root rots. To reduce the probability of mechanical damage to white fir leave trees, avoid leaving white fir along haul routes, planned skid roads, or adjacent to major landings where heavy mechanical injury can occur during harvest operations.

j. 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**

Work activities that produce loud noises above ambient levels would not occur within specified distances (Table 2-4) 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 2-4 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.

(1) 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).

(2) 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 2-4. Mandatory Spotted Owl Restriction Distances**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Zone of Restricted Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Equipment <em>(including nonblasting quarry operations)</em></td>
<td>105 feet</td>
</tr>
<tr>
<td>Chain saws</td>
<td>195 feet</td>
</tr>
<tr>
<td>Impact pile driver, jackhammer, rock drill</td>
<td>195 feet</td>
</tr>
<tr>
<td>Small helicopter or plane</td>
<td>360 feet*</td>
</tr>
<tr>
<td>Type 1 or Type 2 helicopter</td>
<td>0.25 miles*</td>
</tr>
<tr>
<td>Blasting; 2 pounds of explosive or less</td>
<td>360 feet</td>
</tr>
<tr>
<td>Blasting; more than 2 pounds of explosives</td>
<td>1 mile</td>
</tr>
</tbody>
</table>

* 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) Do not mark large, broken-top trees and large snags with loose bark. Retain and protect these structures where possible.
Objective 4: Protect Special Status Wildlife Species

(1) Northern Goshawks are known to inhabit forested habitat of the type found within the Plateau Thin 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) Three known sites of the Mardon skipper butterfly, a Federal Candidate for listing and a Bureau Sensitive species occur in meadow areas within the planning area but outside of any treatment areas. Natural meadows are identified as special habitats and receive protection from disturbance as directed in the RMP (pg. 45).

(3) There are 4 known Bald Eagle nest sites in the project area. Buffer around nest sites. Manage approximately 30-acre core area around nest sites. Retain older forests within ½ mile of nests. Large overstory trees and dominant trees along ridges in the vicinity of nests should be retained. Develop HMP for sites. Avoid disturbance within ½ mile from February 1 through August 15.

(RMP p.57)

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

(1) Three known great gray owl nests would be protected with a ¼ mile protection buffer (approx. 100 acres).

(2) One location of a Survey and Manage snail, Monadenia chaceana, would be protected through the application of a no treatment buffer.

(3) Suitable habitat for Pristiloma arcticum crateris snail species would be protected through no-treatment in Riparian Reserves (which includes suitable habitat within 30 feet on each side of the channel).

k. 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 noninfested 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.

l. Recreation

Objective 1. Maintain snowmobile trails for winter recreation

(1) Snow plow only half (or one vehicle width) of Keno Access and Grizzly roads to provide unplowed track for snowmobiles. Plowed turnouts at appropriate intervals would be approved as needed.

Objective 2. Protect trail tread for the existing Lilly Glen equestrian trail.

(1) Designate skid trail crossings perpendicular to the trail to minimize disturbance to the trail tread.
4. 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.

C. PROPOSED MITIGATION MEASURE

In 2008, the U.S. Fish and Wildlife Service issued a Recovery Plan for the Northern Spotted Owl (NSO). The recovery plan was subsequently challenged in Court, and efforts to revise the recovery plan are underway. Recovery plans are not regulatory documents; rather, they provide guidance to bring about recovery and establish criteria to be used in evaluating when recovery has been achieved. The BLM continues to work with the Service to incorporate Recovery Goals and Actions that are consistent with BLM laws and regulations.

In order to maintain future options in the Plateau Thin Project Area for aiding in the recovery of the northern spotted owl, the Responsible Official directed the project leader to develop a spotted owl mitigation measure. In response, a subset of Alternative 2 was identified that would generally avoid forest thinning within the home range radius of northern spotted owl sites. The exception, two units slightly overlapped with the very outer edge of the home range radius (1.2 mile) of owl sites; for these instances, thinning prescriptions were modified to treat and maintain all existing nesting roosting, foraging and dispersal habitat. The subset of units, identified below (Table 2-6), is the result of applying mitigation for the northern spotted owl. Additionally, this subset of units is also the result of avoiding forest thinning in stands identified as Recovery Action 32 stands. Recovery Action 32 (RA 32) developed under the 2008 Recovery Plan for the Northern Spotted Owl, recommends maintaining “substantially all of the older and more structurally complex multi-layered conifer forests on Federal lands outside of MOCAs” (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.

This subset of Alternative 2, referred to as the Swinning Timber Sale, would treat about 466 acres of forest stands using the silvicultural prescriptions as described in Section 2 (b) Silvicultural Prescriptions and Objectives (Table 2-5). An estimated 258 acres are proposed for pre-commercial thinning, within the commercial treatment units as noted in Table 2-6.

Table 2-5 provides a summary of treatments remaining after the application of northern spotted owl mitigation. Table 2-6 and Maps 2-5 through 2-8 below identify specific units remaining to be treated following the application of northern spotted owl mitigation. The 0.7 mile of temporary spur road construction/reopening would not occur with the implementation of this subset of Alternative 2.

<table>
<thead>
<tr>
<th>Commercial Silvicultural Prescriptions</th>
<th>Acres*</th>
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<tr>
<td>Pine Site Thinning</td>
<td>39</td>
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<tr>
<td>Mixed Conifer</td>
<td>385</td>
</tr>
<tr>
<td>Regeneration (&gt; 20 trees per acre &gt; 20 inches dbh retained)</td>
<td>42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>466</strong></td>
</tr>
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Table 2-6. Plateau Thin with Proposed Mitigation Applied³

<table>
<thead>
<tr>
<th>Unit Descriptor</th>
<th>Acres</th>
<th>Silvicultural Prescription</th>
<th>Yarding System</th>
<th>PCT</th>
<th>Fuels Treatment</th>
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<td>9</td>
<td>71</td>
<td>MC</td>
<td>CR</td>
<td></td>
<td>HP/UB</td>
</tr>
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<tr>
<td>Total Acres</td>
<td>466</td>
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</tbody>
</table>

### Silvicultural Prescriptions
- **MDF** – Moist Douglas-fir
- **Po** - Poles
- **Pi** – Pine Site Treatment
- **R** – Regeneration (> 20 trees per acres retained)
- **MC** – Mixed Conifer
- **WF** – White Fir
- **GSDC** – Group Select Disease Control

### Yarding Systems
- **CR** - Crawler Tractor
- **M** – Mechanical Harvester

### Fuels Treatment
- **HP** – Handpile, cover & Burn
- **UB** – Underburn

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³ Unit acres reported in this table are based on Geographic Information System (GIS) data and rounded to nearest whole acre; unit acres may differ from those reported in individual timber sale contracts/prospectuses due to differences in electronic mapping software.
Map 2-5. Plateau Thin with Proposed Mitigation Applied (Swinning Timber Sale)
Map 2-6. Plateau Thin with Proposed Mitigation Applied (Swinning Timber Sale)
Map 2-7. Plateau Thin with Proposed Mitigation Applied (Swinning Timber Sale)
D. ACTIONS AND ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

This section describes actions and/or alternatives that were considered during analysis but were eliminated from detailed analysis under Alternatives Analyzed in Detail.

**No new road construction:** This alternative would have eliminated any 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 some units within the project area. While road construction was not completely eliminated, new road construction was limited to about 1000 feet (<0.2 mile).

**Imposed Diameter Limit:** Imposing a 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). Meaning 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. There is no management basis for the use of a 20-inch diameter limit to meet the identified needs for the Plateau Thin Forest Management Project. 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 required:

- 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 required 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 alternative imposing a diameter limit on harvesting trees would not be supported by management objectives, is not required by law or regulation, and would cause the project to fail to meet one or more of the stated objectives in the statement of purpose and need for the proposed action. That being said, the Plateau Thin 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 Summary of Silvicultural Objectives (above).
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 Proposed Action Alternative. 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 Plateau Thin Forest Management Project.

The Medford District Proposed Management Plan and Environmental Impact Statement (PRMP/EIS) describes the affected environment for the Medford District Bureau of Land Management PRMP/EIS planning area which covers approximately 858,127 acres of BLM administered lands in both the Cascade and Siskiyou mountain ranges across five counties in southwestern Oregon (PRMP/EIS p. 1-3). The Plateau Thin Forest Management project is located in the Cascade Mountains in Jackson County. This EA incorporates by reference information included in the PRMP/EIS and will provide additional site-specific detail needed for project level planning.

1. Project, Planning, and Analysis Areas

The terms project area, planning 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 the actual forest stands where thinning is proposed, roads proposed for maintenance, and proposed temporary roads.

The term planning area is used to describe the overall area of consideration that was reviewed for the development of the Plateau Thin proposed action.

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 and planning area boundaries.

2. Consideration of Past Actions in the Analysis of Effects

The current condition of the lands affected by the proposed action is the result of 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 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.)
As the Council on Environmental Quality (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 of past action may be useful in two ways according to the CEQ guidance: first for consideration of the proposed action’s cumulative effects, and second 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 the Plateau Thin project, describe indicators of importance along with the spatial and temporal scale of importance (analysis area) 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.

3. Consideration of Ongoing and Reasonably Foreseeable Actions in Analysis of Effects

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. Each resource analysis discusses reasonably foreseeable actions relevant to the analysis of cumulative effects for that particular resource.

When the Plateau Thin Forest Management Project was first proposed, the Bureau of Land Management was working with the Bureau of Reclamation to develop and analyze a similar forest management proposal on Reclamation lands, referred to as the Howard Prairie Forest Management Project. The Howard Prairie Forest Management Project was analyzed under this EA as an ongoing or reasonably foreseeable future action. Since that time the Bureau of Reclamation has deferred work on the Howard Prairie Forest Management Project due to changes in Reclamation priorities. However, for purposes of this analysis, the Howard Prairie Forest Management Project will continue to be considered and analyzed as a reasonably foreseeable future action.

2. The Cottonwood Project, a future forest management project located in the Jenny Creek Watershed, has not yet been developed to move forward as a proposed action. At this time, this project is anticipated to occur in 2011, with planning begin in the fall of 2010. Although the future project can be associated with a general geographic area, and would be designed to implement forest health and timber resource management actions/objectives of the Medford District RMP, the exact proposal is not developed 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 Plateau Thin Forest Management Project. The resulting NEPA document would be subject to public and administrative review once completed.
4. Implementation of Proposed Mitigation

If mitigation for the northern spotted owl is selected for implementation, the following summarizes the key changes in anticipated effects:

- Timber harvest would be reduced by 1,647 acres resulting in nearly 200 acre reduction of soils disturbed/compacted from yarding activities;
- A reduction in sediment produced (but likely immeasurable) from the road prisms due to a decrease in use of roads and elimination of temporary road construction/reopening;
- About 1,647 acres would not receive silvicultural treatments to reduce stand densities and/or reduce impacts from forest pathogens on forest stands; high stand densities would continue to contribute to tree mortality and disease centers would continue to spread uncontrolled.
- High stand densities and continued tree mortality from competition and disease would contribute to an increase in fire hazard on 1,647 acres.
- The amount of suitable northern spotted owl nesting, roosting, and foraging habitat would be removed or downgraded would be reduced by 772 acres (from 1090 to 318 acres).
- The majority of timber harvest, 466 acres, would occur outside the provincial homrange of northern spotted owls. Habitat within northern spotted owl provincial homranges (3 acres) which is proposed for harvest would be treated in such a manner as to maintain current habitat function post harvest.

B. VEGETATION

1. Affected Environment

a. Landscape Pattern

The present day landscape pattern of the vegetation in the Plateau Thin Project Area is a result of topography, fires, wind events, timber harvesting, and forest pathogens. There is a natural diversity of vegetation condition classes within stands and between stands whose boundaries are generally dictated by soils, aspect, and past disturbance. Soils are an important determinant in vegetation changes. As a result, the majority of the timber stands are separated by grasslands, shrublands, or oak woodlands. These influences create a coarse-grained pattern across the landscape with a mosaic pattern of different vegetation types and seral stages.

Federally managed lands within the Plateau Thin Planning Area are presently composed of the following vegetation types: grassland (about 292 acres); shrubland (about 142 acres); hardwood/woodland (about 11 acres); seedlings/saplings, 0 to 4.9 inches diameter breast height (DBH) (about 704 acres); small conifer timber, 5 to 11 inches DBH (about 504 acres); large conifer timber, 11 to 21 inches DBH (about 942 acres); and mature timber (about 2,999 acres).

Grasslands, shrublands, and woodlands comprise 8 percent of the total planning area. Some of the forest lands within the Plateau Thin Project Area have been previously harvested. In this project area, most of the commercial stands originated between 1800 and 1900. Forest fires have played a role in the present day landscape pattern in the analysis area. The largest fires occurred in 1910 with the Short Creek Fire and Deadwood Fire in the Moon Prairie area (Minore 1978) which burned over 2,400 and 2,330 acres, respectively (USDI 1995, Minore 1978). Most other burned areas 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. Plantations comprise 13 percent of the project area (704 acres). The oldest trees sampled in the project area were 436 and 320 years-old. Overall, commercial stand age for the project area averaged 127 years old. Individual sample trees greater than 150 years old made up 30 percent of the total 369 tree sample. Older stands or patches of older trees are in the understory reinitiation stage of forest development and vertical stand structure is diverse.
As a result of past harvests and fire events in the Moon Prairie area, 13 percent of the planning area is in an early seral stage. Natural mortality has also created openings in the canopy layer. 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 precommercial thinning.

The average canopy closure for sampled stands in the Plateau Thin Project Area is 79 percent and ranges from 68 to 100 percent. 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.

b. Tree Series and Plant Associations

There are four tree series in the Plateau Thin Project Area: Douglas-fir, ponderosa pine, white fir, and white oak (Table 3-1). Plant association descriptions within these series can be found in Preliminary Plant Associations of the Siskiyou Mountain Province (Atzet and Wheeler 1984) and 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 3-1. Tree Series and Plant Associations Common to the Plateau Thin Project Area

<table>
<thead>
<tr>
<th>Douglas-fir Series / Plant Associations</th>
<th>Ponderosa Pine Series / Plant Associations</th>
<th>White Fir Series / Plant Associations</th>
<th>White Oak Series/Plant Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSME (Douglas-fir)-ABCO (White Fir)</td>
<td>PIPO–PSME</td>
<td>ABCO-TABR (Pacific Yew)</td>
<td>QUGA (Oregon White Oak)/FRVEB (Woods Strawberry)</td>
</tr>
<tr>
<td>PSME-ABCO/BENE (Dwarf Oregongrape)</td>
<td>ABCO/HERB</td>
<td>QUGA–CEMO (Birchleaf Mountain Mahogany)</td>
<td></td>
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<tr>
<td>PSME-ABCO/HODI (Pacific Ocean Spray)</td>
<td>ABCO-PSME/DEPAUPERATE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSME-ABCO-PIPO (Ponderosa Pine)</td>
<td>ABCO-PIPO</td>
<td></td>
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The Douglas-fir plant associations comprise 79 percent of forestland in the planning area. These associations are cool and dry. White fir is prevalent in the forest understory, but Douglas-fir is preferred. In frequency of occurrence, the PSME-ABCO-PIPO plant association occurs the most frequently (36%) followed by PSME-ABCO (16%), PSME-ABCO/BENE (15%), and PSME-ABCO/HODI (14%). In acreage, the PSME-ABCO-PIPO plant association makes up 31% of the forestland followed by PSME-ABCO (21%), PSME-ABCO/HODI (16%), and PSME-ABCO/BENE (11%).

Drier forest sites make up 4 percent of the forestland in the planning area and are composed of the PIPO-PSME plant association. Ponderosa pine, Douglas-fir, and white fir occur with ponderosa pine being the most efficient. Only the hardiest sugar pine and white fir can survive on these sites and their growth rate is slow (Atzet and Wheeler 1984).
In the planning area, 54 percent of the sugar pine occurs in the PSME-ABCO-PIPO plant association which is the largest represented plant association in the project area. This association is naturally characterized by high basal area, a diversity of shrubs and herbs, and disturbances (Atzet and Wheeler 1984). Of the near 1,200 acres of land in the planning area classified as PSME-ABCO-PIPO, 61 percent is in the understory reinitiation stage of forest development. This later stage of succession, according to Oliver and Larson (1996), begins several decades after the stem exclusion stage begins and displays a low stratum of herbs, shrubs, and advance regeneration invading the forest floor, which until then had been relatively free of low vegetation.

In contrast, 35 percent of the PSME-ABCO-PIPO plant association in the project area is in the stem exclusion stage of forest development. 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 shade tolerant white fir as this species persists under increasingly lessening light conditions. Pine and other sun loving species become suppressed and eventually excluded from the stand giving way to a pure or nearly pure white fir forests. Without disturbances to release growing space, shade intolerant species such as pine continue to decline in number, reducing stand-level species diversity.

The white fir sites combined make up 17 percent of the forestland in the planning area prevailed by the ABCO-TABR plant association (11%). According to survey data, this was the only white fir plant association group where sugar pine was found. Another white fir plant association group ABCO-PSME/HODI, along with PSME-ABCO/HODI, yield the highest average square feet of basal area per acre. The ABCO-PSME/HODI plant association are hot and dry while PSME-ABCO/HODI is moderately dry (Atzet and Wheeler 1984).

At the stand level, the landscape pattern can be considered more fine-grained when compared to historic stands for all vegetation condition classes. 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. White fir is replacing ponderosa pine, sugar pine, incense cedar, and Douglas-fir because of its more shade-tolerant nature. White fir is also encroaching upon the edges of meadows and oak woodlands, although mortality of white fir along these edges is evident. Suppressed shrubs and hardwood trees beneath the dominant tree canopy layer are dying. White oak and black oak have dropped out of some conifer stands where light and water have become limiting.

Recognizing that landscape vegetative patterns are in a constant state of dynamics we are merely observing the landscape vegetation of today at one single point in time. Although current vegetation stem densities are high and are mostly in the mid and mature seral stages, the vegetation condition classes of today are atypical when compared to historic patterns. With or without silvicultural management, the vegetation will continually change because of natural succession. There is no single state of a forest that is considered the only natural state.

c. Forest Vigor and Growth & Risk of Tree Mortality (competition and insects)

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. The current average relative density index for ponderosa pine stands was 0.64. At this density, pine stands exhibit reduced growth, crown decline, and competition-induced mortality. According to Cochran (1998), “Ponderosa pine quickly responds to new growing space even at old ages and would quickly take advantage of the available site resources.”

A decrease in stand vigor is expected and considered forthcoming with continued overstocking and increasing stand age. A productive forest stand, absent of natural or human density control, will continue growing unleashed 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. More than half of the stands inventoried have relative density indices between 0.55 and 1.00, which bounds the zone of imminent competition-mortality (Drew and Flewelling 1979). Undisturbed populations eventually compete for growing space and gradually thin the population as individuals die in a self-thinning process (Barbour, et al. 1987).

Currently, the relative densities of stands throughout the project area are high. This is primarily due to the lack of natural disturbance and as a result of fire suppression. The stand relative density index ranges from 0.496 to 0.906. Trees per acre range from 97 to 537. The overall average relative density for the Plateau Thin Project Area is 0.588 indicating that physiologically the trees have entered the zone of imminent competition induced suppression and mortality.

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). Crown leaf surface area has a linear relationship with sapwood area at breast height and can be accurately estimated from measurements of sapwood thickness. By measuring diameter at breast height, width of the last growth ring, and sapwood thickness, Waring’s vigor index can provide a meaningful measure of tree vitality that is relevant to determine whether or not a particular tree would be susceptible to beetle infestation. 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 stemwood 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/m²/yr). Trees with vigor ratings below 30 (g/m²/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 and Pitman 1985).

Pine species in the project area are becoming scarce. The vigor rating for Ponderosa pine falls below 30 at a rating of 21 (g/m²/yr). Regarding tree vigor in general, a vigor index of 21 grams of stem growth per meter squared per year is very low. In pine stands and in mixed conifer stands, where pine are naturally encountered, shade tolerant white fir are encroaching and successfully competing against the pine for soil nutrients, water, and growing space. White fir continually advances 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 (Figure 3-1).
Most conifers have an associated bark beetle that is capable of killing the tree under the right conditions. 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 at a slow rate of 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 (Hall 1995, 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 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).

Core measurements were taken from 56 ponderosa pine sample trees representing all vegetation condition classes. The current average ponderosa pine tree vigor rating is 21 g of annual wood production per square meter of foliage. In addition, the 10-year incremental growth data for ponderosa pine revealed a current rate of 1.26 inches per decade (Figure 3-1). Furthermore, the current average relative density index for ponderosa pine stands was 0.64. This data indicates that, based on Waring’s vigor rating indices, last decade’s growth rate, and relative density indices, ponderosa pine species are growing poorly and their survival in the project area is threatened. Ponderosa pine species in the project area are growing at a rate that leaves them prone to and at increased risk of bark beetle attack.

As observed with Douglas-fir (Figure 3-3), the average growth rate per decade has been declining over the last 20 years. However, the decline in growth for ponderosa pine is sharper compared to Douglas-fir. Ponderosa pine growth is declining at a 20-year average of 0.22 inches per decade. The forthcoming decades indicate that if variables remain constant, the growth rate of ponderosa pine for 2015 and 2025...
may decline to 1.04 and 0.82, respectively. Regardless, of any future estimates, current data collected in the project area representing poles, mid, and mature vegetation condition classes (Table 3-1) of the ponderosa pine series reflect a current unhealthy condition.

The susceptibility of trees to damage by bark beetles can be mitigated by stocking control which is tied closely together with tree vigor (Larsson, 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 project 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 project area.

For all inventory stands, sample cores were taken from 369 trees representing all vegetation condition classes and plant association groups across the project area. Each core was measured to determine individual tree vigor, age, and growth rates. Vigor ratings were determined by the Waring Tree Vigor Index and growth rates were tabulated by decade. Figure 3-2 illustrates the 10-year growth rate of all 369 sample trees, combining Douglas-fir, white fir, and ponderosa pine, spanning to the decade ending in the year 1765.

The chart illustrates a period of improving tree growth between the decades of 1945 and 1965 followed by a decline from 1985 to 2005. Timber harvesting occurred on BLM lands in the early 1940’s and tapered off in the 1960’s which suggests the increased period of growth following harvest. 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 and Schlesinger 1985; Edwards 1975). 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 Plateau Thin Project Area was 1.60. This figure is a mere snapshot in time, but 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, Hall 1995). At this time, according to sample core measurements, combined forested stands in the project area are growing at a favorable rate to withstand beetle attacks. However, when analyzed by species, the average diameter growth of 1.26 for ponderosa pine in the last decade 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 (Figures 3-2 and 3-3) exhibits a declining curve. Since 1985, all three species (Douglas-fir, ponderosa pine, and white fir) in the project area individually exhibited a declining growth trend after an increase from previous decades (Figure 3-3). If all influencing variables, that is, temperature, precipitation, soils, elevation, and densities, remain constant or worsen in terms of optimal forest productivity, trees within the project area will continue to experience a growth decline. Based on this trend it is estimated that by the year 2015 the average ten-year growth rate will drop below 1.5 inches in diameter per decade to a rate of 1.42 inches in diameter per decade. If variables remain the same, the trend could continue at an average decline of 0.18 inches in diameter growth per decade. In 20 years the decadal growth could be as short as 1.24 inches.

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

Douglas-fir tree core samples were taken from 311 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 70 for Douglas-fir compared to 21 for ponderosa pine and the average growth last decade was 1.65 inches. Based on Waring’s vigor rating
index, the data indicates that Douglas-fir in the project area can generally survive one or more years of relatively heavy bark beetle attacks and, based on their decadal growth, are less prone to beetle attack. However the declining trend over the last twenty years indicates that if variables remain constant, the projected growth rate of Douglas-fir in ten years will continue dropping by an estimated average of 0.16 inches per decade. In 2015 the estimated growth rate could drop just shy of the 1.5 inch resiliency threshold to 1.49 inches per decade and by 2025 may decline further to an estimated 1.33 inches per decade.

White fir samples, taken primarily from white fir sites across the project area, exhibited 1.76 inches of diameter growth between 1995 and 2005. A vigor rating index is not available for white fir species; however Figure 3-3 also displays the average 10-year incremental growth rate of white fir exhibited in the planning area. Mean annual precipitation between the Howard Prairie Dam and Ashland NOAA Climate Stations measured a 30-year average of 26.17 inches per year (Oregon Climate Service 2008). The average relative density index for white fir was 0.42, which is low in relation to Drew and Flewelling’s zone of competition induced mortality (.55 to 1.00). According to Cochran (1998), “healthy stands of white fir grow very rapidly, produce a dense crown cover, and are visually pleasing.” However he raises doubts about growing white fir stands on sites with mean annual precipitation rates below 32 inches even if stand densities are kept very low. Shultz (1994) rated the risk of white fir mortality based on annual precipitation as Low, Medium, High, and Extreme. A mean annual precipitation from 25 to 30 would have a High mortality risk rating while a rating between 30 and 40 mean annual precipitation would be at Medium risk to mortality.

**d. Forest Pathogens**

Western dwarf mistletoe (*Arceuthobium campylopodum*) and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) infections occur on few stands and partial stands in the project 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 and 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.

Forest pathogens 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 the sites, they will become infected, and their likelihood of attaining large sizes will be low. The pathogen will survive on the site unless immune species occupy the gaps.

In the project area, laminated (*Phellinus weirii*), Armillaria (*Armillaria ostoyae*), and annosus (*Heterobasidion annosum*) root diseases are readily infecting and killing white fir and Douglas-fir. These diseases expand radially at a rate of about 1 ft per year and can remain viable in large stumps for at least 50 to 60 years. Brown cubical butt rot (*Phaeolus schweinitzii*) is also present causing severe root and butt decay of older Douglas-fir. Douglas-fir beetles often attack *P. schweinitzii*-infected trees.

Most root pathogens spread when the roots of susceptible uninfected trees directly contact the roots of diseased trees as in the cases with *A. ostoyae* and *P. weirii* root diseases. *A. ostoyae* is most common in stressed trees and often associated with compacted soils, in poorly planted areas, and where trees have been wounded. This disease can create large openings where highly susceptible tree species never attain large sizes. In the project area white fir are the most susceptible and are readily infected and killed. *P. weirii* causes severe root and butt decay, growth loss, and mortality in both Douglas-fir and white fir. Bark beetles often attack *P. weirii*-infected trees.
Treatments are intended to target infection foci that have expanded to form a disease center which expands at an average radial rate of 1 ft. per year. The centers are variable in size, already understocked and open containing dead standing trees, windthrown trees, and occasionally unaffected escapes. The centers eventually fill in with hardwoods, shrubs, and resistant conifers. Symptomatic trees will occur around the margins of these centers and exhibit various stages of decline. Susceptible conifers (white fir and Douglas-fir) may regenerate and occupy the newly available growing space in the centers, but will probably contact inoculum and die at an early age, thereby perpetuating the cycle of mortality and keeping the source inoculum alive. Laminated root rot will not spread into dead tree roots, however, the pathogen can live saprophytically remaining viable and infective in dead roots for 50 years or more after its host has died.

In *H. annosum*, the fungus infects its host by both mycelial growth across root contacts of adjacent trees and windblown spores contacting tree wounds, stumps, etc. (Figure 3-4). The primary spread of new infection centers starts by spore-caused infection of freshly cut stumps. Two strains of *H. annosum* exist: the P-group which affects pine and the S-group, affecting firs, hemlocks, and spruce. The S-group is the form recognized in the project area.

![Figure 3-4. Source: Otrosina and Cobb, USDA Forest Service Gen. Tech. Rep. PSW-116, 1989](image)

The root diseases in the project area kill host cambium, decay root wood, plug water conducting tissue, or cause some combination of these effects. Tree mortality from root disease occurs when trees with decayed roots are windthrown or by bark beetle attack on root disease-weakened trees.
e. Coarse Woody Material

On 21,400 feet of transect line, coarse woody material (CWM) averaged 15.2 tons per acre, and ranged from 4.7 to 38.9 tons per acre. The coarse woody material stems were concentrated in the 8-11 and 12-15 inch classes at the large end, although some sites contained pieces between 48 and 51 inches large end diameter. The average total length per acre equaled 1,440 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), 4 (losing form), and 5 (no form) were most common.

Stand inventory data for the planning area indicates that the mid-sized condition class (11 to 21 inches DBH) exhibits an average of 17.1 damaged trees per acre with an average of 18.9 inches DBH. The mid sized stands also have an average of 14.3 dead standing trees per acre with an average of 17.6 inches DBH. The mature size class stands (21 inches DBH and larger) have an average of 10.1 damaged trees per acre with an average of 23.1 inches DBH. In the mature stands there is an average of 13.2 standing dead trees per acre at a quadratic mean diameter of 22.6 inches DBH. Overall, damaged live trees ranged from 5 to 60.6 TPA with a quadratic mean diameter of 20.7 inches DBH; while dead standing trees per acre ranged from 0.7 to 26.7 TPA with a mean quadratic diameter from 8.6 to 30.9 inches DBH. Snags over 40 inches DBH (from .2 to 2, average 1.2 snags per acre) were found in some stands, namely in T38S-R4E-19 and 20. Some of the damaged trees will be retained for green tree retention.

2. Environmental Consequences

a. Alternative 1 - No Action

The No-action Alternative would allow forest stands to remain at the overall average of 0.588 relative density index, three major root disease inoculums to perpetuate within infection centers, and a continued decline in species and biological diversity. Stand densities would continue on their current trajectory and remain overpopulated. A relative density index rating of 0.55 for any given stand marks the point of imminent mortality and suppression; crown closure occurs at a RDI of 0.15 (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.

No action would allow annosus (Heterobasidion annosum), Armillaria (Armillaria ostoyae), and laminated root disease (Phellinus weirii) to persist 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 project area, disease-susceptible trees continue to recolonize these sites. The regeneration becomes infected and their likelihood of attaining large sizes will be low. The pathogen will survive on the site unless immune species occupy the gaps.

Without action, forest structure and species composition could not be managed to meet the desired forest stand characteristics (see Chapter 1). On pine sites, white fir and Douglas-fir would remain the most prevalent species and stands would remain in the stem exclusion stage of development if mortality does not occur. Out of all 56 ponderosa pine sampled, the current average ponderosa pine tree vigor rating is 21 grams of annual wood production per square meter of foliage. Trees with vigor ratings below 30 (g/m²/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 1.26 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 was 0.64. 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 project area is threatened.
Without management action, individual 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. Pine and oak species would continue to decline in number from competition with white fir and Douglas-fir because of their shade intolerance. 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. Resources previously used by the dead tree are reallocated to the surviving vegetation facilitating the growth of small diameter trees into overly dense unhealthy forest structure prone to a perpetual cycle of root disease infection, high severity wildfire, and eventual dieback from intense competition. The relative densities also present a high fuel hazard across the landscape. The Medford District RMP directs land managers to use commercial thinning to recover anticipated mortality and reduce stand susceptibility to disturbances such as wildfire, insect infestations, wind, and disease (USDI 1995a: 72). The No-Action Alternative would not be consistent with the Medford District Resource Management Plan Timber Management Objectives and Direction, and would not meet the need identified for the Plateau Thin Project (see Chapter 1).

With no reduction in forest stand densities and control of root disease susceptible species, slow tree growth and poor vigor will 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, root disease resistance, stand density, diameter growth, and vigor, the forest is unhealthy. When left undisturbed, stands continue to grow and produce new seedlings, although in unhealthy and dense conditions. Many stands are infected with root diseases and new seedlings are perpetuating the pathogen in root disease pockets. 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 could be completely decimated by root diseases, 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 other wildlife species. Fire hazard would increase with the abundance of dead vegetation and ladder fuels, and would be at maximum levels.

**b. Alternative 2 (Proposed Action)**

The proposed prescriptions to be applied across the forest landscape are based upon the present vegetation structure, species composition, aspect, and vegetation condition class. Through forest stand treatments, tree densities would be reduced, thus, allowing for improved individual tree vigor and growth, and improved forest health. Forest stands receiving low commercial thinning treatments would be less subject to crown fires (see Fire & Fuels). Table 3-2 of the silvicultural prescription shows projected 20-year diameter growth for treated and untreated stands (projections from the southwest Oregon ORGANON growth analysis model). Some stands will have disease infection center treatments that remove all infected trees in the pocket.
Table 3-2. Diameter Growth in Thinned vs. Unthinned Stands Grown for 20 Years

<table>
<thead>
<tr>
<th>O.I.#</th>
<th>POLES MID</th>
<th>STAND AGE (BREAST HEIGHT AGE)</th>
<th>CURRENT BA/AC (ft²)</th>
<th>CURRENT TREES PER ACRE</th>
<th>CURRENT 10-YEAR INCREMENT (INCHES)</th>
<th>CURRENT AVERAGE DBH</th>
<th>PROJECTED DBH AFTER INITIAL HARVEST</th>
<th>PROJECTED DBH IN 20 YEARS (INCHES) UNTHINNED</th>
<th>PROJECTED DBH IN 20 YEARS (INCHES) THINNED</th>
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<td>11.2</td>
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<td>12.7</td>
<td>15.1</td>
<td>15.0</td>
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</tbody>
</table>

* Pine Site Prescription
** White Fir Prescription

The average relative density for the area is 0.588 and indicates that physiologically the trees are in the zone of imminent competition and mortality. The silvicultural activities proposed resemble particular natural disturbances that are inherent to forests and therefore do not create entirely unnatural stands (Oliver & Larson 1996). 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.

Table 3-3 shows the growth of one mid size conifer stand (11 to 21 inches DBH) and one mature conifer stand with and without management. In the mid sized stand trees are lost through natural mortality versus being utilized through timber harvesting at a specified rate as recommended in Table 3-3.
Table 3-3. Description of O.I. Unit Nos. 120499C and 120928 with/without Silvicultural Treatment

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<thead>
<tr>
<th>Existing Stand: 120499C (Mid Stand)</th>
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</thead>
<tbody>
<tr>
<td><strong>Stand Age</strong></td>
<td><strong>Trees / Acre</strong></td>
<td><strong>Basal Area</strong></td>
<td><strong>RDI</strong></td>
<td><strong>Scribner Board-foot Volume</strong></td>
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<tr>
<td>87</td>
<td>316</td>
<td>270</td>
<td>.685</td>
<td>45,051</td>
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<td><strong>Future Growth of Stand if Not Treated (note the decline in trees/acre from natural mortality)</strong></td>
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<tr>
<td>97</td>
<td>286</td>
<td>295</td>
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<td>.749</td>
<td>66,052</td>
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<td>221</td>
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<td>.788</td>
<td>86,274</td>
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<td>137</td>
<td>204</td>
<td>366</td>
<td>.802</td>
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<tr>
<td><strong>Future Growth of Stand if Thinned to a Relative Density Index of .404 (122 ft² BA / AC)</strong></td>
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<tr>
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<td>.487</td>
<td>32,557</td>
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<td>137</td>
<td>143</td>
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<td>.627</td>
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<table>
<thead>
<tr>
<th>Existing Stand: 120928 (Mature Stand)</th>
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</thead>
<tbody>
<tr>
<td><strong>Stand Age</strong></td>
<td><strong>Trees / Acre</strong></td>
<td><strong>Basal Area</strong></td>
<td><strong>RDI</strong></td>
<td><strong>Scribner Board-foot Volume</strong></td>
</tr>
<tr>
<td>94</td>
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<td>280</td>
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<td>55,742</td>
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<td><strong>Future Growth of Stand if Not Treated</strong></td>
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<td>104</td>
<td>326</td>
<td>294</td>
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<td><strong>Future Growth of Stand if Thinned to a Relative Density Index of .346 (146 ft² BA / AC)</strong></td>
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<td>.465</td>
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<td>134</td>
<td>98</td>
<td>188</td>
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<td>144</td>
<td>97</td>
<td>207</td>
<td>.546</td>
<td>56,725</td>
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</tbody>
</table>

The Stand Visualization System (SVS) illustrates the prescriptions to portray what existing forest stands look like today and after application of the proposed prescriptions (U.S.D.A. and University of Washington 1995). ORGANON plot data was input into the SVS program for the simulations. The following data is for individual forest stands described in Table 3-3. Many similar stands of each vegetation type were studied to develop the prescriptions. Even though stand stocking potentials differ, individual stands will be marked approaching the simulation figures because of similar stand structure and existing trees per acre.

Figures 3-5 and 3-6 illustrate the pre and post-harvest stand conditions of a mid-sized mixed conifer stand in the Douglas-fir plant series (T38S-R3E-Sec. 26). Currently the stand has 316 TPA, a relative density index of 0.685, a tree diameter range from 2.7 to 38.2 inches DBH, and a species composition of 12 percent Douglas-fir, 80 percent white fir, 1 percent sugar pine, and 6 percent incense cedar. There are 138 TPA in the understory (trees <8 inches DBH) with 89 percent white fir and 11 percent incense cedar. The stand immediately after harvest produces an outcome that lowers the RDI to 0.404 (Figure 3-5, bottom left). There are a projected 178 TPA with a basal area of 122 ft² per acre. The species composition after harvest projects 41 percent Douglas-fir, 6 percent sugar pine, 35 percent white fir, and 12 percent incense cedar. Openings would allow more sugar pine and incense cedar to regenerate.
Figure 3-5. SVS Illustration: Treatment of Stand 120499C. Top: current condition; Bottom left: post-harvest condition; Bottom right: 50-year post harvest condition.

a. Current condition
Table 3-3 compares the difference between the treated and untreated stand. The treated stand, 50 years later, projects a reduction in trees per acre each decade by natural mortality. However, in comparison, the greater loss in trees per acre occurs in the untreated stand due to compounding competition each decade resulting from uncontrolled densities. After 50 years, the untreated stand holds 204 TPA at a stand RDI of 0.802 (a RDI from 0.55 to 1.00 bounds the zone of imminent mortality and suppression). In contrast, the 50 year treated stand holds 142 trees per acre at a stand RDI of 0.627.

In addition, following fifty years of growth, ORGANON projects the mean crown ratio in the treated stand growing to 0.414 (41% crown ratio) compared to 0.307 (31% crown ratio) in the untreated stand.
This long term outcome further benefits the ecosystem by providing greater tree crown area that would improve individual tree health as well as habitat for a variety of wildlife species.

Figures 3-7 and 3-8 illustrate the pre and post-harvest stand conditions of a mature-sized class mixed conifer stand in the Douglas-fir plant series in T. 38 S., R. 4 E., Section 19. Currently the stand has 366 TPA, a relative density index of 0.906, approximate crown closure of 100 percent, 208 ft² of BA/AC, and a quadratic mean diameter of 11.8 inches DBH. Of the 201 TPA in the understory (<8 inches DBH) 100 percent of these are white fir despite there being dominant ponderosa pine in the overstory. The white fir is occupying all available growing space in the understory because of its prolific growth in this shaded environment (ORGANON estimated 100 percent crown closure). Subsequently, the large ponderosa pine in the overstory have no opportunity to regenerate, because the prolific white fir out-competes the ponderosa pine seedlings, which require open space and sunlight to establish and grow. The overall species composition is 26 percent Douglas-fir, 72 percent white fir, and 2 percent ponderosa pine. Figure 3-7 (bottom left) displays the stand after harvest (105 TPA at a RDI of 0.346). The quadratic mean diameter changes from 11.8 to 14.2 inches DBH. This immediate result derives from merchantable small diameter trees selected for removal while together leaving the largest, healthiest, dominant trees. The treated stand resembles an older cohort with a higher proportion of large diameter trees. The treated stand also creates a more mixed species compositional balance with 31 percent Douglas-fir, 64 percent white fir, and 5 percent ponderosa pine. Openings would allow pine to regenerate.

Figure 3-7. SVS Illustration: Treatment of Stand 120928. Top: current condition; Bottom left: post-harvest condition; Bottom right: 50-year post harvest condition.
a. Current condition

b. Post-harvest condition
ORGANON projects a 50-year post harvest stand condition with 97 trees per acre, RDI of 0.546, quadratic mean diameter of 19.8 inches DBH, and trees ranging in size from 4 to 52 inches DBH. The 50 year old untreated stand however yields 217 TPA, a RDI of 0.956, a quadratic mean diameter of 17.0 inches DBH, and trees ranging in size from 2 to 50 inches DBH. The treated stand yields 2.8 more inches in quadratic mean DBH growth than the untreated stand. In addition, the 50 year old treated stand, even after 50 years of growth, is at a healthier density level (0.546 RDI) below the 0.55 threshold of imminent mortality and suppression. In contrast, the relative density of the untreated stand after 50 years is 0.956, nearly double the treated stand, and far above the 0.55 threshold of imminent mortality and suppression.

Table 3-4 also shows that relative densities will lower to an acceptable range if the stands are treated accordingly. The correlative density index rating between 0.55 and 1.00 for any given stand marks the zone of imminent mortality and suppression; crown closure occurs at a RDI of 0.15 (Drew and Flewelling 1979, Hayes et al. 1997). Briegleb (1952) stated that the optimum densities for most combinations of factors will be found to be between 0.34 and 0.55 relative densities. Trees will then be vigorous enough to withstand bark beetle attacks and the effects of root diseases if their roots should contact an infected host. Leaf area index values should begin to increase after the stands are thinned.
Table 3-4. Recommended BA/AC (ft²) to Lower Stand Relative Density to an Acceptable Level

<table>
<thead>
<tr>
<th>O.I.#</th>
<th>CURRENT BA/AC (ft²)</th>
<th>CURRENT RELATIVE DENSITY</th>
<th>RECOMMENDED BA/AC (ft²)</th>
<th>REMAINING TREES/ACRE</th>
<th>RESULTING RELATIVE DENSITY</th>
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</thead>
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<td>120546**</td>
<td>160</td>
<td>.413</td>
<td>134</td>
<td>365</td>
<td>.353</td>
</tr>
<tr>
<td>123216**</td>
<td>176</td>
<td>.424</td>
<td>145</td>
<td>251</td>
<td>.350</td>
</tr>
</tbody>
</table>

* Pine Site Prescription
**White Fir Site Prescription

With the group selection prescription, pine and cedar species will be favored to increase their prevalence in the forest stands thus enhancing species diversity.

The objective of harvest is to curtail the spread of the root rot into the uninfected areas, regenerate the moderate and severe root rot centers with resistant species, and protect the integrity of the remaining stand from wind damage. The prescription for the project area is to harvest with the group selection method within root disease pockets, leaving all resistant species within pockets, and cutting all susceptible trees (white fir and Douglas-fir). In laminated root disease the prescription calls for an additional removal of all susceptible trees (white fir and Douglas-fir) 50 feet beyond the last visibly infected/symptomatic tree/stump (Hadfield and Johnson 1977, Nelson et al. 1981, USDA(a), Hadfield et al. 1986). According to Hadfield et al. (1986) “many susceptible trees within 50 feet of the apparent edge of a disease center have a high probability of being infected even though they do not show crown symptoms”. Whenever a large infected area (≥1 acre in size) borders an uninfected stand with no root disease, 50 feet of true fir and Douglas-fir trees will be removed from the last visibly symptomatic tree or visible edge of disease center. Leave all pine, cedar, and other non-host species within this buffer strip. If infected areas ≥1 acre in size are found, mark all but 16 to 25 trees/acre within the infected area leaving all pine and incense cedar. Intermediate crown class trees with the largest crowns should be left when possible for structural diversity. Outside the infection centers, the remainder of the stand will be thinned to prescription, removing infected trees and the most susceptible trees, while leaving the resistant pine and incense cedar. True fir stumps across the entire unit will then be treated with Sporax to prevent the windblown spores of *Heterobasidion assosum* from entering the fresh stumps.

In addition, precommercial thinning would occur in selected units with dense understories. The excess, small diameter 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 will be thinned to a desired stocking level to improve the growth and vigor of the remaining trees. Achieving the desired species composition goals is of equal importance. Pre-commercial thinning will also reduce fuel ladders that allow fire to spread vertically from a surface fire to a crown fire.

By utilizing various landscape prescriptions, future silvicultural options would be greater than under the No-action Alternative, meeting RMP Timber Management Objectives for achieving a continuous supply of timber production through a balance of growth and harvest. The prescriptions would also ensure that
drought resistant conifer species such as ponderosa pine and incense cedar will be present in future stands where appropriate in regard to site conditions; important also for maintenance of species diversity and overall forest health.

There is within stand variation in canopy closure and this variation would remain across the landscape. On Douglas-fir sites canopy closure would be greater than 44 percent. On pine and Douglas-fir regeneration harvest sites, canopy closure would average approximately 35 and 44 percent, respectively. Pine species are shade intolerant so canopy closure should be lower, but not lower than 32 percent.

Untreated forest stands, that are retained as Riparian Reserves and plant and animal buffers, could contribute to increasing the radial spread of root disease as susceptible species continue occupying the sites, contacting the roots of uninfected host trees, and infecting surrounding healthy trees. After initial hosts die out recolonization of root disease pockets by susceptible species occurs readily in the project area. This would subsequently perpetuate the pathogen on the site and its damaging impacts would widen further. Mortality of untreated pine stands as a result of competition against white fir could contribute to epidemic levels of bark beetles that could infect adjacent forest stands. Untreated stands would also be at higher risk for high severity wildfire (see Fire and Fuels section).

C. FIRE & FUELS

This section discloses impacts to fire regimes from fuels and forest health activities such as prescribed fire, thinning and logging. Smoke impacts, as a result of prescribed fire, are discussed in “Air Quality”.

Issues/Concerns

Scoping (external and internal) generated the following issues/concerns related to implementing the Proposed Action. These effects may or may not occur as a result of the proposed action but were of concern to members of the public or ID team specialists.

- Timber harvesting would increase surface fuels over the short-term (6 months to 2 years) in stands treated. Some people expressed their concern that leaving untreated logging slash, even if only for a short period of time, could lead to increased wildfire behavior and increased risk of escape from initial attack.

- Management of forest stands can result in altered micro climates. Increasing spacing between the canopies of trees can contribute to increased wind speeds, increased temperatures, drying of topsoil and vegetation and increased shrub and forb growth. These changes in microclimates and vegetation structures can alter wildfire behavior and its effects on the land (fire severity).

- Some comments were received requesting that this EA address the conclusions documented in the article *Patterns of fire severity and forest conditions in the western Klamath Mountains*, California. The article suggests that untreated forest stands with closed canopy conditions result in lower fire severity when burned by wildfire than open and non-forest vegetation conditions and lists management implications.

1. Affected Environment

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, 1995). Early settlers to this area used fire to improve grazing and farming and to expose rock and soil for mining. Historic records of the Dead Indian District of the Crater National Forest, summarized by Carroll E Brown (as cited in USDI 1995b:27), described that over 75 percent of the area was burned by fire in previous years.
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. Plant association groups are a credible link to historic ecological process, including fire regimes that occurred on sites in the past (Franklin and Agee 2003). Historic 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.

One historic fire regime is found within the project area (Schmidt et al. 2002):

Fire Regime 3: < 50 years fire return interval, Mixed Severity
Typical plant communities include mixed conifer and very dry westside Douglas-fir. 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.

Mixed-severity fire regimes (mosaics of frequent, low severity and infrequent but high severity) are more difficult to describe due to complexities that result in a mosaics of fire effects. Sites with more frequent fire historically are more apt to result with more severe effects from fires today than would have occurred historically (Agee 1998; Agee 2002). For sites that have a less frequent fire regime (higher elevation white fir stand types) 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.

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 timber stands proposed for thinning (fire regime 3) are in condition class 2. There are small portions of these stands that are in condition 3. Stand densities and ladder fuels (white fir) are extremely dense in some areas due to the absence of fire.
c. 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 1962 to 2005 show a total of 53 fires occurred throughout the project area. Lightning accounted for 25 percent of the total fires and human caused fires accounted for 75%. The following table is a break down of the fires within the project area:

Table 3-5. Fire Number by Size

<table>
<thead>
<tr>
<th>Total Number of Fires</th>
<th>Size Class</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>A</td>
<td>&lt;.25ac</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>26-10ac</td>
</tr>
</tbody>
</table>

Only 66 percent or 35 fires started on BLM managed lands. Of these fires, lightning started 29 percent and the remaining fires were human caused.

d. 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 from the Jackson County Fire Hazard and Risk Assessment, 2006. 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 acres in each fire hazard rating category for the entire project area.

Table 3-6. Fire Hazard Ratings for the Plateau Thin Planning Area

<table>
<thead>
<tr>
<th>Fire Hazard Rating</th>
<th>Percentage of Acres by Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low hazard (1-3)</td>
<td>23%</td>
</tr>
<tr>
<td>Moderate hazard (4-7)</td>
<td>72%</td>
</tr>
<tr>
<td>High hazard (8-10)</td>
<td>5%</td>
</tr>
</tbody>
</table>

Past actions that have cumulatively contributed to the current wildfire behavior and potential include timber harvesting, fuels reduction, and fire suppression. High forest stand densities and forest disease is contributing to tree mortality in the planning area (see Silviculture section), which has contributed to 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.
e. Effects of Fire Suppression

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. As a result of the absence of fire, there has been a build-up of fuels and a change to fire-prone vegetative conditions. This is particularly true for dry Douglas-fir, ponderosa pine, and the dry mixed-conifer forest types. Historically frequent, low intensity fires maintained much of these forest types in an open condition which were dominated by large-diameter trees.

In addition, ponderosa pine trees that thrive in fire prone environments are quickly shaded out by the more shade tolerant Douglas-fir or white fir species in the absence of fire. As a result, ponderosa pine area declining across the landscape. Trees growing at lower densities, as in ponderosa pine stands, tend to be more fire-resistant and vigorous. Eventually they grow large and tall, enhancing the vertical and structural diversity of the forest. Some populations of organisms that thrive in the more structurally diverse forests that large trees provide are becoming threatened.

Many forests developed high tree densities and produced slow growing trees rather than faster growing trees after fire suppression became policy in about 1910. In the Douglas-fir series in southwest Oregon there has been an increase in tree basal area with a shift to more shade tolerant species (Atzet 1996). Trees facing such intense competition often become weakened and are highly susceptible to insect epidemics and tree pathogens. Younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods. Increased tree mortality contributes to increased dead and down fuel loadings and the probability of high intensity wildfire. High intensity fires can damage soils and often impact riparian vegetation. The fire behavior type that these sites would support has also changed. 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.

Sites that have a less frequent fire regime (white fir stand types) 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.

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.

For the purposes of this analysis, the planning area boundary was used to analyze the effects of implementing the proposed action. It is also assumed for this analysis that fire suppression activities would continue on federal and non federal lands. 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.

While current policy requires the continuance of fire suppression activities in the Plateau Thin Project Area, BLM has been successful in achieving the reintroduction of fire to landscapes across the Medford District through prescribed burning and fuels reduction programs. While it is known that wildfires will occur annually throughout southwestern Oregon, it would be speculative to try to predict exactly where and when they will occur and the size of area impacted. Therefore, the assumptions described below are provided for informational purposes as they are common to all alternatives and are not used to compare differences among alternatives.

There are stipulations within the protection agreement that allow the BLM to designate areas that require special fire management activities during suppression efforts in order to insure impacts to resources are minimized. It is recognized that restrictions could increase the cost of suppression which the Bureau of Land Management would incur requiring a modification of the contract. During suppression activities on BLM lands the following guidelines would be followed:

- BLM resource advisors would 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 would be used as a starting point for burn-out or backfire operations designed to stop fire spread. Backfires would be designed to minimize fire effects on habitat. Natural barriers would be used whenever possible and fires would be allowed to burn to them.
- In the construction of fire lines, minimum width and depth would be used to stop the spread of fire. The use of dozers should be minimized and resource advisors would be consulted when appropriate. Live fuels would be cut or limbed only to the extent needed to stop fire spread. Rehabilitation of fire lines would be considered.
- The felling of snags and live trees would only occur when they pose a safety hazard or would cause a fire to spread across the fire line.
- The construction of helispots should be minimized. Existing helispots or natural openings should be used when possible. Helispots would not be constructed within Riparian Reserves, or areas of special concern.
- Retardant or foam would not be dropped on surface waters or on occupied spotted owl nest sites.
- Resource advisors would determine rehabilitation needs and standards in order to reduce the impacts associated with fire suppression efforts.

2. Environmental Consequences

a. Alternative 1 - No Action

The current trend of increasing stand density which results in increased mortality to the timbered stands would continue. The transition from areas of ponderosa pine to excessively dense fir stands would also continue. 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.

The timber stands proposed for thinning which are in condition classes 2 and 3 would not be treated and fuels reduction of the ladder fuels would not be accomplished.

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 and mixed conifer stands in 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 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, especially in the commercial timber harvest stands. Under the No-action Alternative, high fire hazard would remain in the project area, with a higher potential than the 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. There are no private industrial lands that are known to be scheduled for timber harvest. There are no other proposed timber harvest projects in the planning area by the BLM. Defensible space and driveway treatments will 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.

Based on trends in the last 35 years, humans will continue to be responsible for the majority of wildfires (75%). Most of the human-caused fires will continue to be associated within about 300 feet of roads. There are no expected significant gains in the miles of new roads, except for an occasional private driveway.

b. Alternative 2 (Proposed Action)

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 we refer to them 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.
Increased Activity Fuels from Timber Harvest
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 10. 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 6-11 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, recent 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 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.

Treatment of slash created from commercial thinning as well as the treatment of noncommercial size material (ladder fuels) and existing surface fuels are proposed for stands that are commercially thinned. By treating the noncommercial sized material in these stands, ladder fuels would be reduced. The reduction of this material along with the treatment of surface fuels 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 these stands would be greatly reduced. Also, mortality of the smaller diameter conifers would be reduced. The reduction of flame length would also increase the chance that direct attack of a wildfire could occur which would reduce acres burned in the event of a wildfire.

Another alternative for fuels treatment is to utilize whole tree yarding and remove non merchantable material for biomass. Several units are being analyzed for this in terms of the economics. The average cost of handpiling of the logging slash and handpile burning is $400.00/acre. Slashing/thinning non-commercial understory trees is an additional $350.00/acre. These costs would be reduced if biomass removal is utilized.

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 in Southern Oregon show 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.
**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 *In Press*; Agee 1996; Agee 1993).

The implementation of Alternative 2 would promote more fire resilient forest stands by thinning from below, removing suppressed 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; Agee et al.2000).

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 and with renewed vigor from forest thinning. 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 and incense cedar. 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).

Regeneration harvesting is necessary to provide renewal of forest conditions that will grow the next stand of trees for timber harvest (Medford District RMP, p. 181,194). In the short-term (about 10 years) approximately 110 acres of regeneration harvest units and group select patches within 142 acres of disease control units would be more fire resilient. This is because these prescriptions call for leaving the larger healthier trees (16 to 25 trees per acre 20 inches diameter or greater), thinning existing understory trees (which reduces ladder fuels) and treating post harvest slash (surface fuels). In the long term (after 10 years) these stands would begin to increase in flammability and decrease in fire resiliency as young trees begin to establish and grow beneath the overstory.

While the silvicultural prescriptions and objectives vary by prescription type they are all designed to retain healthy large trees. The maintenance of pine species on pine sites contributes to the fire resiliency of forest stands. Thinning mixed conifer, Douglas fir, and pine stands under this project favor the removal of white fir, a tree species that is fire intolerant. 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 due to road construction and for logging operations (landings and cable corridors) the fire resilience for the planning area as a whole is improved due to the overall reduction in fire hazard across the planning area that would result from thinning and post harvest fuels treatments.

**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). Therefore, it is important to manage surface fuels so that potential fire line intensities remains at a manageable level as is proposed with this project (see Chapter 2).
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. This project proposes to treat all slash generated by the treatments as well as understory thinning efforts.

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; Agee et al.2000).

**Predicted Climate Changes**

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.
D. WATER RESOURCES

The *Jenny Creek Watershed Analysis* (USDI 1995b) provides general water resources background information for the planning area. Stream surveys and associated GIS mapping were completed for all Federal lands within the analysis area, and mapping of streams and roads on private lands was accomplished using air photo interpretation. Riparian Reserve locations and widths were determined site-specifically using the guidelines in the Northwest Forest Plan incorporating on-the-ground verification of stream types, wetlands, fisheries data, and site potential based on soils.

1. Analysis/Planning Area Description

The proposed Plateau Thin Forest Management Project is within the Jenny Creek Tier 1 Key Watershed, a fifth-field watershed within the Upper Klamath Subbasin. Most of the land within the planning area drains into Howard Prairie Reservoir for eventual diversion to the Bear Creek Watershed. The remainder of the planning area drains into Grizzly Creek below Howard Prairie Dam or Soda Creek above the Grizzly Creek confluence, which is approximately 0.7 mile above the confluence of Soda Creek with Jenny Creek.

The analysis area is located entirely within the snow zone; transient snow zone is not an issue. Winter precipitation usually occurs as snow, which ordinarily melts during the spring runoff season from March through June. Precipitation falls predominately from November through March and summer months are typically dry. The precipitation patterns in the winter months are wide based with relatively low intensity and long duration in contrast to localized, short duration, and high intensity summer storms that occasionally occur.

For purposes of analyzing the affected environment and the proposed project, the planning area is stratified into two analysis areas (Table 3-7) composed of hydrologic units that were delineated using drainage boundaries: the area draining to Howard Prairie Reservoir (“Howard Prairie”) and the area draining to Grizzly Creek from Howard Prairie Dam to its confluence with Soda Creek and Soda Creek above its confluence with Grizzly Creek (“Grizzly-Soda”). The portions of the analysis areas outside the planning area would not be directly affected by the proposed project activities but are considered for cumulative effects analysis.

The size of the analysis areas 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 occurring in the drainage, may have a potential significant impact (“cumulative effect”). The analysis 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.
Map 3-1. Location of Planning Area within Jenny Creek Watershed

Legend
- Jenny Creek Key Watershed
- Howard Prairie Analysis Area
- Lower Grizzly Analysis Area

Key Watershed Ownership
- Bureau of Land Management
- Bureau of Reclamation
- Private Individual or Company
- State Agency
- U.S. Forest Service
- Undetermined
- Howard Prairie Lake
- Streams
Map 3-2. Analysis Areas Associated with the Plateau Thin Planning Area

Table 3-7. Analysis Areas Associated with the Plateau Thin Planning Area

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>BLM Acres within Planning Area</th>
<th>Non-BLM Acres within Planning Area</th>
<th>Total Acres within Planning Area</th>
<th>BLM Acres/Percent within Analysis Area</th>
<th>Non-BLM Acres/Percent within Analysis Area</th>
<th>Total Acres within Analysis Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>5,851</td>
<td>6,911</td>
<td>12,762</td>
<td>7,044 (38.5%)</td>
<td>11,251 (61.5%)</td>
<td>18,295</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>115</td>
<td>141</td>
<td>256</td>
<td>2,210 (52.5%)</td>
<td>1,998 (47.5%)</td>
<td>4,208</td>
</tr>
<tr>
<td>Totals</td>
<td>5,966</td>
<td>7,052</td>
<td>13,018</td>
<td>9,254 (41%)</td>
<td>13,249 (58.9%)</td>
<td>22,503</td>
</tr>
</tbody>
</table>

As mentioned above, the streams within the Howard Prairie Analysis Area all drain into Howard Prairie Reservoir, and the streams within the Grizzly-Soda Analysis Area drain into Jenny Creek.

The BLM manages 41 percent of the land within the analysis areas associated with the planning area (Table 3-7). The Bureau of Reclamation (BOR) manages land within both of the analysis areas for a total ownership of 13 percent. The Forest Service (USFS) manages land within both of the analysis areas for a total ownership of 4 percent. Private lands encompass 42 percent of the analysis areas and include land owned by industrial forest companies, residential landowners, and cattle ranches.

a. Surface Water

Surface water in the Plateau Thin analysis area includes streams, ditches, springs, wetlands, and a reservoir. Streams are classified as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. 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 3-8). Streams categorized as perennial or intermittent on federal lands are required to have Riparian Reserves (see Fisheries section and Chapter 2) 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 1995a:27). Streams on private forest lands are managed according to the Oregon Forest Practices Act, which classifies and protects streams based on three beneficial use categories (fish use, domestic water use without fish use, and all other streams).

**Table 3-8. Stream Miles by Analysis Area, Stream Type, and Ownership**

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Perennial</th>
<th>Long Duration Intermittent</th>
<th>Short Duration Intermittent</th>
<th>Dry Draw</th>
<th>Total Stream Miles</th>
<th>Stream Drainage Density (Mi./Mi.²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BLM</td>
<td>Non-BLM</td>
<td>BLM</td>
<td>Non-BLM</td>
<td>BLM</td>
<td>Non-BLM</td>
</tr>
<tr>
<td>Howard Prairie</td>
<td>4.04</td>
<td>14.86</td>
<td>6.10</td>
<td>12.10</td>
<td>8.90</td>
<td>11.5</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>4.57</td>
<td>5.43</td>
<td>1.22</td>
<td>1.14</td>
<td>1.03</td>
<td>1.24</td>
</tr>
<tr>
<td>Totals</td>
<td>8.61</td>
<td>20.29</td>
<td>7.32</td>
<td>13.24</td>
<td>9.93</td>
<td>12.74</td>
</tr>
</tbody>
</table>

Springs, wetlands, lakes/ponds, and small impoundments on BLM-administered lands within the planning area have been identified and mapped in GIS. These waterbody features are also contained within Riparian Reserves.

There are approximately 125 stream miles within the analysis areas, of which approximately 75 miles are within the proposed planning area boundaries. Within the proposed planning area, 27 miles are on BLM-administered lands and 48 miles are on non-federal lands. There are 29 miles (23 percent) of perennial streams, 21 miles (16 percent) of long duration intermittent streams, 23 miles (18 percent) of short duration intermittent streams, and 53 miles (42 percent) of dry draws within the planning area.

There are almost five miles of irrigation ditches in the analysis areas. Approximately 2.7 miles are on private lands and 2.2 miles are on federally owned lands. (For exact locations see maps associated with this proposed project).

Both small- and large-scale water diversions alter flow within the two analysis areas. There are many uses for small scale water storage and diversions including: livestock, wildlife, fire protection, irrigation, and domestic use, with the primary uses being irrigation and livestock. Howard Prairie Dam was constructed in the 1970s by the Talent Irrigation District to divert water to the Rogue Valley. This dam stores approximately 60,600 acre feet of water. Water is moved from the Howard Prairie reservoir through a canal, and along with water from Hyatt Lake, passes through the Keene Creek forebay (reservoir), and then via a tunnel in the mountain to the power plant above Emigrant Reservoir. The flow in the canal coming from Howard Prairie Reservoir averages around 50 cubic feet per second during the summer months.

On BLM-administered lands, locations of private water developments used for diverting, storing, and/or transporting water were identified from a search of the Oregon Water Resources Department website.

**b. Ground Water**

Groundwater supplies in the planning area are somewhat limited in the Farva soil series due to the moderately rapid permeability of the volcanic rocks found in the majority of the area, and available, to a greater degree, in the Pinehurst soil series due to a moderately slow permeability and deep rooting depth.

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3 http://www.usbr.gov/pn/hydromet/
4 http://egov.oregon.gov/OWRD/
USDI and USDA 1997:36. The Plateau Thin Planning Area has not been identified as a critical groundwater area by the Oregon Water Resources Department (OWRD 1989).

2. Water Quantity

This section discloses the impacts from various vegetation treatments and ground disturbing activities on water quantity. Impacts to water quality are discussed under the section titled Water Quality (below). Aquatic habitat, riparian areas, and wildlife related to water are discussed in the Fisheries section.

Issues/Concerns

Scoping (external and internal) generated the following issues/concerns related to implementing the proposed action. These effects may or may not occur as a result of the proposed action but were of concern to members of the public and/or BLM specialists.

- Increases in soil compaction from proposed logging and road construction may affect hydrologic flows, including peak flow and low flow.
- Temporary road construction could alter the natural drainage patterns and indirectly affect stream flow.
- Vegetation canopy reduction associated with harvest and fuels reduction may affect stream flow.

a. Discussion of Issues/Concerns and Related Research

This section provides a short literature review pertaining to the issues identified to be relevant to the implementation of the proposed action and its potential effects on water quantity, and sets the stage for the description of the affected environment and subsequent analysis of effects.

Soil compaction (due to ground-based logging and fuels treatment equipment, and the presence of forest roads and trails) may increase the frequency and magnitude of peak streamflows (Harr 1976a). In undisturbed forest soils in western Oregon, infiltration capacities far exceed the maximum rates of rainfall so that all water enters the soil (Harr 1976b), thus minimizing overland flow. Compaction can reduce the infiltration properties of the soil, resulting in increased runoff. Soil compaction can also impede the subsurface movement of water as it moves downslope in shallow aquifers. Peak flows for small, headwater streams appear to be increased where at least 12 percent of a watershed was severely compacted by road building, tractor skidding, or tractor windrowining of slash (Harr 1976a). Factors that influence the contribution of a compacted area to increased runoff include: proximity of compacted area to streams, connectivity of compacted areas to streams, and watershed characteristics (Harr et al. 1979). Severe fire that exposes bare soil can also reduce the infiltration properties of the soil, resulting in increased runoff (Neary et al. 2005). Whole tree yarding using a mechanical harvester would not cause any detrimental compaction as a result of using such equipment during dry soil conditions or on a two foot snow pack (see Soils section).

Although there have been numerous studies in the Pacific Northwest that examine the effects of forest harvest on peak flows, the published results vary widely, depending on a number of factors including the type of event (rain; rain-on-snow; snow melt), the characteristics of the drainage basin, and the location in the basin of roads and clearcuts (Church and Eaton 2001). No paired watershed studies provide data on forest management practices commonly used today by federal land managers, including commercial thinning and extensive riparian buffers. Most of the paired watershed studies in the Pacific Northwest examine clearcut and shelterwood harvests, where clearcuts included riparian vegetation. A summary of paired catchment studies conducted in the Oregon Cascades shows peak flow increases from 13 to 42 percent (Moore and Wondzell 2005). Peak flow changes for catchments that were 100 percent clearcut included a decrease of 36 percent, no significant change, and increases from 23 to 42 percent. Peak flow changes for catchments that were 25 or 30 percent patch cut included several with no significant change and increases of 13 and 17 percent. For the two shelterwood treatments, one had no significant change and the other had a 32 percent increase. Treatment types were a mix, with some catchments cable yarded, some tractor yarded, some had both cable and tractor yarding, some were roaded, and some were
broadcast burned. Peak flow change does not appear to be related in any simple way to the percentage of basin area cut or basal area removed (Moore and Wondzell 2005). The magnitude of peak flow increases declined with increasing event magnitude in most cases, with the greatest increases typically associated with autumn rain events on relatively dry catchments. These autumn events resulted in small peak flows with little hydraulic consequence (Moore and Wondzell 2005). Peak flow increases for flow events with a return interval of 5 years or greater were either small or there was no increase (Beschta et al. 2000). Post-treatment recovery rates varied among studies. For the catchments in the Oregon Cascades, recovery times of at least 10 years in all cases where there was a significant treatment effect and at least 30 years in two cases were reported (Moore and Wondzell 2005).

In the snow zone under certain circumstances, greater snow accumulation can occur in clearings, producing the potential for higher peak flows during spring snowmelt (Moore and Wondzell 2005).

Roads have three primary effects on hydrologic processes: (1) they intercept rainfall directly on the road surface and road cutbanks, and affect subsurface water moving down the hillslope; (2) they concentrate flow, either on the surface or in an adjacent ditch or channel; and (3) they divert or reroute water from paths it otherwise would take were the road not present (Gucinski et al. 2001). Roads connected to stream channels through ditch lines effectively extend the stream channel network, changing runoff timing and ultimately increasing the magnitude of peak flows (Wemple et al. 1996). The effect of roads on peak streamflows depends strongly on the size of the watershed; for example, capture and rerouting of water can remove water from one small stream while causing major channel adjustments in another stream receiving the additional water (Gucinski et al. 2001). Roads have relatively insignificant effects on peak flow in large watersheds where they constitute a small proportion of the land surface, they do not seem to change annual water yields, and no studies have evaluated their effect on low flows (Gucinski et al. 2001).

Roads that cross dry draws have the potential to route storm flow into the dry draw, and subsurface flow through the colluvium (i.e. loose rock and soil at the base of the slope) can also be intercepted by a road cut or compaction from a road that crosses the bottom of a dry draw, initiating surface flow with scour and deposition in the draw. This has the potential to change the downstream flow characteristics of the draw to a short-duration intermittent stream, affecting the size of downstream peakflows due to the more rapid delivery of storm flow to downstream reaches (water flows much faster through the defined surface channel of a short-duration intermittent stream than it does subsurface through the colluvium of a dry draw).

Well-designed roads with a properly functioning drainage system attempt to mimic the local natural drainage pattern by keeping the local downslope movement of water similar to the pre-road condition. However, during extreme events (drought or peak flow) any hydrologic differences between the artificial drainage associated with the road system and the natural system become more critical and can cause noticeable effects to the local environment.

Water yield is defined as the total volume of surface runoff, measured as stream discharge, which leaves a drainage area (Church and Eaton, 2001). Removal of vegetative canopy can increase discharge during the normal low-flow period and annual water yield, although absolute increases are small (Harr 1976b) and the effect is short term (Hicks et al. 1991:225). A summary of 12 studies in the Pacific Northwest suggests that annual water yield increases are not measurable when less than 25 percent of a catchment is harvested (Stednick 1996). When stands are only thinned, the residual stand may increase its use of water, so changes in streamflow following thinning are likely to be less than might be expected from counts of trees alone (Mechan 1991:186). Harr (1976) found that patch cutting instead of clear-cutting within a watershed, combined with riparian buffers of 50-100 feet can reduce potential increases in water yield that may be experienced due to a basin exceeding 25% open space. Harr (1976) found that the annual increases in water yield within a watershed were only 5% when patch-cutting was combined with riparian buffers. Increased water yield is primarily a result of reduced evapotranspiration and interception within the watershed and can persist for one to two decades following harvest activity, depending on the rate of vegetative recovery, with water yields generally decreasing to pretreatment levels within two to three decades (Hicks et al. 1991).
b. Precipitation

Average annual precipitation in the Plateau Thin Planning Area is about 38 inches. Low streamflows normally coincide with the period of low precipitation from July through October. The highest streamflows usually occur from January through May. Streamflows during the months of April and May and part of June are augmented by melting snowpack. Significant flows can also be produced by local, high intensity summer storms, although these events are relatively rare and their effect is limited to the local area. Flows in Grizzly Creek at the outflow of the reservoir, especially low summertime flows, have been augmented with water from the reservoir since the dam was built. The Howard Prairie Dam has resulted in a dramatic change in the hydrologic connectivity between headwater streams and the larger streams they flow into and it serves to regulate the movement and transport of sediment from upstream sources.

c. Past Actions

Water quantity in the Howard Prairie and Grizzly-Soda analysis areas is a function of natural and human-caused factors. Natural site factors include climate, geology, and geographic location. Natural processes that have influenced water quantity include floods, wildfires, and drought. Past human activities that have altered water quantity in the analysis area include: land clearing (for agricultural and residential use), timber harvest, road operations, water withdrawals, dam building, and fire suppression.

Streamflows are naturally low during the summer due to low precipitation, reduced soil drainage, and sustained high evapotranspiration (MacDonald et al. 1991:95). Fire suppression has resulted in overly dense forest stands with high evapotranspiration rates that likely contribute to decreasing the amount of water available for summer streamflows. Past harvests in the analysis area often included riparian vegetation. Vigorous regrowth of phreatophytic (i.e. deeply rooted trees that obtain their water from the water table) hardwoods following past harvest of riparian areas significantly increased evapotranspiration rates during the growing season, causing a reduction in summer flows (Hicks et al. 1991:224).

The degree to which hydrologic processes are affected by vegetation canopy reduction (e.g. land clearing or timber harvest) will be analyzed based on the amount of an analysis area that is below the historic crown closure. The historic crown closure for the planning area varies by ecoregion. The analysis areas associated with the proposed project straddle two ecoregions: the Southern Cascades ecoregion, and the Southern Cascade Slope ecoregion (WPN 2001: A-80, A-115).

Forest types within the Southern Cascades ecoregion historically had 40-45 percent canopy crown closure (WPN 2001:A-83). For analysis purposes, historic crown closure is assumed to be approximately 40 percent for forested lands in the Southern Cascades, which is at the low end of the range for canopy closure for this ecoregion. Canopy closure for the Southern Cascade Slope ecoregion was historically less than 30 percent canopy crown closure (WPN 2001:A-118). Forested lands make up approximately 87 percent of the overall analysis area (Table 3-9).

### Table 3-9. Forest Land and Ecoregion by Analysis Area

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Total Acres within Analysis Area</th>
<th>Forest Lands1 (% of Total Area)</th>
<th>Southern Cascades Ecoregion (% of Forest Land)</th>
<th>Southern Cascade Slope Ecoregion (% of Forest Land)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>18,295</td>
<td>84.3</td>
<td>88.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>4,208</td>
<td>96.2</td>
<td>97.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Totals</td>
<td>22,503</td>
<td>86.5</td>
<td>90.2</td>
<td>9.8</td>
</tr>
</tbody>
</table>

1/ Forest lands were determined from the 2005 aerial photos.
We used the 2005 aerial photos to estimate forest stands with crown closures less than the historic level for all ownerships (Table 3-10).

Table 3-10. Percent of Forest Lands with Crown Closures Less than Historic Level

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Federal</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>4.6</td>
<td>17.4</td>
<td>22.0</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>3.3</td>
<td>4.6</td>
<td>7.9</td>
</tr>
<tr>
<td>Totals</td>
<td>4.3</td>
<td>14.8</td>
<td>19.1</td>
</tr>
</tbody>
</table>

1/ Federal is a combination of BLM, Forest Service, and BOR lands

The range of natural variability for percent of an area in early successional vegetation with snags in the adjacent Upper Rogue Subbasin is estimated to be from 10 to 40 percent for National Forest lands (USDA 1993:85). While the Plateau Thin Project would drain to the Klamath River under natural conditions (prior to the dam), the planning area borders the Upper Rogue Subbasin, which has similar forest types and structures, climate, historic fire frequency, and soil types as found in the Plateau Thin Planning Area. Therefore, information on historic ranges of variation in landscape scale patterns described in “A First Approximation of Ecosystem Health for National Forest System Lands” is applicable to this project area. This means that within the Upper Rogue Subbasin, from 10 to 40 percent of the forest lands would have less than the historic crown closure at any given time due to natural disturbances such as wildfire, drought, insect infestations, forest pathogens, etc. The percent of forested lands below the historic crown closure is within the conservative range of natural variability (10 to 40 percent) for both of the analysis areas.

Areas of compacted soil, such as occur from roads and landings, tractor yarding, or ground-based fuel treatments, can be a concern from a hydrologic perspective because such areas can decrease the infiltration properties of the soil, resulting in increased surface runoff. This can also contribute to decreased soil moisture within and downslope of the compacted area. To determine past soil-compacting treatments, we used timber sale and fuel treatment records for BLM-administered lands and aerial photo analysis for non-BLM lands (see Soils section). The following assumptions were used to calculate the compacted area resulting from roads and past treatments (Table 3-11):

1. Roads are assumed to be permanently compacted at the rate of 7 feet width for jeep roads, 12 feet width for natural or unknown surfaced roads, 15 feet width for rocked roads, and 16 feet width for paved roads (Samuelson 2008);
2. Twenty-five percent of the harvest acreage is compacted for all units tractor logged on private lands and those on BLM-managed lands tractor logged prior to 1983 (Swanson and Dyrness 1973:266; Adams and Froehlich 1981:10);
3. Twelve percent of the BLM tractor units harvested in 1983 or later are considered compacted (USDI 1979);
4. Landings are 0.5 acres each and are considered 100 percent compacted; and
5. Effects of compaction are considered to be alleviated after 30 years (see Soils section), therefore only activities that have occurred since 1975 have been included in this analysis.

We obtained road miles from the BLM GIS data base, from an aerial photo (2005 photos) survey, and field visits. This is the best information available, although we acknowledge that there may be roads not included such as non-GIS roads that are hidden by tree canopy, OHV trails, and private roads built after the 2005 photos. These additional roads would not change the outcome of the analysis.
Table 3-11. Estimated Existing Soil Compaction by Analysis Area for All Lands

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Compacted Area from Past Treatments(^2) (acres)</th>
<th>Compacted Area from Roads (acres)</th>
<th>Total Compacted Area (acres)</th>
<th>Total Compacted Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>1,746</td>
<td>264</td>
<td>2,010</td>
<td>11%</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>637</td>
<td>76</td>
<td>713</td>
<td>17%</td>
</tr>
<tr>
<td>Totals</td>
<td>2,383</td>
<td>340</td>
<td>2,723</td>
<td>12%</td>
</tr>
</tbody>
</table>

1/ Lands include: BLM, Forest Service, Bureau of Reclamation, and Private industrial
2/ Past treatment acres are from tractor harvest.

The 17 percent compacted area in the Grizzly-Soda analysis area (Table 3-11) is above the 12 percent level of concern identified for potential increases in peak flows (Harr 1976a).

Road density provides a general index of relative extent of the amount of road in the analysis areas (Table 3-12). Areas with higher road densities will generally experience more road-related effects, however, many other factors such as design, location, maintenance, use, surface type, gradient, and geology can influence the effect of any particular road. High road densities are found in both the analysis areas. Overall road density is 7.4 mi./mi.\(^2\).

The percentage of the drainage area in roads is a similar index. The *Oregon Watershed Assessment Manual* (OWAM) that was developed by Watershed Professionals Network (WPN 1999:IV-16) for the Governor's Watershed Enhancement Board (now known as the Oregon Watershed Enhancement Board) states that rural drainages with more than 8 percent roads have a high potential of experiencing more than a 10 percent increase in peak flows. Drainages with 4-8 percent roaded area have a moderate risk and those with less than 4 percent roads have a low risk. Both analysis areas have 4 percent or less roaded area (Table 3-12) and thus have a low to moderate risk of peak flow increases due to roads.

Table 3-12. Road Miles, Road Density, and Percent of Area Roaded

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Road Miles From GIS Data BLM</th>
<th>Non-BLM(^2)</th>
<th>Additional Road Miles From Aerial Photos</th>
<th>Total Road Miles</th>
<th>Road Density(^1) (mi./mi.(^2))</th>
<th>Percent of Area in Roads(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>52.9</td>
<td>43.9</td>
<td>31.2</td>
<td>82.2</td>
<td>210.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>21.4</td>
<td>20.7</td>
<td>1.1</td>
<td>7.4</td>
<td>50.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Totals</td>
<td>74.3</td>
<td>64.6</td>
<td>32.3</td>
<td>89.6</td>
<td>260.8</td>
<td>7.4</td>
</tr>
</tbody>
</table>

1/ Conversion factors used to convert road miles to acres were: 13 feet width for jeep roads, 30 feet width for natural or unknown road surfaces, 35 feet width for rocked road surfaces, and 38 feet width for paved roads (Samuelson 2008).
2/ Non-BLM lands include Forest Service, Bureau of Reclamation, and Private ownership.

In addition to roads, the analysis areas contain an additional 47 miles of trails. A majority of which are narrow hiking trails which do not affect canopy opening. Twelve percent of these trails are paved, the rest are natural surface. Trails comprise only a small fraction (approximately 0.1 percent) of the analysis area acreage, and, as such, have a negligible effect on compaction. Trails, therefore, will not be mentioned further in this analysis.

Road-stream crossings are used as an indication of connectivity between roads and streams (Table 3-13). Concentration of runoff by road drainage systems may contribute to more rapid delivery of storm runoff directly to streams, resulting in increased peak flows. Road segments linked to the channel network increase flow routing efficiency and offer a plausible mechanism for peak flow increases (Wemple, et al. 1996). Drainages with a larger number of road-stream crossings are more likely to experience an increased magnitude and frequency of peak flows.
Table 3-13. Stream Crossings¹ by Analysis Area, Stream Type, and Ownership

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Perennial</th>
<th>Long Duration</th>
<th>Short Duration</th>
<th>Dry Draw²</th>
<th>Total Xings³ (Number)</th>
<th>Xings/Stream Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BLM</td>
<td>Non-BLM</td>
<td>BLM</td>
<td>Non-BLM</td>
<td>BLM</td>
<td>Non-BLM</td>
</tr>
<tr>
<td>Howard Prairie</td>
<td>19</td>
<td>21</td>
<td>25</td>
<td>50</td>
<td>63</td>
<td>58</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>14</td>
<td>20</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>33</strong></td>
<td><strong>41</strong></td>
<td><strong>35</strong></td>
<td><strong>58</strong></td>
<td><strong>67</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

¹/ Stream crossing information obtained from the BLM GIS database and 2005 aerial photos.
²/ Dry draws are also known as ephemeral channels
³/ xings = road stream crossings.

Roads located near a stream or mid-slope generally have a greater chance of directly affecting the hydrologic function of the stream system. The number of stream crossings by stream type for each analysis area is used as an indicator of road location (Table 3-13). Of the 616 total stream crossings identified, 52 percent are over dry draws that are generally located higher in a watershed and nearer to the ridgetops. Another 21 percent of the stream crossings intersect intermittent short-duration streams, for a total of 73 percent that are generally located in the upper slopes with small contributing areas. Perennial stream crossings amount to 12 percent of the total, and long-duration intermittent crossings consist of 15 percent of the total.

3. Water Quality

This section discloses the impacts from various vegetation treatments and ground disturbing activities on water quality. Soil erosion is addressed in the Soils section and aquatic habitat and riparian areas are discussed in the Fisheries section.

Issues/Concerns

There is potential for short-term effects to water quality from increased sediment produced from disturbance associated with the combination of temporary road reopening/construction, road maintenance, logging activities, and tractor logging.

Non-point source pollution (sedimentation) from management activities has the potential to degrade the aquatic ecosystem. Of special concern are 303 (d) listed streams: Grizzly Creek (below Howard Prairie Dam) and Hoxie Creek (tributary to Howard Prairie Reservoir).

a. Discussion of Issues/Concerns (Potential Effects) and Related Research

This section provides a short literature review pertaining to the issues identified to be relevant to the implementation of the proposed action and its potential effects on water quality, and sets the stage for the description of the affected environment and subsequent analysis of effects.

Timber harvesting operations have variable effects on sediment production (Everest et al. 1987). A study in Washington State (Rashin et al. 2006) concluded that the primary operational factors that influenced the effectiveness of timber harvest BMPs in controlling sediment delivery to streams were: the proximity of timber falling and yarding activities to streams and particularly whether yarding routes crossed streams; the presence or absence of designated stream buffers; and the use of special timber-falling and yarding practices to prevent direct mechanical disturbances of stream channels. Stream buffer practices were most effective where timber falling and yarding activities were kept at least 10 meters (32.8 feet) from streams and outside of steep inner gorge areas. The overall effectiveness of streamside buffers was diminished by cable yarding routes or skid trails that crossed buffers and streams.

Excluding commercial harvest from Riparian Reserves prevents disturbance to stream channels during the felling and yarding operations. Increased surface erosion can result from ground disturbance and soil compaction caused by tractor logging (Sidle 1979). A buffer width of 100-200 feet is sufficient to
prevent most sediment from reaching streams (A.C. Kendig and Cedarock 2003). The amount of surface erosion generated by slash burning is generally proportional to the severity and extent of the burn (Sidle 1979).

Most of the increase in sedimentation associated with forestry activities is attributed to forest roads (Sullivan 1985). There are two processes by which roads increase sediment in streams: 1) by increasing the incidence of mass failures; and 2) by erosion of the road surface, cut banks, and ditches and subsequent transport of this material to the stream (Duncan et al. 1987). In the Plateau Thin Planning Area, surface erosion from road surfaces, cut banks, and ditches represents the dominant source of road-related sediment input to streams (see Soils section).

There is high variability in sediment production from road segment to road segment. Most segments produce little sediment, while only a few produce a great deal (Luce and Black 1999). Sections of road having a steep gradient, being heavily used, and draining directly into larger streams have the highest potential to produce and deliver material of a size most apt to deposit on or in the streambed (Bilby et al. 1989). Older roads in mid-slope positions dominate the production of sediment during extreme storms (Wemple et al. 2001). Ridgetop roads usually have the least effect on streams (Furniss et al. 1991).

Stream crossings by roads are particularly effective at increasing sediment yields because of their direct impact on the channel and failure of inadequately designed and constructed culverts adds large amounts of sediment to streams (Kattelmann 1996). Although any stream crossing will have some impact on the channel, careful engineering, construction, and maintenance can limit the severity (Kattelmann 1996).

Several studies reporting on sediment movement below forest roads noted the importance of obstructions (including vegetation) on the slope below the road (Seyedbagheri 1996). Slash filter windrows placed at the toe of a road fill have been shown to reduce movement of sediment below fillslopes (Seyedbagheri 1996). Cross drain spacing was also recognized as important as a predictor of sediment movement downslope from logging roads.

A study of soil loss from forest roads in the southern Appalachian Mountains (Swift 1984) concluded that soil loss rates from a non-surfaced roadbed were eight times greater than from roadbeds with six to eight inches of gravel. New fill slopes, although uncompacted and unvegetated, eroded only where storm runoff from culverts or ditches flowed over loose soil. Vegetation on the cutbank and ditch was shown to be effective in reducing erosion from forest roads in the Oregon Coast Range (Luce and Black 1999). Road segments where vegetation was cleared from the cutbank and ditch produced about seven times as much sediment as road segments where vegetation was retained. Closure of unsurfaced roads during the wet season can also help to reduce erosion (Kattelmann 1996).

Studies conducted in western Washington and Oregon found that 80 percent of the road runoff points emptied directly into the drainage system (Duncan et al. 1987). Of the stream entry drainage points, 88 percent entered first or second order channels while only 13 percent emptied directly into permanent water. Thus, the delivery of road sediment to larger streams often depended on its transport through these smaller, often ephemeral channels. Woody material in these small channels acted to trap and hold larger sediment, thus preventing it from reaching larger channels downstream.

Sediment production from forest roads declines substantially with time. A study of 74 road segments with road surfaces graded in western Oregon found 70 percent recovery by the second year and 90 percent recovery by the third year (Luce and Black 2001).

A review of forest management impacts on water quality concluded that the use of BMPs (see Chapter 2; USDI 1995a, Appendix D) 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; such implementation must include ephemeral channels, often overlooked in the application of BMPs (Kattelmann, 1996:871; Brown and Binkley 1994:20). Ephemeral streams displaying evidence of a defined channel and annual scour and deposition on BLM-administered
lands ("short-duration intermittent") have designated Riparian Reserves along them, and are subject to all of the project design features (PDFs)/BMPs applicable to Riparian Reserves (see Chapter 2; USDI 1995a, Appendix D), and additional PDFs/BMPs apply to other non-riparian draws with no active stream channel and not meeting the Riparian Reserve criteria ("dry draws") (see Chapter 2). Because all stream crossings in general (whether by road, culvert or bridge) are coincident with the active channel, there is little opportunity to buffer any inadequacies of design or construction; while any crossing will have some impact, careful engineering, construction and maintenance can limit the severity (Kattleman 1996:892). The use of BMPs in forest operations is generally effective in avoiding significant water quality problems (Kattelmann 1996:871; Brown and Binkley 1994:20). Much can be done to protect water quality simply by avoiding activities in sensitive areas, such as riparian zones, areas susceptible to mass movement, and areas where soils may become saturated and produce overland flow (Kattelmann 1996:871; Megahan and King 1985:14).

Stream sediments may negatively impact aquatic species such as salmonids, amphibians and insects (see Fisheries section), and may impair the quality of domestic water supplies. Sediment suspended in water increases turbidity, limiting the depth to which light can penetrate if turbidity is increased to a sufficient degree. High turbidity levels can severely limit the ability of sight-feeding fish to find and obtain food.

b. Current Water Quality Conditions

The 1996 amendments to the Safe Drinking Water Act (SDWA) mandated that state agencies conduct source water assessments for every public water system. This planning area does not fall within a source water area, and, as such, would not affect any public water system.

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated beneficial uses. In practice, water quality standards have been set at a level to protect the most sensitive uses. The Oregon Department of Environmental Quality (DEQ) is required by the federal Clean Water Act (CWA) to maintain a list of stream segments that do not meet water quality standards for one or more beneficial uses. This list is called the 303(d) list because of the section of the CWA that makes the requirement. DEQ’s 2004/2006 303(d) list is the most recent listing of these streams (ODEQ 2006a).

The BLM is recognized by Oregon DEQ as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM and DEQ have a Memorandum of Agreement (MOA) that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations. In accordance with the MOA, the BLM in cooperation with the Forest Service, DEQ, and the Environmental Protection Agency is implementing the Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters (USDA and USDI 1999). Under the Protocol, the BLM will protect and maintain water quality where standards are met or surpassed, and restore water quality limited waterbodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses. The BLM would also adhere to the State Antidegradation Policy (OAR 2005; 340-041-0004) under any proposed actions. The DEQ released the draft Upper Klamath Subbasin Total Maximum Daily Load (TMDL) for public review in February 2010 and extended the comment period until May 27, 2010. A water quality restoration plan (WQRP) for BLM-administered lands in the Jenny Creek Watershed (USDI 2008), within the Upper Klamath Subbasin, was prepared by the BLM and submitted to the DEQ in May 2008. The DEQ has reviewed the BLM’s WQRP; however they are holding any comments until after they issue the final Upper Klamath TMDL. Proposed recovery goals in the WQRP focus on protecting areas where water quality meets standards and avoiding future impairments of these areas, and restoring areas that do not currently meet water quality standards. Necessary federal and state permits would be obtained for any proposed instream work.
In advance of a TMDL setting specific numeric targets for the planning area, the Oregon statewide narrative criteria found in OAR 340-041-0007(1) (ODEQ 2006b) is the water quality criteria that applies to BLM management.

\[(1)\] Notwithstanding the water quality standards contained in this Division, the highest and best practicable treatment and/or control of wastes, activities, and flows must in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.

Within the Plateau Thin analysis area, two streams are included on DEQ’s 2004/2006 303(d) list for summer temperature: Grizzly Creek and Hoxie Creek (Table 3-14). The DEQ identifies the listed segment of Grizzly Creek from below the Howard Prairie Dam to the confluence with Jenny Creek. According to the U.S. Geologic Survey’s (USGS) Geographic Names Information System (GNIS), the segment that the DEQ refers to as Grizzly Creek from Soda Creek to Jenny Creek is actually Soda Creek. Jenny Creek, which is approximately 0.7 miles below the confluence of Grizzly and Soda creeks, is also on the DEQ’s 2004/2004 303(d) list for summer temperature. The proposed action would not have any effect on stream temperatures because it does not include any manipulation of Riparian Reserves and therefore affects on stream temperature will not be addressed in this environmental assessment.

Table 3-14. 2004/2006 303(d) Listings in the Plateau Thin Analysis Area (ODEQ 2006a)

<table>
<thead>
<tr>
<th>Stream Segment</th>
<th>303(d) List Date</th>
<th>Listed Parameter</th>
<th>Season</th>
<th>Total Miles Affected</th>
<th>BLM Miles Affected(^1,2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grizzly Creek</td>
<td>1998</td>
<td>Temperature</td>
<td>Summer</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Hoxie Creek</td>
<td>1998</td>
<td>Temperature</td>
<td>Summer</td>
<td>3.6</td>
<td>1.3</td>
</tr>
</tbody>
</table>

\(^1\) BLM manages 1.1 out of 3.0 total stream miles for Grizzly Creek, and 1.3 out of 3.6 total stream miles for Hoxie Creek.
\(^2\) Grizzly Creek is located within the analysis area but downstream of the planning area.

There is an overall road density in the analysis areas of 7.4 mi./mi.\(^2\) (Table 3-12). Roads built in riparian areas can adversely affect both stream temperature and sediment. There are approximately 61 road miles (approximately 23 percent of all road miles) located within Riparian Reserves on lands within the analysis areas.

Road stream crossings can also be a source of sediment to streams and the interconnection of roads with streams is considered an indicator of potential for sediment impacts to be conveyed to the stream. Stream crossing densities in the analysis areas average five crossings per mile. (Table 3-13). There are approximately 297 road stream crossings on perennial and intermittent streams within the analysis area of which 135 (45 percent) are on BLM-administered land.

Natural or unsurfaced roads are generally more likely than surfaced roads (rocked or paved) to contribute sediment to streams. We determined road miles by surface type for all roads on BLM-administered lands, BLM-controlled roads on non-BLM lands, and where possible non-BLM roads (e.g. private or Bureau of Reclamation lands) within both analysis areas. We obtained the road information from BLM’s database in addition to our aerial photo analysis (using 2005 photos) that identified roads not in the database. All roads from the aerial photo analysis and those from the database with an unknown surface type were designated as natural surface for the purpose of analysis. Natural surface roads comprise approximately 78 percent of all roads within the two analysis areas.

Roads on BLM-administered lands in the analysis area are stable with no failures present (see Soils section). Road sediment sources are primarily surface erosion from natural surfaced roads and road ditches that connect to streams. Sediment from chronic erosion of natural surface roads is the major sediment source in the planning area (see Soils section).
c Past Actions

Past ground-disturbing activities such as road building, logging, residential and agricultural clearing of riparian zones, livestock grazing, maintenance of irrigation diversions, irrigation return flows, irrigation ditch blowouts, and the use of off-highway-vehicles in sensitive areas have contributed sediment to streams in the analysis area (USDI 2008). Agricultural and residential development contributed sediment through channel modification, grazing, and land clearing.

Livestock grazing has occurred throughout the analysis area since the mid 1800s (USDI 1995b). Large numbers of cattle and sheep were driven from lower valley pastures to high plateau meadows each summer during the mid 1800s to early 1900s. These large numbers of livestock had an adverse impact on watershed conditions, especially along stream courses and near springs and meadows (USDI 1995b). Current grazing occurs on BLM land within the analysis area. The analysis area encompasses portions of three grazing allotments (Keene Creek, Deadwood, and Howard Prairie). The season of use varies by allotment but in general this area is open to grazing June through November. Anecdotal data suggests that stocking rates early in the last century were greater than current stocking rates by at least an order of magnitude (Hosten et al. 2007).

Rangeland Health Assessments (RHAs) and RHA Determinations were completed for the Keene Creek and Deadwood Allotments in July 2008 (www.blm.gov/or/districts/medford/index.php). These assessments are conducted by an interdisciplinary team of resource specialists who assess ecological processes, watershed functioning condition, water quality conditions, special status species, and wildlife habitat conditions on an allotment. All available data were used to make an overall assessment of rangeland health as described in the Standards for Rangeland Health and Guidelines and Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington (Standards and Guidelines) (USDI 1997), in light of the Fundamentals of Rangeland Health at 43 CFR 4180.1. For both the Deadwood and Keene Creek Allotments, four out of the five standards were not being met as a result of livestock grazing. The allotments were not meeting the standards for Riparian/Wetland Areas, Ecological Processes, Water Quality, and Native, T&E, and Locally Important Species. Even though streamside riparian areas are generally improving throughout these allotments, current livestock grazing was found to be negatively affecting stream temperature, establishment of riparian vegetation, stabilization of streambanks, sediment regimes and water quality. The Keene Creek Allotment was recently voluntarily relinquished (no future grazing authorized). The Howard Prairie Allotment is schedule to be evaluated in 2009.

Logging activities started in the late nineteenth and early twentieth century’s, but were limited in scale until the late 1940s (USDI 1995b). During the second half of the twentieth century, large scale intensive timber harvest and road building resulted in increased sediment production. Until the Oregon Forest Practices Act was passed in 1972, yarding was typically accomplished using tractors, even on steep slopes, with little regard for protecting stream crossings. Riparian areas received little protection and ground disturbing activities such as yarding resulted in sediment reaching the streams. Trees were harvested from streambanks leaving little vegetation to prevent the banks from eroding into the streams during high flows. Early forest roads were often poorly designed and located in unstable areas or areas where the water table was close to the surface; road failures provided a major source of sediment.

The BLM implemented a land management plan in 1979 (USDI 1979) that provided 100 foot no-cut riparian buffers for anadromous fish-bearing streams and retained shade from hardwoods and non-commercial conifers on resident fish-bearing streams, but provided minimal to no protection of nonfish-bearing streams. Road design and construction practices improved during the 1980s; however, extensive road building occurred.

Although harvest has not occurred in riparian areas (now protected within Riparian Reserves) since implementation of the Northwest Forest Plan in the mid 1990s, BLM stream surveys indicate the presence of some past timber harvest in BLM riparian areas.
The advent of the Northwest Forest Plan in 1994 (USDA and USDI 1994) followed by the Medford District Record of Decision and Resource Management Plan in 1995 (USDI 1995a) resulted in major improvements for stream and watershed protection and restoration on federal lands. Riparian Reserves establish protection for all fish-bearing streams as well as nonfish-bearing perennial and intermittent streams, wetlands, lakes, and ponds. Over the past 10 years, road construction has declined and road decommissioning and upgrading has increased. Implementation of best management practices during road and logging operations have reduced impacts on water quality. Water quality on federal lands is on an upward trend with reductions in sediment input.

4. Environmental Consequences – Water Quantity

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management, reasonably foreseeable future actions, and events unrelated to the Plateau Thin Project. Discussion for Alternative 2 reflects the direct and indirect impacts of the proposed action. 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).

a. Alternative 1 - No Action

No actions are proposed under Alternative 1 (the No Action Alternative); therefore direct and indirect effects are the current conditions in the planning area which are the result of past actions not related to the Plateau Thin project. Alternative 1 describes anticipated effects of not implementing an action at this time.

Under Alternative 1, there would be no changes in percent of BLM forest lands with crown closures less than the historic level, areas of compacted soil, road densities, percent of area in roads, or number of stream crossings. There would, therefore, be no change to the potential of increasing the magnitude and frequency of peak flows on BLM lands.

Older roads in the area would be maintained but not upgraded and would continue to influence local runoff and groundwater flow. In the long term, older roads with limited drainage capability are more likely to experience a road failure during an extreme precipitation event causing subsequent adjustments to local flow and groundwater conditions. For example, a channel may become diverted and an alternative drainage developed.

In the long term, with no stand management on BLM-administered lands, a high intensity wildfire over part or all of the area may occur. Should this happen, (see Fire section) it could drastically 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. In a relatively short time vegetation would reestablish and less water would be available for summer flow. It would take a longer period of time for vegetation to recovery sufficiently for peak flows to return to their normal range.

Past events in the planning area that currently have the potential to influence peak streamflows include past timber harvesting, wildfire, road construction, and land development. These activities potentially influence peak streamflows and water yield through canopy removal, soil compaction, or drainage network alteration. Risk assessments for potential increased peak flows consider the effects of these past actions in their methodology. For example, areas previously harvested are included in the analyses of historic canopy closure (Table 3-10). There have been no major wildfires within the analysis area in the last 30 years. There have been several smaller fires in both of the analysis areas (see Fire & Fuels section), and the current condition of the burned areas is accounted for in the historic canopy closure.
analyses. Roads constructed for past activities (i.e. developing private land, logging, etc.) are included in the percent of an area in roads (Table 3-12) for the OWAM’s determination of potential for peak flow increases due to roads.

Reasonably foreseeable future actions planned for BLM-administered lands in the analysis area include approximately 690 acres of pre-commercial thinning (PCT). Since PCT treatments would not use heavy mechanized equipment, or create any new roads, there would not be any means for affecting peak flows through compaction. It is likely the increased water available through stem reduction would be taken up by the resulting increased vigor and growth of the remaining vegetation. It is, therefore, unlikely that PCT treatments would affect overall water yield or stream flows. Therefore, this action would not affect water quantity within the analysis area.

BOR proposed a forest management project on their lands surrounding the reservoir. The project includes approximately 571 acres of thinning, 546 in the Howard Prairie analysis area, and only 25 acres in the Grizzly-Soda analysis area. Proposed thinning on BOR-managed lands are not expected to reduce the crown closure below historic levels.

There are no reasonably foreseeable future actions proposed for Forest Service-managed lands within either analysis area.

Under reasonably foreseeable future actions for private lands, it is assumed that private forest lands would continue to be intensively managed for timber production on approximately a 60-year rotation (USDI 1994:4-5). The actual timing of any timber harvest on private land is dependent on many factors, including valuations based on supply/demand, ownership, etc. We developed a reasonably foreseeable future scenario for private lands by using 2005 aerial photos and assuming a 60-year rotation for private timber lands within the analysis area (Table 3-15). We assumed that crown closures would be zero percent after the reasonably foreseeable future timber harvest on private lands. Most areas that could be harvested on private lands are accessible by existing roads, so no new road construction is included in the reasonably foreseeable future scenario.

Under the reasonably foreseeable future timber harvest on private forest lands, there would be an increase in the percent of forest land with crown closures less than historic levels in each analysis area, with the increases ranging from three percent in the Lower Grizzly Analysis Area to six percent in the Howard Prairie Analysis Area (Table 3-16).

Table 3-15. Reasonably Foreseeable Future Timber Harvest1 on Private Forest Lands

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Reasonably Foreseeable Future Harvest on Private Forest Lands</th>
<th>Percent of Forest Land</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acres</td>
<td></td>
</tr>
<tr>
<td>Howard Prairie</td>
<td>1,005</td>
<td>6.5</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>129</td>
<td>3.2</td>
</tr>
<tr>
<td>Totals</td>
<td>1,134</td>
<td>5.8</td>
</tr>
</tbody>
</table>

1/ Reasonably foreseeable future timber harvest that would reduce crown closure that is currently above historic levels to below historic levels.

The projected increase in crown closures that would be less than historic levels for private lands is added to federally-administered lands to obtain a total by analysis area (Table 3-16).
Table 3-16. Percent of Forest Lands with Crown Closures Less than Historic Level after Reasonably Foreseeable Future Timber Harvest

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Federal</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>4.6</td>
<td>23.9</td>
<td>28.5</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>3.3</td>
<td>7.8</td>
<td>11.1</td>
</tr>
<tr>
<td>Totals</td>
<td>4.3</td>
<td>20.6</td>
<td>24.9</td>
</tr>
</tbody>
</table>

1/ Reasonably foreseeable future timber harvest that would reduce the crown closure below historic levels is only anticipated for private lands. See Table 3-10 for existing percentages.

2/ Federal does not include foreseeable actions on USFS or BOR lands because future treatment on BOR lands would be thinning only, and would not decrease the canopy closure below historic levels. No harvest is anticipated for USFS lands.

Under the reasonably foreseeable future timber harvest scenario, both analysis areas would remain within the range of natural variability (10 to 40 percent) for early successional vegetation (Table 3-16).

Private timber lands identified for future harvest were included in the reasonably foreseeable future compacted area calculations (Table 3-17). For this analysis, we assumed that tractors would be used for future harvest on private timber lands if the slopes are 60 percent or less. Using this assumption, all reasonably foreseeable future harvest on private lands would be tractor logged. To determine the compacted area resulting from reasonably foreseeable future harvests it was assumed 25 percent of the harvest acreage would be compacted for tractor logging on private lands.

Table 3-17. Estimated Soil Compaction by Analysis Area for All Lands after Reasonably Foreseeable Future Soil Compacting Actions

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Estimated Compacted Area From Foreseeable Future Treatments</th>
<th>Existing Compacted Area (Acres)</th>
<th>Existing and Future Compacted Area (Acres)</th>
<th>Total Compacted Area (%)</th>
<th>Increase in Percent Compacted Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>Tractor² (Acres)</td>
<td>317</td>
<td>2,010</td>
<td>2,327</td>
<td>12.7</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>35</td>
<td>713</td>
<td>748</td>
<td>17.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Totals</td>
<td>352</td>
<td>2,723</td>
<td>3,075</td>
<td>13.7</td>
<td>1.6</td>
</tr>
</tbody>
</table>

1/ Reasonably foreseeable future soil compacting actions anticipated on private timber lands and BOR lands.

2/ Assumption that all reasonably foreseeable future harvest in these analysis areas would be tractor yanded.

Compacted area would increase by approximately 352 acres (or 1.6 percent) in the analysis areas as a result of the reasonably foreseeable future harvest activities on private and BOR lands (Table 3-17).

The total percent compacted area would be above the 12 percent level of concern in both the analysis areas after adding the reasonably foreseeable future activities that could result in soil compaction.

In conclusion, based on the information contained in the tables above, Grizzly-Soda, and to a lesser degree Howard Prairie, would be considered at moderate risk for increases in the magnitude and frequency of peak streamflows due to past, present, and reasonably foreseeable future actions. Although both analysis areas have a high road density both analysis areas are at or below the level of concern for percent of area in roads and within historic levels of canopy closure. Compaction would increase slightly beyond existing levels but any potential peak streamflow effects may be tempered by adequate canopy cover. In addition, the majority (73%) of road-stream crossings are generally located in the upper slopes of the watershed, intersecting either ephemeral or short-duration intermittent channels, and have a lesser chance of directly affecting the hydrologic function of the stream system. Under Alternative 1, a high intensity wildfire would be a concern for potential increases in the magnitude and frequency of peak streamflows for both analysis areas should one occur.
b. Alternative 2 (Proposed Action)

Alternative 2 would not affect streamflows in the analysis area as a result of little to no net change in soil compaction due to reusing old skid trails, designating skid trails, and limiting harvest to dry soil conditions or when there is a deep snow pack; and no change to overall road density or percent of area in roads. It is unlikely streamflows would be affected due to changes in vegetative cover.

Seven different prescriptions would be used for commercial harvest units under Alternative 2: moist Douglas fir thinning, pine site thinning, mixed conifer, regeneration harvest, white fir thinning, group select- disease control, and pole thinning (see Chapter 2). The average post-treatment crown closure would vary between prescriptions as well as between and within analysis areas for the same prescription. The average post-treatment crown closure would be above 30 percent for all prescription types except for the regeneration harvest treatment. The proposed prescription for regeneration harvest would result in average post-treatment crown closures below 30 percent on a total of 110 acres (0.8 percent of the planning area, or 0.5 percent of the analysis areas).

Tractor yarding would be limited to designated skid trails, minimizing the compacted area to 12 percent. In a study of thinnings and partial cutting by yarding systems, skidding logs caused approximately 8 percent compaction (Landsberg, 2003). Observations of the units proposed for harvest reveal many old skid trails still apparent across the landscape, and where feasible, these old skid trails would be reused. Designating skid trails and reusing old skid trails would reduce the area that would be compacted during tractor logging operations. Whole tree yarding using a mechanical harvester would not cause any detrimental compaction as a result of using such equipment during dry soil conditions or on a two foot snow pack (see Soils section). We use a road width of 15 feet to estimate compacted area that would result from proposed temporary roads. The temporary roads would be decommissioned by blocking vehicle access after their use. Hydrologic recovery would occur over time as vegetation becomes established. However, since this method of decommissioning only reduces some of the compacted area, and since it is unknown how long till hydrologic recovery occurs, the full amount of compacted area (1.3 acres) has been included for this analysis. It should, therefore, be considered that the total amount of compaction due to road building will be less than the 1.3 acres listed in Table 3-18.

Table 3-18. Estimated Soil Compaction by Analysis Area Resulting from Alternative 2

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Estimated Compacted Area From Proposed Yarding, Landings, and Roads</th>
<th>Existing Compacted Area (Acres)</th>
<th>Total Compacted Area From Alt. 2 Acres (%)</th>
<th>Total Compacted Area (Alt. 2 &amp; Existing) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tractor Acres</td>
<td>Road Acres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Howard Prairie</td>
<td>230</td>
<td>1</td>
<td>2,010</td>
<td>231 (1.3%)</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>13</td>
<td>0</td>
<td>713</td>
<td>13 (0.3%)</td>
</tr>
<tr>
<td>Totals</td>
<td>243</td>
<td>1</td>
<td>2,723</td>
<td>244 (1.1%)</td>
</tr>
</tbody>
</table>

1/ See Past Actions section in Affected Environment under Water Quantity section for a summary of how compacted acres are calculated.
2/ This would be the maximum amount of compaction if no decommissioning was done to the temporary roads.
3/ Existing acres from Table 3-11.
Table 3-19. Estimated Total Soil Compaction by Analysis Area Resulting from All Actions

<table>
<thead>
<tr>
<th>Analysis Area</th>
<th>Existing Compacted Area (Acres)²</th>
<th>Estimated Compacted Area For Reasonably Foreseeable Future Actions on Private and BOR Lands³</th>
<th>Total Compacted Area From Alt. 2 Acres⁴</th>
<th>Total Compacted Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard Prairie</td>
<td>2,010</td>
<td>317</td>
<td>231</td>
<td>2,558 (14%)</td>
</tr>
<tr>
<td>Grizzly-Soda</td>
<td>712</td>
<td>35</td>
<td>13</td>
<td>760 (18%)</td>
</tr>
<tr>
<td>Totals</td>
<td>2,722</td>
<td>352</td>
<td>244</td>
<td>3,318 (15%)</td>
</tr>
</tbody>
</table>

1/ All actions include those done under Alternative 2 (Table 3-18) and foreseeable actions (from Table 3-11)
2/ From Table 3-11
3/ From Table 3-17
4/ From Table 3-18

Considering reasonably foreseeable future actions, under Alternative 2, the total combined compacted area, within both analysis areas, would remain above the 12 percent level of concern identified for potential increases in peak flows (Table 3-19); Alternative 2 would only increase compaction in the Grizzly-Soda analysis area by 13 acres (0.3 percent), and the Howard Prairie analysis area by 231 acres (1.3%). The increase in compacted area for the two analysis areas would primarily be the result of tractor yarding. However, since old skid trails would be used, where feasible, the total amount of compaction (as listed in Tables 3-12 and 3-13) calculated as a result of this proposed action is the maximum possible for this Alternative. It is, therefore, likely, an overestimation. It is estimated there will be a maximum of forty landings used within the planning area. The majority are existing and if needed, will be expanded up to one-half acre each to accommodate whole tree yarding for biomass removal. There will be no landing expansion in Riparian Reserves (see PDFs). If landings occupied one-half acre each they would only comprise 0.09 percent of the analysis area (or, only 0.15 percent of the planning area) which would increase the total compacted area from 15.0 to roughly 15.1 percent for both analysis areas.

Peak streamflows are not expected to be affected by soil compaction resulting from this project because there would not be any connectivity from the yarding activities to stream channels. Project design features such as no yarding in Riparian Reserves, waterbarring tractor skid trails, avoiding tractor skid trails on slopes over 35 percent, not expanding landings in Riparian Reserves, and “winterizing” landings and temporary spur roads, would prevent surface flow from traveling very far down skid trails or reaching stream channels. No ground-based mechanized fuel treatments are proposed under Alternative 2.

Under Alternative 2, proposed pre-commercial thinning would not change the existing crown closure. The proposed fuel reduction treatments outside the commercial harvest units would not affect the existing crown closure levels. Fuels treatments (including slashing, underburning, and handpiling) within the commercial harvest units would only affect the understory vegetation and not change the crown closure resulting from the commercial harvest. On BLM-administered lands, the proposed treatments would tend to reduce the risk of severe fire. To the extent Alternative 2 reduces the risk of such a fire as compared to Alternative 1, the risk of an adverse change in streamflow would also be reduced in Alternative 2 as compared to Alternative 1.

Under Alternative 2, proposed commercial harvest would not change the overall percent of historic canopy closure on forest lands in the Grizzly-Soda analysis area, and would only decrease the crown closure that is currently above historic levels to below historic levels in the Howard Prairie analysis area by 110 acres, or 0.7 percent of forested lands. No noticeable increase in the magnitude or frequency of peak streamflows would be expected as a result of crown closure reductions proposed under Alternative 2.
Proposed road treatments under Alternative 2 would not result in an increase in road density or percent of area in roads in either of the analysis areas. Temporary road construction/reconstruction would be short-term and the temporary roads would be decommissioned by stabilizing and blocking after use. All other road treatments would occur on existing roads only. Both analysis areas would continue to have 4 percent or less roaded area under Alternative 2 and thus continue to have a low to moderate potential for peak flow increases.

Of the 0.7 miles of proposed temporary roads, only one proposed temporary road segment would cross the upper reach of a dry draw. The other two temporary spurs would not cross any streams or water features. Therefore, the amount of road-stream crossings would remain at the existing level for both the Howard Prairie and Grizzly-Soda analysis areas. The temporary road segments would be stabilized and blocked after use, and would achieve hydrologic recovery over time. Since the road construction is temporary and on relatively flat terrain, it is anticipated that soil erosion increases would likely occur after the first rainy season following construction. Because the proposed temporary road construction would be located on gentle to flat slopes and it is anticipated that, under average rainfall conditions, the erosion rates would be less than 4 yd³/ac/yr during the first storm events after construction and decrease down to about 3 times natural rates after 3 years (see Soils section). Typically, newly constructed roads experience the highest erosion rates during the short period before grass becomes established. The road segments would have very little effect on the hydrologic network, as there is only one drainage crossing and soils are stable.

Road maintenance would consist of placing rock surfacing on native surfaced roads, adding rock to the existing base, and re-establishing drainage. Road maintenance would occur in both analysis areas. The rock surfacing would reduce the likelihood of surface erosion and subsequent transport of sediment to streamcourses. The road drainage improvements would further disperse road runoff and decrease the concentration and routing of water to streams during storm events. This would help to reduce sediment delivery attributed to roads and possibly the timing and magnitude of peak streamflows.

5. Environmental Consequences - Water Quality

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management, reasonably foreseeable future actions, and events unrelated to the Plateau Thin project. Discussion for Alternative 2 reflects the direct and indirect impacts of the proposed action. 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).

a. Alternative 1 - No Action

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 Plateau Thin project and effects which we expect will occur from identified other on-going and reasonably foreseeable future actions. Alternative 1 describes anticipated effects of not implementing the proposed action at this time.

Under Alternative 1, there would be no change in existing water quality on BLM-administered lands. Streams in the analysis area that are on the DEQ’s 2004/2006 303(d) list would continue to exceed water quality standards. Surface erosion from roads would be expected to remain a concern, and the risk of sediment inputs to streams would be expected to remain relatively constant. A minimum level of BLM road maintenance would occur to prevent major sediment input or repair drainage failures. There would be no action to decrease road interactions with streams.

In the long term, with no stand management on BLM-administered lands, and the subsequent increase in stand densities and fuel loading, there is a high probability that a severe, stand-replacement fire could

Plateau Thin Project 3-50 Environmental Assessment
burn across the planning area (see Fire section). A high severity fire could reduce or eliminate riparian vegetation and expose large areas of bare soil to the erosive forces of rainfall, potentially increasing soil erosion and sedimentation.

Reasonably foreseeable future actions planned for BLM-administered lands in the analysis area include a pre-commercial thinning, routine road maintenance activities, and continued livestock grazing. A recently completed fuels reduction project (2009) hand treated about 110 acres in the analysis area.

BLM road maintenance activities would entail a minimum level of maintenance to correct drainage deficiencies or repair drainage features. This work may have a positive benefit to water quality.

Reasonably foreseeable future livestock grazing would likely continue to negatively affect water quality by increasing turbidity/sedimentation through streambank disturbance and riparian vegetation removal. The BLM is currently developing an environmental assessment (EA) to evaluate the grazing leases for the Deadwood Allotment. The grazing lease renewal EA may impose practices that would reduce the impact of livestock grazing on water quality. The lease authorization process is expected to be completed by the Summer of 2010. The lease authorization process for the Howard Prairie Allotment is scheduled to be completed in the summer/fall of 2010. The Keene Creek Allotment was voluntarily relinquished.

There are no reasonably foreseeable future actions for Forest Service-managed lands within the analysis area.

The Bureau of Reclamation proposed a forest management project on Reclamation land surrounding the lake. This project included approximately 571 acres of thinning—546 in the Howard Prairie analysis area, and only 25 acres in the Grizzly-Soda analysis area.

Reasonably foreseeable future forestry operations on private forest lands in the analysis area are assumed to be the same as under the Water Quantity section: no new road construction and an estimated 1,134 acres of timber harvest (Table 3-15). Private forest lands in the planning area would be managed according to the Oregon Forest Practices Act, which was evaluated in 2002 for adequacy in achieving and maintaining water quality goals (ODF and ODEQ 2002). The evaluation noted that current protection requirements may be inadequate to prevent short-term temperature increases on nonfish-bearing and small fish-bearing streams. In addition, the report indicates that wet-weather hauling and steep-slope ground skidding practices allowed under the Forest Practices Act are not adequate in meeting sedimentation and turbidity standards. The evaluation provided recommendations for improving current practices to have a greater likelihood of meeting water quality standards. Agricultural/rural residential lands would be managed according to county ordinances and also encouraged to reduce water pollution by following suggested practices described in DEQ’s Water Quality Management Plan (WQMP) for this area. Conforming to the WQMP should ensure achievement of water quality standards necessary to achieve TMDLs by private land owners.

In conclusion, past actions from the 1850s to the 1980s on both private and federal lands throughout the analysis area contributed to water quality degradation—specifically sediment increases. With the cessation of some activities, such as intensive grazing, and the moderation of impacts from other activities, such as logging and road building, water quality conditions are improving. Natural surface roads that are used during the wet season and ground skidding on moderate slopes would likely continue to have erosion concerns and contribute sediment to nearby streams. Reasonably foreseeable future actions on private lands would be required to adhere to the TMDLs and WQMP upon their completion by DEQ and water quality in the analysis area would be expected to continue to improve. Reasonably foreseeable future livestock grazing on private and BLM land would continue to alter stream banks, and continue to cause increases in turbidity/sedimentation to area streams. However, if grazing lease renewals impose practices to reduce aquatic impacts, conditions could improve. The lack of vegetation management on BLM-administered lands may lead to a high intensity fire that could expose large areas of bare soil, thus increasing sedimentation.
b. Alternative 2 (Proposed Action)

Under Alternative 2, proposed road related actions would have the greatest potential for increasing the amount of sediment delivered to streams in the planning area. Road operations proposed under Alternative 2 include temporary road construction, road maintenance, renovation (opening up closed roads), and expanding landings. All road work would be done during the dry season to prevent or minimize sediment delivery to streams to the maximum extent practicable.

Under Alternative 2, three new temporary road segments, totaling approximately 0.7 miles, would be constructed: two in T38S-R3E-Sec. 13 and one in T38S-R4E-Sec. 17; all three would be within the Howard Prairie analysis area. All three temporary routes would be decommissioned by blocking to prevent vehicle access prior to the completion of the timber sale. These roads would be located on stable, low to flat slopes (topographic benches), with no culvert or ditch installations. One of the proposed roads in section 13 would not cross any defined channels, but would cross the upper end of a dry draw (ephemeral) that turns into an intermittent stream approximately 1,250 feet (0.2 mi) downstream of the crossing. Erosion prevention and sediment control measures implemented during the construction and decommissioning, and down woody material in the dry draw would greatly limit any offsite soil movement. If this road segment is needed beyond one season it would be winterized prior to fall rains. Should any sediment movement occur from this road it would be minimal and the potential for offsite transport low. It is not expected that any sediment coming from this road would be discernable above background levels where this creek joins Howard Prairie reservoir. The other two proposed road segments would not cross any streams or dry draws, thus there would be a very low risk of sediment reaching a water body. Any soil mobilized from these new temporary routes would be trapped by groundcover vegetation and woody material along the road margins, and not move into any stream channels or dry draws. Additionally, native surfaced roads would not be used during the wet season.

Proposed road maintenance would consist of adding additional rock surfacing onto the existing base and improving road drainage by re-contouring (re-establishing) ditchlines and grading existing roads. Rock surfacing would reduce the amount of soil moving off the road surface, resulting in less sediment entering streams. The road drainage improvements would further disperse road runoff and decrease the rapid, concentrated routing of water to streams during storm events. This would help to reduce the amount of sediment delivered to streams that are connected to the road network. The rock surfacing and drainage improvements would help to reduce the sediment input from roads to the maximum extent practicable and were identified as a restoration priority in the Jenny Creek Watershed Analysis (USDI 1995b). The proposed drainage improvements would greatly reduce the chronic sediment delivery to tributaries within the two analysis areas.

The proposed decommissioning would include blocking the roads to vehicle traffic. Work would be conducted during the dry season when streamflows are not present in ephemeral draws. Any sedimentation resulting from material entering the ephemeral channel during decommissioning would be localized and of limited duration with the use of sediment control BMPs at the work site. Erosion prevention and sediment control BMPs include: water barring each side of the dry channel crossing in order to adequately filter road surface runoff and limit sediment transport to streams; and seeding (with native or approved seed) and mulching areas of disturbed ground prior to the onset of season rains. Although unlikely, the timing of any sediment pulse would coincide with high intensity rainfall events when streams would be expected to have high turbidity levels. Erosion from the road surface would continue to occur until vegetation becomes sufficiently established to protect the surface during rain events (where rainsplash can dislodge individual particles or the velocity of overland flow across the surface is sufficiently slowed down by the vegetation).

Overall, proposed road maintenance and use in and near streams could increase sedimentation in the short term. The timing of the sedimentation increases would coincide with normal high sediment levels that typically occur during high rainfall events. It is expected that sediment/turbidity levels resulting from the proposed road work would not be detectable at the mouth of any tributary to Jenny Creek or Howard Prairie reservoir. The location and design features of the proposed temporary road construction, rock
surfacing, road drainage improvements to existing roads would result in a net reduction in sediment delivered to streams over the long term.

Sedimentation as a result of log truck travel on roads in the planning area would be very low due to the proposed road surfacing, dust abatement, and BMPs for seasonal hauling restrictions. Natural surface roads used as haul routes during the dry season have the potential to directly transport airborne particulates to stream channels. Repeated use of the roads during dry conditions would create dust that may settle into the channels. However, through following standard BMPs, it is unlikely that enough dust would reach a stream channel at any one time to create enough turbidity to exceed DEQ’s turbidity limit. It is highly unlikely winter hauling would produce sediment in streams because log truck travel would only be allowed on roads when there is a minimum of 4 inches of hard-packed snow, and there is no sediment risk once trucks reach paved surfaces.

Under Alternative 2, about 30 to 40 landings, up to 0.5 acres in size, are needed to accommodate mechanized harvesting. The majority of these landings are existing, but in some cases, may need expanding to accommodate biomass utilization. No new landings are proposed for construction or expansion within Riparian Reserves. Landing renovation would not occur during the wet season (October 15th to June 15th) when the potential for soil erosion and water quality degradation exists. Where necessary, stabilization of landings would occur (i.e., rock surfacing, seeding and mulching, or other approved methods) would be implemented prior to the onset of seasonal rains (BMPs, Chapter 2).

Erosion from the landings would be very minimal due to their location, very low slopes within the analysis area, and application of erosion control measures, which will greatly reduce the likelihood of any sediment from entering stream channels. BMP implementation and the location of proposed landing sites would greatly limit the amount of sediment moving offsite to stream channels.

Proposed actions due to commercial harvest would include tree felling and log yarding. Of these actions, yarding would be most likely to lead to sedimentation due to ground disturbance. Research has found that the amount of ground disturbance from yarding varies by logging system, with tractor causing approximately 21 percent disturbance (see Soils section). The potential for sediment in commercial harvest units to reach stream channels is very low due to erosion prevention BMPs (see Chapter 2), such as, no harvest or yarding in Riparian Reserves and limiting the extent of skid trails (see Soils section). Waterbars on tractor skid trails would prevent water from concentrating on bare, compacted ground and move it to adjacent vegetated or slash covered slopes.

Proposed PCT treatments would be performed manually and would not involve any ground disturbance. Therefore, the PCT treatments would not have any effect on erosion rates or sedimentation in the planning area. There are no PCT treatments within Riparian Reserves. Post-PCT treatments may include handpiling and burning the thinned material. The combination of Riparian Reserve buffers and the relatively flat to rolling terrain in the planning area would reduce if not prevent the movement of sediment or ash into stream channels. Any increases in sediment or ash to waterbodies as a result of pile burning would be very slight and not expected to be detectable in any mainstem or the reservoir.

Under Alternative 2, prescribed burning in the commercial harvest units would be primarily handpile burning and some underburning. Spring underburning would result in a low intensity burn with minimal duff consumption. Sediment increases from spring underburning would be very slight given the low intensity burn and BMPs that stipulate no ignition or fire lines in Riparian Reserves. Fall underburning would only be undertaken if “spring-like” conditions exist for soil and duff moisture levels. An area burned in the fall would not revegetate until the following spring; intense fall and winter rains immediately following the burn could result in soil and ash movement (see Soils section). Vegetation and down material in Riparian Reserves would trap any off-site soil and ash movement and greatly reduce the likelihood of it entering stream channels. No pile burning resulting from commercial harvest is proposed in the Riparian Reserves adjacent to commercial treatments.

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6 http://www.deq.state.or.us/wq/standards/turbidity.htm
Under Alternative 2, fuel reduction treatments are proposed for both the Howard Prairie and Grizzly-Soda Analysis Areas. Treatments would include manual thinning of brush, hardwoods, and small conifers; hand piling; and pile burning. Thinning and pile burning would not occur within Riparian Reserves. Riparian Reserve buffers would reduce the entry of sediment or ash into stream channels to the maximum extent practicable. Any increases in sediment or ash to waterbodies as a result of pile burning would be very slight and not expected to be detectable in any mainstem or the reservoir.

Alternative 2 would have minimal adverse effects on sedimentation because:

1) proposed temporary spur road construction would occur in stable locations, thus minimizing the risk of road failure;
2) proposed temporary spur road construction would only cross one dry draw;
3) design features for the proposed spur road construction would include outsloping to lessen concentrated flows and associated sediment delivery to downstream waterbodies;
4) rock surfacing on existing natural surfaced roads, adding rock to the existing base, would decrease sediment delivery;
5) the potential for sediment from commercial harvest units to reach stream channels is very low due to BMPs, including Riparian Reserves, or harvesting with no less than 24” of snow cover, and the flat to rolling terrain;
6) manual PCT would not involve any ground disturbance and therefore would not have any effect on erosion rates or sedimentation in the planning area;
7) sediment increases from underburning would be very slight given the low intensity burn and BMPs that stipulate no ignition or fire lines in Riparian Reserves;
8) BMPs would reduce to the maximum extent practicable the entry of sediment or ash into stream channels from pile burning within Riparian Reserves proposed for non-commercial thinning; and
9) No landing construction or expansion would occur inside Riparian Reserves, and BMPs would greatly limit any sediment moving off-site.

“Minimal adverse effects” means actions would not result in the listing of streams as water quality limited. Hoxie and Grizzly Creeks are within the planning area and on the 2004/2006 303(d) list for temperature. Under Alternative 2, road maintenance and reconstruction would provide a long-term benefit to water quality. Road upgrades are identified as important strategies for 303(d) listed stream restoration in the Jenny Creek WQRP (USDI 2008).

The Medford District PRMP/EIS (USDI 1994) acknowledges that surface-disturbing activities under the PRMP alternative could result in increased turbidity and sediment levels and that these increases would adversely affect water quality and could impair beneficial uses such as fish and domestic water use (USDI 1994:4-18). Any adverse effects of turbidity or sedimentation on water quality resulting from Alternative 2 would be within the scope of what was analyzed in the PRMP/EIS.

Existing human-caused sediment sources in the analysis area are primarily related to the road network created by past actions. The incremental impact of Alternative 2 on sedimentation in the planning area would be minimal compared to the sedimentation contributed from past, present, and reasonably foreseeable actions as described under Alternative 1. The primary sediment source resulting from Alternative 2 would likely occur from ground disturbance caused by log hauling and road activities. However, the impact is expected to be minimal given the implementation of BMP’s and winter hauling over frozen surfaces. Long-term cumulative benefits to water quality from road improvements proposed under Alternative 2 would be greater than under Alternative 1 for both analysis areas.

E. SOILS & SITE PRODUCTIVITY

1. Affected Environment

The proposed Plateau Thin Forest Management Project is within the Jenny Creek Watershed. Soils series identified in the project units are Farva and Pinehurst. The topography in the project area is main hillslopes ranging is slope between 8 and 35 percent slope.
The Farva soil series is a moderately deep, well drained soil. 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 one-half 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.

The Pinehurst soil series is a very deep, well drained soil. It formed in colluvium derived from basalt and andesite. Typically, the surface is covered with a layer of needles and twigs about one inch thick. The surface layer is dark reddish brown loam about 15 inches thick. The subsoil to a depth of 60 inches is dark reddish brown clay loam. The depth to bedrock is 60 inches or more. In some areas the surface layer is stony. Permeability is moderately slow in the Pinehurst soil. Available water capacity is about 10 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 yd³/ac/year and erosion rates increased in harvest areas to 0.7 yd³/ac/yr (in Amaranthus, 1985, p.233). Erosion rates are highly dependant 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 planning 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. A map showing the location of the soils in the proposed project units is displayed below.
a. Roads

There are approximately 135 total miles of road in the analysis area. Approximately 45 miles of the existing roads are 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.

b. 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 soil porosity and site organic matter (OM). 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 erosion 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. 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 trees, shrubs, grasses, and moss. Soil organic matter appears typical for the region with most of the sites having less than ½ inch of litter (leaf and needles). Some sites with a mature forest canopy 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 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).

c. 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 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 1980’s 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 1,600 acres of the 2,113 acre proposed area has 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 about 627 acres of past tractor harvest was on designated skid roads. A lot of the harvesting before the 1970s was in the form of single tree selection or group selection taking out the biggest and most valuable trees. During the 1970s through the 1980’s 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. It is estimated that most of BLM-administered land in the planning area has been tractor logged in the past with 65 percent occurring before 1980. There has been approximately 330 acres harvested on BLM-administered land within the planning area in the last 10 years.

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 Plateau project.

Discussions for Alternative 2 reflect the direct and indirect impacts of the proposed action(s) of this alternative. 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 - No Action

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 exists. 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. 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" 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 road maintenance and the risk of a catastrophic wildfire would increase as a result of the no action alternative.

b. Alternative 2 (Proposed Action)

There is about 0.7 miles of road construction proposed under this alternative with all construction to be obliterated after use. Road construction would have the greatest impact on the soil resource as approximately 6 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 yd³/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 yd³/ac/yr) the first few substantial storm events after construction and decrease down to about 3 times natural rates after 3 years. 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).

Since the new construction is temporary road on fairly flat ground, then it is anticipated that soil erosion increase would only be noticeable the first rainy season following construction. Some of the proposed new road construction would be to reopen roads that were previously built and closed. These previously closed roads would have similar disturbance as that of a newly constructed road along the road prism (15’width). It is estimated that about 2 acres of disturbance would occur for every mile of road reopened, used and closed. Currently the erosion from these previously closed roads is slightly (<15%) above natural rates. Again, most of the noticeable soil erosion would occur during the first few rain events after reconstruction and use.
The construction of landing areas would disturb about one half acre each. The landing would be stabilized (e.g. surfaced with rock, seeded and mulched, or other approved methods) before the winter rains. Potential erosion from the proposed new landings would be less than twice the natural erosion rate immediately after construction and regress back to near natural rates within three to five years. This small increase in erosion rates is predicted due to the gentle topography of the landscape and required project design features addressing the treatment of landings for erosion control during and after use.

The road renovation that would occur consists of surfacing portions of existing roads. This road work will help in reducing surface erosion from roads and decrease sediments reaching local waterways, which is a very slight (<15% decrease over existing rates) but positive effect as roads are the main source of soil erosion and sedimentation to local waterways.

Soil disturbance from timber harvesting may not be avoidable, but it 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 not be restored (Miller and others, 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 would result in approximately twelve percent or less of the area compacted (USDI, 1995. p.156). Designating skid trails would most likely reduce 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 many old skid trails still apparent across the landscape. Tree and brush vegetation has been slow to re-establish in some of the skid trails as a result of the compaction from past harvesting. Whole tree yarding using the mechanical harvester would not cause any detrimental compaction as a result of using such equipment during dry soil conditions or on a two foot snow pack.

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 Reserve 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 (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.

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 volatilizes 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 (PRMP/EIS 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 and of themselves lead to soil depletion over several succeeding rotations (Beschta, nd). 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. Lower intensity cutting results in a 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 Plateau Thin 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 sites previously affected by past harvest and soil erosion have since recovered as past actions occurred over twenty years ago. Therefore, cumulative effects to the soil resource as a result of the timber harvest would be minimal if the soil resource is allowed enough time to recover from the disturbance of this project.
Answers: 0.5

F. FISH & AQUATIC HABITATS

1. Affected Environment

The proposed Plateau Thin Forest Management Project would occur in the upper Jenny Creek 5th Watershed. For the purposes of analyzing fish and aquatics, the analysis area will describe all areas where the project has any type of effect. All proposed timber harvest and road work is planned upstream of Howard Prairie Dam except approximately 60 acres in the Soda Creek 7th field drainage and approximately 10 acres in the Grizzly Creek 7th field drainage. The analysis area includes Howard Prairie Reservoir and the following seven streams: Grizzly Creek (North), Grizzly Creek (South), Hoxie Creek, Soda Creek, Willow Creek, Swinning Creek, and an unnamed tributary to Howard Prairie Reservoir. The only streams in the analysis area that do not flow directly into Howard Prairie Reservoir are Soda Creek and Grizzly Creek (South).

Fisheries Resource Determined Relevant to the Plateau Thin Project:

- The Jenny Creek Watershed is also designated as a Tier 1 Key Watershed for the recovery of at risk stocks of fish; the majority of the project area is located above Howard Prairie Reservoir which impounds the waters of Grizzly Creek, Hoxie Creek, Willow Creek, Swinning Creek, and other unnamed tributaries.

- There is concern that increased sedimentation from the implementation of the project proposal (see Potential for Impacts to Hydrologic Function and Water Quality above) could potentially impact fish and aquatic habitat for resident fish in the analysis area.

a. Endangered Species Act, Coho Critical and Essential Fish Habitat

In 1997 the Southern Oregon/Northern California (SONC) 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). On May 5, 1999, NMFS designated Coho Critical Habitat (CCH) for SONC 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). There are no coho salmon within the analysis area and nearest CCH is approximately 15 miles downstream, downstream of Irongate Reservoir.

Essential Fish Habitat (EFH) has been defined by NOAA fisheries 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. There is no EFH within the analysis area. More information regarding EFH may be found at: http://www.nmfs.noaa.gov/ess_fish_habitat.htm.
b. Fish Species within the Jenny Creek Watershed

The Jenny Creek watershed supports 14 species of fish, described in Table 3-20.

### Table 3-20. Native and Nonnative Fish within the Jenny Creek Watershed

<table>
<thead>
<tr>
<th>Native Fish</th>
<th>Nonnative Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jenny Creek redband trout* (Oncorhynchus mykiss spp.)</td>
<td>Brown bullhead (Ameirus nebulosus)</td>
</tr>
<tr>
<td>Klamath speckled dace (Rhinichthys osculus)</td>
<td>Black crappie (Pomoxis nigromaculatus)</td>
</tr>
<tr>
<td>Jenny Creek sucker* (Catostomus rimiculus)</td>
<td>Rainbow trout (Oncorhynchus mykiss)</td>
</tr>
<tr>
<td>Marbled sculpin (Cottus klamathensis)</td>
<td>Channel catfish (Ictalurus punctatus)</td>
</tr>
<tr>
<td>Pacific lamprey (Lampetra tridentata)</td>
<td>Largemouth bass (Micropterus salmoides)</td>
</tr>
<tr>
<td>Flathead minnow (Pimephales promelas)</td>
<td>Smallmouth bass (Micropterus dolomieu)</td>
</tr>
<tr>
<td>*Bureau Sensitive Species</td>
<td>Bluegill (Lepomis macrochirus)</td>
</tr>
<tr>
<td></td>
<td>Golden shiner (Motemigonus crysoleucas)</td>
</tr>
</tbody>
</table>

Source: Jenny Creek Watershed Analysis, 1997.

**Native Fish**

Fish within the Jenny Creek watershed are isolated above a series of impassable, natural falls on Jenny Creek, south of the California border. The Jenny Creek sucker and redband trout are genetically distinct because of this genetic isolation (JCWA, 1995).

The Jenny Creek redband trout is part of the Upper Klamath Lake Basin Species Management Unit (SMU), which in turn is a part of the Interior Great Basin redband trout population occupying the great basin of Oregon, Idaho, Nevada, northern California, upper Columbia River drainage, upper Klamath Basin, and, upper Sacramento River drainage (ODFW, 2005). The Oregon Department of Fish and Wildlife categorize the Jenny Creek redband trout population as “vulnerable.” The Bureau of Land Management lists the Jenny Creek Redband Trout as “Sensitive” on the Special Status Species List (USDI 2008). Distribution of redband trout within the analysis area is unknown.

The Jenny Creek sucker has been documented 0.7 miles downstream from the analysis area boundary, below a falls in Jenny Creek. Three other native fish species in the Jenny Creek watershed, marbled sculpin, pacific lamprey, and flathead minnow, are confined to the lower two miles of Jenny Creek by a series of waterfalls. These species, along with the Jenny Creek sucker, are not further discussed in this EA because they are not found within the analysis area and would not be affected by the proposed action.

Speckled dace are present in Howard Prairie Reservoir, its tributaries, and most likely in Soda Creek. Although speckled dace currently do not have any special status, a genetic study indicates the Jenny Creek speckled dace could be genetically distinct (Pfrender and Lynch, 1998). The speckled dace are most numerous in low gradient meadow reaches within the analysis area. The population of speckled dace appears to be in good condition in the Jenny Creek watershed (Smith, personal conversation); however, the population size within the analysis area is currently unknown.

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6 The Little Hyatt Lake Fish Salvage reported capturing 10,987 Dace in Little Hyatt Lake Dam, just below the AA in Keene Creek (USDA, 2007). While snorkeling for the Jenny Creek Sucker, fish biologists recount seeing thousands of Dace in lower Jenny Creek.
Nonnative Fish
Nonnative fish were introduced into the watershed mainly from ODFW stocking and from bait fisherman. ODFW regularly stocks rainbow trout in Howard Prairie Lake. Brown bullhead, golden shiner, black crappie, bluegill, and largemouth bass are all introduced fish species that occur in the analysis area, mainly in Howard Prairie Lake.

The nonnative lake fish negatively impact the native fish in the analysis area through competition and introgression (the entry or introduction of genes from one gene complex to another). Historically, Jenny Creek redband trout were the only trout species to occupy fish-bearing tributaries in the analysis area. Genetic dilution and competition from hatchery rainbow trout are putting these populations at risk.
Genetic analysis confirmed hybridization and introgression between redband trout and hatchery rainbow trout in the analysis area (Buchanan et al. 1994; ODFW, 2005). BLM Fish presence/absence surveys conducted in 2007 found that the trout had the appearance of rainbow trout in all the streams within streams of the analysis area except Soda Creek, South Fork Canal, and Willow Creek\(^7\). Because of genetic dilution, the redband trout population is likely in poor condition throughout the analysis area.

c. Fish Distribution in the Analysis Area

Fish presence/absence surveys are complete for all streams on BLM land within the analysis area. Trout use extends highest in each of the stream systems surveyed and ends because of a lack of habitat or stream flow in all reaches except Soda Creek and Grizzly Creek (South). An impassible culvert is blocking fish from 0.3 miles of fish habitat in Soda Creek and Grizzly Creek flows out of Howard Prairie Dam. Table 3-21 shows the fish distribution within the analysis area.

Table 3-21. Fish Distribution in the Plateau Thin Fish Analysis Area

<table>
<thead>
<tr>
<th>Tributaries to Hyatt Lake</th>
<th>Upper Trout Distribution (miles of fish use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swinning Creek</td>
<td>0.8</td>
</tr>
<tr>
<td>Hoxie Creek</td>
<td>0.7</td>
</tr>
<tr>
<td>Grizzly Creek (North)</td>
<td>1.3</td>
</tr>
<tr>
<td>Grizzly Creek (South)</td>
<td>2.5</td>
</tr>
<tr>
<td>South Fork Canal</td>
<td>1.8</td>
</tr>
<tr>
<td>Willow Creek</td>
<td>1.4</td>
</tr>
<tr>
<td>Soda Creek</td>
<td>2.2</td>
</tr>
<tr>
<td>Unnamed Tributary to Howard Prairie</td>
<td>0.2</td>
</tr>
</tbody>
</table>


Aquatic Insects

No aquatic macroinvertebrate inventories have been conducted in the analysis area; however, in 1993, Aquatic Biological Associates surveyed Beaver Creek, a tributary to Jenny Creek located approximately 3.0 miles away from the analysis area. It is likely that the macroinvertebrate community in Beaver Creek is similar to streams within the analysis area because of proximity, elevation, and habitat. Normally aquatic insect communities on adjacent streams are very similar because adult insects migrate over ridges to colonize new areas. Beaver Creek sampling efforts did not find many cool water genera and species ordinarily expected in a cold water, mountain stream. Missing species included species needing year-round cold water and some of the microhabitat specialists (Aquatic Biological Associates, 1993). Streams within the analysis area most likely have the same deficiencies found in Beaver Creek. Furthermore, Howard Prairie Lake removed approximately 6.5 miles of historical macroinvertebrate creek habitat. Macroinvertebrate populations are most likely in poor condition in the analysis area because of these deficiencies.

Aquatic Mollusks

Aquatic mollusk surveys have been conducted throughout the analysis area and the Jenny Creek Watershed. The Fredenberg pebblesnail (*Fluminicola* n. sp. 11), a Survey and Manage species, was observed in the analysis area, near the mouth of Soda Creek. The Fredenberg pebblesnail was only observed in one of the twenty-five sites sampled in the analysis area; however, all populations of pebblesnail are considered at risk because of their endemism, their sensitivity to habitat disturbance, and

\(^7\) Although this is further evidence of hatchery rainbow trout influence, these surveys were only a small sample of the fish populations within these creeks. Genetic analysis was not conducted on these fish.
their life history trait of only breeding once in a lifetime. Pebblesnails are associated primarily with cold springs and headwaters of streams. The Jenny Creek watershed has a large number of springs, making it a unique area for pebblesnails. Threats to the species include eutrophication caused by excessive nitrogen and phosphorus levels, reduced dissolved oxygen, elevated water temperature, water diversions, and excessive sedimentation. This species is not further discussed in this EA because they are not affected by the proposed action.

d. Physical Habitat

Past Actions
Instream habitats in the analysis area are degraded, as compared to pre-European settlement. Beaver trapping, ranching, flood control, water diversions, and timber harvest have altered the floodplains and stream channels in the analysis area and the Jenny Creek watershed in the last 150 years. Beneficial hydraulic functions have diminished as beaver populations declined due to beaver trapping and removal. Beaver ponds usually have slow current velocities and large edge-to-surface-area ratios and, therefore, contain extensive cover and a highly productive environment for both vegetation and aquatic invertebrates; these conditions provide fish with foraging opportunities not found in un-impounded stream habitat (Hanson and Campbell, 1963; Keast and Fox, 1990). Floodplains were cleared of vegetation to provide more pastureland and many of the streams were straightened and bermed to prevent streams from exceeding their banks. Grazing along the streams increased bank instability in some areas and reduced riparian vegetation. Regeneration of large riparian vegetation, which typically occurred following vegetation removal by flood flows or beaver activity, has been inhibited in some areas by grazing. The combined effect of these actions reduced the quality of habitat in the stream channels within the analysis area (USDI, 2005).

Private timber companies and the BLM have harvested timber from lands in the analysis area and the Jenny Creek watershed since the beginning of the 1900s. Prior to the Northwest Forest Plan, clear-cutting and tree harvest in riparian areas on Federal lands were common practice; hence many riparian areas were degraded (USDI, 1997) and large wood recruitment was greatly reduced from historic levels. In order to harvest trees, many roads were constructed throughout the watershed that contribute sediment to instream habitat (see water resources and soils sections). Fine sediment in excessive amounts degrades stream and aquatic organism health. Excessive 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 from high sediment amounts can disrupt feeding and territorial behavior of juvenile salmonids, which can lead to decreased growth rates and increased mortality. These effects may be far-reaching; stream reaches many miles downstream of point-sources of sediment input have the potential to be negatively impacted (Meehan et al. 1991).

Both small- and large-scale water diversions alter flow in the analysis area and the Jenny Creek watershed (see hydrology section). Howard Prairie Dam was constructed in the 1970s by the Talent Irrigation District to divert water to the Rogue Valley. This dam, along with Hyatt Dam, Little Hyatt Dam, and Keene Creek Dam (located downstream of the analysis area in the Jenny Creek watershed), divert approximately 300,000 acre feet out of the watershed on a yearly basis.

While other activities have occurred in the watershed that have directly or indirectly altered aquatic habitats, the above discussed activities have and continue to have the greatest impacts to fish and fish habitat. All of these activities have had negative impacts to the major drainages within the watershed, and have contributed to the degradation of aquatic habitats and the reduction of the biological health of the stream system.

Riparian Reserve Condition
Riparian Reserves on BLM lands within the Jenny Creek watershed are primarily associated with streams and springs. Riparian vegetation within the analysis area are characterized by Douglas-fir, Ponderosa pine, and white fir overstory. Grasses, vine maple, and willows are the dominant understory vegetation.
Current Riparian Reserves on BLM-administered lands (1,208 acres) vary in age from young stands (less than 10 years) to old growth: approximately 186 acres of grass/oak woodlands; 418 acres are second growth, less than 80 years old; and 604 acres of mature/old-growth, older than 80 years. Younger second-growth conifer stands tend to be overstocked and do not provide a good source of large wood for streams (Murphy and Koski, 1989). Forests older than 80 years old have the potential to provide large wood and are more likely functioning at a full potential to provide shade to streams. 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).

**Aquatic & Riparian Habitat**

The primary lifecycle requirements for salmonids are cool water temperatures, hiding cover, clean spawning gravels, rearing pools, and an adequate food supply. Fish production is largely determined by habitat quantity and quality (Meehan, 1991). Aquatic habitat complexity (amount of wood, pools, fine sediment levels, and gravels quantities) in the project area is generally low and undesirable for optimal fish production (Meehan, 1991).

Riparian habitat surveys were completed on all fish-bearing streams on BLM land within the analysis area except Grizzly Creek (North), which does not flow through BLM land. Presence/absence surveys indicate that aquatic habitat conditions on Grizzly Creek (North) are similar to other streams within the analysis area. Stream surveys rated the aquatic habitat based on large wood, stream substrate composition, and shade.

Large wood provides cover for fish, forms pools, stabilizes channels, and traps and sorts fine sediment (Meehan, 1991). Reductions in large wood available for in-stream recruitment, through past wood removal and riparian timber harvest, have led to channel simplification and reduced cover for fish. The effect of this throughout the Pacific Northwest is declining fish production (Meehan, 1991). Riparian surveys measured amounts of large wood in all fish streams in the analysis area. Fifty or more pieces of wood per mile is the desired condition and less than 17 pieces/mile is considered low (Moore, 1997). All surveyed streams in the project area lacking large wood. Soda Creek has the highest level with seven pieces/mile which is well below desired levels. All other streams are below six pieces per mile. The lack of large wood is a major contributing factor to the poor habitat rating for all streams in the analysis area and this deficiency has resulted in few pools existing in most streams.

Stream substrate composition also contributes to the stream functioning condition rating in the riparian survey protocol. Clean gravel is important for spawning fish. When high, fine sediment levels occur in spawning gravels, less spawning occurs, eggs can be suffocated, and emerging fry become trapped, resulting in reduced production (Philips et al. 1975; Tappel and Bjornn 1983; Chapman 1988; Meehan, 1991). Hausle and Coble (1976) reviewed studies on salmonid fry emergence in gravels with concentrations of sediment exceeding twenty percent. When concentrations of sand were greater than twenty percent in spawning beds, emergence success declined. Stream substrate composition was determined on all fish-bearing streams in the analysis area. Sand and silt were the dominant substrates on all surveyed fish-bearing streams in the analysis area. Spawning gravel is low, both in volume and appropriate size, and pool frequency was low (BLM Riparian Surveys, USDI 2002; BLM Presence/Absence Surveys 2007). Hoxie Creek had the highest percentages of fine sediment, with ninety percent of the stream dominated by sand and silt. The high sediment levels observed in the riparian surveys are consistent with the BLM fish presence/absence survey habitat observations (2007). Existing levels of sediment likely reduce incubation and emergence success in most streams in the analysis area. Table 3-22 summarizes sediment levels in the analysis area.
<table>
<thead>
<tr>
<th>Stream</th>
<th>Sediment Levels (percent of substrate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swinning Creek</td>
<td>65-70%</td>
</tr>
<tr>
<td>Hoxie Creek</td>
<td>90%</td>
</tr>
<tr>
<td>Grizzly Creek (south)</td>
<td>60-65%</td>
</tr>
<tr>
<td>S.F. Canal</td>
<td>70-80%</td>
</tr>
<tr>
<td>Willow Creek</td>
<td>70-75%</td>
</tr>
<tr>
<td>Soda Creek</td>
<td>35-75%</td>
</tr>
<tr>
<td>Unnamed Tributary to Howard Prairie</td>
<td>75%</td>
</tr>
</tbody>
</table>

Source: USDI BLM riparian surveys 2002

Shade conditions range from moderate to poor with only Soda Creek having an excellent shade rating (USDI 2002). Past riparian harvest and streamside road construction have negatively influenced riparian shade conditions.

PFC ratings are a part of the Hydrology Survey protocol and ratings for fish-bearing streams within the analysis area are in Table 3-23.

<table>
<thead>
<tr>
<th>Stream</th>
<th>PFC Rating</th>
<th>Trend</th>
<th>Habitat Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soda Creek (above dam)</td>
<td>Functional at Risk</td>
<td>Downward</td>
<td>High sediment levels</td>
</tr>
<tr>
<td>Soda Creek (below dam)</td>
<td>Functional at Risk</td>
<td>Upward</td>
<td>High amount of active erosion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low amounts of Large Wood</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eroding banks</td>
</tr>
<tr>
<td>Willow Creek</td>
<td>Functional at Risk</td>
<td>Downward</td>
<td>High sediment levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low amounts of Large Wood</td>
</tr>
<tr>
<td>Swinning Creek</td>
<td>Functional at Risk</td>
<td>Downward</td>
<td>High sediment levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low amounts of spawning gravels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low amounts of Large Wood</td>
</tr>
<tr>
<td>Hoxie Creek</td>
<td>Functional at Risk</td>
<td>Downward</td>
<td>High sediment levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low Large Wood</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low shade levels</td>
</tr>
<tr>
<td>Grizzly Creek (South)</td>
<td>Nonfunctional</td>
<td>NA</td>
<td>High sediment levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low shade levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low Large Wood levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low amounts of spawning gravels</td>
</tr>
<tr>
<td>South Fork Canal</td>
<td>Functional at Risk</td>
<td>NA</td>
<td>High sediment levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low shade levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No Large Wood</td>
</tr>
<tr>
<td>Unnamed Tributary</td>
<td>Functional at Risk</td>
<td>NA</td>
<td>High sediment levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low shade levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low Large Wood</td>
</tr>
<tr>
<td>Grizzly Creek (North)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: USDA, BLM riparian surveys 2002.
All stream surveys within the analysis area were rated Functional at Risk except Grizzly Creek (South) which rates as Nonfunctional. Lack of large wood and high fine sediment levels are the main fish habitat deficiencies in the analysis area.

**Water Temperature**

High summer water temperatures affect sensitive fish and aquatic species (see water quality section). Optimum stream temperatures for salmonids are 55 to 60°F and temperatures over 84°F are considered lethal (Meehan, 1991). The absorption of solar radiation is the largest cause of increasing stream temperatures. Stream temperatures increase in response to timber harvest that removes shade trees in riparian areas (Beschta et al. 1987). Other factors, such as climate, stream size, elevation, and groundwater flows, riparian roads, and grazing also influence stream temperatures. Hoxie Creek and Grizzly creek are the only tributaries in the analysis area monitored for water temperature. Stream temperatures in Hoxie Creek exceed the Oregon Department of Environmental Quality water quality standard of 64.4°F for fish-bearing streams on most days from July to late August (1998) and reached 70.2°F as a high temperature. Grizzly Creek (south) exceeded the temperature standard 28 days when monitored (1999) and had a maximum temperature of 64°F (ODEQ, 2008). Temperature data does not exist for other tributaries in the analysis area and it is unknown whether they meet state water quality standards.

**Fish Passage and Aquatic Connectivity**

Fish connectivity is important to maintain a viable reproductive population and for access to food throughout the watershed. Fish naturally migrate to other drainages and maintain connectivity between fish populations in the watershed (Roni et al. 2002). It is common for fish to move within streams and between stream systems throughout the year (Kahler et al. 2001). Historic fish distribution in the upper Jenny Creek Watershed was most likely very different before the construction of four earthen dams that block the fish migration to the analysis area. Howard Prairie Reservoir contains the only dam within the analysis area. All of the dams affect fish distribution by blocking fish from moving upstream or downstream or in and out of the analysis area. As a result, fish connectivity is poor within the Jenny Creek Watershed and the analysis area.

Several smaller fish barriers exist within the analysis area. There are two known fish barriers on Soda Creek. A dam located on private land at river mile 1.3 creates a small pond which diverts water for irrigation. This dam is a potential barrier to rainbow/redband trout. A 28-inch metal culvert located at river mile 2.2 on BLM road 36-2E-26 completely blocks rainbow/redband trout. This barrier is located higher up in watershed close to the end of the natural distribution of redband trout. The second known barrier, an undersized culvert on Grizzly Creek, partially blocks rainbow/redband from upstream migration.

**Conclusion**

Stream channels in the analysis area are high in sediment and lack large wood. The major contributing factor to the high sediment in streams in the analysis area is most likely high road densities and the low flushing nature of the low gradient creeks. Low stream gradient allows sediment to accumulate in the absence of more extreme flushing events. Macroinvertebrate populations decrease in abundance and variety with increasing percentages of fine sediments (Mebane, 2003). Much of the historical fish and macroinvertebrate stream habitat in the analysis area is not suitable because it is now lake habitat (Howard Prairie Reservoir). Fish production is largely determined by habitat quantity and quality (Meehan, 1991). Low amounts of large wood and high sediment levels place the fish and macroinvertebrate production below its potential in the Jenny Creek Watershed and the analysis area.

The overall state of fish and aquatic habitat in the analysis area is in poor condition as shown in Table 3-24. Fish passage is poor because dams block the natural fish distribution patterns. Road densities are high and are a major contributor to high sediment levels in the creeks. Fish introductions put the native redband trout at risk and warm water fish are competing with the native fish.
Table 3-24. Analysis Criteria for Fish and Aquatic Habitat - Overall Condition

<table>
<thead>
<tr>
<th>Analysis Criteria</th>
<th>Condition</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat</td>
<td>Poor</td>
<td>High sediment levels, low amounts of large wood.</td>
</tr>
<tr>
<td>Aquatic Insects</td>
<td>Poor/Unknown</td>
<td>Much of the aquatic insect habitat in the analysis area has been converted to lake habitat; high sediment levels make for poor insect habitat.</td>
</tr>
<tr>
<td>Fish Passage</td>
<td>Poor</td>
<td>Dams block trout migration throughout the Jenny Creek watershed and the analysis area. Culverts blocking fish in analysis area.</td>
</tr>
<tr>
<td>Water Temperature</td>
<td>Unknown</td>
<td>Not enough information to draw conclusion. Hoxie and Grizzly Creeks are the only creeks with temperature data. Hoxie Creek and Grizzly Creek both have high summer temps.</td>
</tr>
<tr>
<td>Population</td>
<td>Poor</td>
<td>Hybridization puts the redband trout population at risk, much of the stream habitat in the analysis area has been converted to lake fishery.</td>
</tr>
<tr>
<td>Overall State of the Fishery</td>
<td>Poor</td>
<td>All known analysis criteria are poor.</td>
</tr>
</tbody>
</table>


**Foreseeable Future Actions**

The consideration of effects from reasonably foreseeable actions in the analysis of effects of the Plateau Thin Forest Management Project is described below.

**Private Timber Harvest**

Future timber harvest on private lands would likely occur within the watershed. Timber harvest on private lands is governed by state forestry regulations and, as such, receive a different level of protection than Federal lands. This EA is tiered to the analysis completed for the RMP. The PRMP (page 4-5) used the assumption that private lands would be harvested on a 60-year commercial rotation (i.e., all suitable forested lands would be logged at approximately 60-year tree-growing rotations). This analysis assumes all suitable private lands will be harvested in the future and the amount of disturbance to aquatic systems as a result of this harvest will continue at similar to present rates, contributing to degraded aquatic habitats.

**Livestock Use**

The analysis area encompasses portions of three grazing allotments (Keene Creek, Deadwood, and Howard Prairie); the Keene Creek Allotment covering the majority of the analysis area was recently voluntarily relinquished (no future grazing authorized). The Keene Creek Allotment is showing no instances of decline in composition by riparian shrubs or rushes and sedges (Hosten and Whitridge 2007). However, conditions recorded at the time of aquatic mollusk surveys described cattle grazing as a negative anthropogenic influence on lotic environments with heavy to severe impacts at 58 percent of the survey sites (Frest and Johannes 2005). Increases in fine sediment occur where cows have direct access to streams. Fine sediment increases negatively impact Jenny Creek suckers, Jenny Creek redband trout, and other aquatic organisms in this system that has existing high levels of fine sediment and a limited capacity to move sediment naturally.

**Other Federal Harvest**

The BLM’s Klamath Falls Resource Area is planning the Cold Onion Timber Sale in the lower portion of the Jenny Creek watershed. The Cold Onion Timber Sale is located over 7 miles downstream and would not contribute affects to the Plateau Thin Analysis Area.

The Reclamation proposed forest management on Reclamation lands surrounding Howard Prairie Reservoir using similar forest management prescriptions, although the project is currently deferred.
2. Environmental Consequences

a. Alternative 1 - No Action

Alternative 1 describes the anticipated effects of not implementing the proposed action at this time. Long term sediment increases could occur under this alternative as no BLM road maintenance would occur. Sediment input from high road densities and road stream crossings would remain the same. Shade would improve on BLM land as riparian buffers recover from past harvest; however, shade trees would continue to be harvested from riparian areas on private land. Actions on private land including riparian harvest, road construction, and use of natural surface roads would negatively impact shade, peak flows (see soils, hydrology sections) and sediment in the analysis area. Water withdrawals would continue to limit the amount of water available to aquatic organisms. Grazing on private and BLM land would continue to alter stream banks, contributing sediment to the system. Under Alternative 1, water quality and quantity would continue to negatively affect aquatic organisms in the project area.

Under this alternative, the risk of large scale, high intensity fire in the project area would increase (see Fire/Fuels management section) because no action would be taken to reduce fuel loading. Nearly a century of fire exclusion has occurred in the analysis area and consequently, fuel loading is greater than would naturally occur. Consequently, an uncontrolled fire could be of such intensity to reduce the quality of aquatic habitat by severely increasing erosion (see soils section). Furthermore, a high intensity fire could potentially reduce shade by increasing the likelihood of fire carrying into riparian areas at high intensities. This could reduce water quality by killing shade trees, thus increasing water temperatures.

Thirty-five percent (35%) of the Riparian Reserves are in young to mid seral conditions in the analysis area as result of past timber harvest in riparian areas. Since the designation of Riparian Reserves in 1994, riparian areas on BLM-administered lands are no longer managed for timber production. These areas are able to recover and eventually reach mature seral conditions. Most private timber land has been cut in the past, including riparian areas. This has contributed to the existing high sediment levels in streams and the lack of large wood in streams. It is expected harvest would occur on private industrial timber land to some extent in the foreseeable future.

It is expected that existing roads on private and BLM-administered lands (not all problem roads are identified) would continue to erode, causing sedimentation of adjacent streams in the foreseeable future. Foregoing road decommissioning, road maintenance or renovation opportunities would maintain this condition on BLM lands. This would have a negative effect on fisheries and aquatic resources through potential increases in stream sediment levels. This is also dependent upon private activities and associated use and maintenance of the transportation system in the watershed. The adverse effects from the continued sedimentation of streams would continue to negatively affect spawning rates, egg and early fry survival, and rearing and feeding behaviors of fish in these streams.

By not completing the hazardous fuels reductions, areas would remain at a higher risk of high intensity fires. Alternative 1 would maintain the current risk of high intensity fires, which would contribute to the likelihood that riparian areas would burn if a large fire occurred in the analysis area. Loss of vegetation in riparian areas would further delay attaining late-successional riparian stand characteristics. Since many Riparian Reserves are already young and overstocked, a fire in Riparian Reserves would further delay the time it would take for these areas to reach mature conditions. This would be a detriment to fish, aquatic habitat, and Riparian Reserves.

b. Alternative 2 (Proposed Action)

The proposed Plateau Thin Forest Management Project activities to be analyzed are timber harvest, log yarding, log hauling, temporary road construction, landing construction, and road maintenance. Analysis of the Proposed Action considered the following:
• No harvesting, yarding, landing construction/use or post-harvest slash treatment would occur in Riparian Reserves and no avenues exist for sediment to enter streams. Riparian buffers have been shown to protect aquatic ecosystems during timber harvest activities because they maintain shade levels, large wood recruitment, and protect aquatic habitat (Hall and Lantz 1969, Newbold et al. 1980, Murphy et al. 1986, Meehan 1991).

• During dry season haul, dust abatement would be used to reduce the amount of dust created by haul and vegetation between the roads and streams acts as a filter, trapping airborne dust particles before they reach the stream. It is highly unlikely winter hauling would produce sediment in streams because sediment would not be exposed when at least 4 inches of snow is on the ground.

**Timber Harvest, Yarding, and Post-Harvest Slash Treatment**

Commercial and non-commercial timber harvest activities would not directly affect aquatic habitat. No felling, tractor or cable yarding, or other timber treatments would occur in Riparian Reserves; hence there is no mechanism for disturbed soils to enter stream channels and no potential for reduced shade or increased stream temperatures. Project Design Features (see Chapter 2, Project Design Features) for felling, tractor, and cable yarding operations would minimize the potential for sediment transport into dry draws (potential mechanisms for sediment delivery).

This project is not in the rain-on-snow zone so timber harvest is not anticipated to affect peak flows (see Water Resources); no adverse channel modifications are expected as a result of harvest activities. Although compaction within the analysis area would remain high (15%), peak stream flows are not expected to be affected by soil compaction resulting from this project because: 1) the increases are very slight (< 1 percent in each unit) because tractor yarding would be restricted to existing skid trails where they occur; 2) no connectivity between harvest units and stream channels; and 3) project design features would limit soil disturbance (see Chapter 2 Project Design Features).

**Timber Hauling**

The main haul roads for this project would be the Keno Access, Howard Prairie, and Willow Creek Roads. Dead Indian Memorial Highway and Highway 66 allow access to Highway 140 or Interstate 5 respectively. Approximately 26.5 miles of roads in the analysis area may potentially be used as haul routes. Timber hauling would occur on 9.0 miles of gravel, 13.1 miles of natural surface, and 4.4 miles of paved road surfaces.

All timber hauling would occur in the dry season or when at least 4 inches of packed/frozen snow is present on roads. Log hauling would be restricted when precipitation would cause runoff from roads into ditch lines. Roads used as haul routes during the dry season have the potential to directly transport airborne particulates to stream channels. Repeated use of the roads during dry conditions would create dust (sediment) that may settle into the channels. Non-paved roads located adjacent to or crossing stream channels may contribute small amounts of dust to streams if used during dry conditions. Timber hauling would use two non paved stream crossings where fish are present: Grizzly Creek (Road #38-4E-32) and Willow Creek (Road #39-4E-1), located upstream of fish habitat. In the short term, this could contribute to a slight increase in sediment, although any increases would likely not be measurable above background levels. The potential for any sediment particles to enter the stream channel would be greatly diminished by following standard PDFs, which include dust abatement. Winter hauling would not likely result in producing sediment to streams because winter hauling would only occur when at least 4 inches of packed/frozen snow covers the road and sediment would not be exposed. Timber hauling would not contribute to maintaining the habitat analysis criteria (sediment) in poor condition as described in Table 3-24, Analysis Criteria for Fish and Aquatic Habitat - Overall Condition, under the affected environment section.

**Temporary Road Construction**

To facilitate timber harvest operations, 0.7 mile of temporary roads would be constructed. These roads would be constructed on flat surface topographic benches and would not cross any intermittent or perennial streams. The temporary roads would be located in drainage basins of two intermittent streams.
that eventually flow into Howard Prairie Lake. One segment (A - 0.3 miles) would be located off spur road 38-3E-3.6 in the southwest corner of the section and crosses one dry draw. Another segment (B - 0.2 miles) would be located off the Keno Access Road in the southeast corner of the same section. The third segment (C – 0.2 miles) is an existing old road located in T. 38 S., R 4 E, in section 17. Segments B and C would not cross any channels or dry draws and would not affect aquatic habitat in any manner. The distance of the temporary roads from water bodies is summarized in Table 3-25.

Table 3-25. Proximity of Temporary Roads to Streams

<table>
<thead>
<tr>
<th>Road Segment</th>
<th>Length</th>
<th>Distance from Water Body</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Dry Draw</td>
</tr>
<tr>
<td>A</td>
<td>0.3 miles</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>0.2 miles</td>
<td>800 feet</td>
</tr>
<tr>
<td>C</td>
<td>0.2 miles</td>
<td>660</td>
</tr>
</tbody>
</table>

Road segment A would not cross any defined channels, but would cross one dry draw that turns into an intermittent stream approximately 1,250 feet downstream of the crossing. The channel would not have enough flow to transport sediment (see Water Resources section). Also, woody material is present in the draw below the crossings, and would sufficiently trap any sediment that moves off of the road and into the dry draw. There is small potential that during a flood event, routed water and transported fine sediment from road segment A could enter the dry draw. It is expected that sediment generated by temporary road construction would not reach intermittent streams because dense vegetation exists between the roads and the streams to filter sediment. No direct or indirect effects to fish or aquatic habitat would occur as a result of temporary road construction. All temporary roads would be blocked, water barred, seeded, and mulched the same season as used. Temporary road construction and closure would only occur during the dry season. By following the required Project Design Features (Chapter 2), fish and aquatic habitat would remain unaffected from temporary road construction in the analysis area.

**Road Maintenance**

It is highly unlikely sediment from road maintenance activities would reach fish-bearing streams because the nearest road work would be 0.3 miles from fish-bearing streams. Rock surfacing would reduce the amount of soil moving off the road surfaces, resulting in less sediment entering streams. Adding water dips would further disperse road runoff and decrease the rapid, concentrated routing of water to streams during storm events. This would help to reduce the amount of sediment delivered to streams connected to the road network. The rock surfacing and drainage improvements would help to minimize the sediment input from roads. However, due to high road densities in the area, any long-term reduction in sediment levels in streams would be small and immeasurable. In the long-term, road maintenance would not contribute to any measurable change in the habitat analysis criteria (sediment), nor would it contribute to maintaining the habitat analysis criteria in poor condition as described in Table 3-24, Analysis Criteria for Fish and Aquatic Habitat - Overall Condition, under the affected environment section.

**Landings**

Landing construction would not occur in Riparian Reserves. Landing construction or expansion would not occur during the wet season (October 15th to June 15th) when the potential for soil erosion and water quality degradation exists. Each new landing would disturb about 0.5 acre. New soil disturbance from landing construction/expansion stabilized prior to fall rains. Erosion from the proposed new landings would be very minimal due to their position on the landscape and application of Project Design Features to address erosion control; sediment would not reach streams or aquatic habitat because there is no causal mechanism for sediment transport. Expanding and constructing of landings would not affect fisheries resources because all proposed sites are located on gentle slopes, ridges, or are already existing landings.
**Fuels Treatments**
Prescribed burning planned under this alternative would be in the form of handpile burning or broadcast burning. Broadcast burning would be an under burn and the intensity of the burn would be light to moderate and would have slight direct short term effect on erosion (See soils section). Fuels treatments would leave riparian buffers and would involve minimal ground disturbance. Check lines (fire line dug in order to stop the fire) would be waterbarred and rehabilitated where needed to prevent erosion and sedimentation to streams after ignition operations are completed. Canopy cover would not be reduced by treatments, nor would ground compaction increase; hence, peak flows would not be affected. For these reasons, fuels treatments are not expected to impact fisheries resources.

All timber harvest, post harvest slash treatment, yarding, temporary spur road construction, and landing development would occur outside of Riparian Reserves. There is no causal mechanism by which sediment from these activities would reach streams; therefore, the Plateau Thin Forest Management Project would not contribute to adverse cumulative effects to fish, aquatic habitat, or riparian resources.

Sediment generated from the proposed road maintenance and log hauling is expected to be an inconsequential amount. An inconsequential increase in fine sediment would have no cumulative affects to fish or aquatic habitat in the short term. Reduced sedimentation as a result of the proposed road maintenance would not be meaningful in terms of the overall elevated sediment levels throughout the project area. The overall high sediment levels would persist and the benefits to fish and aquatic habitat would be minor.

The fuels treatments would reduce the risk of a large-scale fire impacting riparian habitat; a beneficial effect to fish, aquatic habitat, and riparian resources.

**Environmental Consequences Fish and Aquatics Conclusions**
Proposed Timber Harvest, Yarding, Hauling, Post-Harvest Slash Treatment, Temporary Road Construction, or Road Maintenance would not result in changes in overall conditions documented under Fish and Aquatics Analysis Criteria in the affected environment section (see Table 3-24). Although habitat, aquatic insects, connectivity, water quality, and the overall fish population analysis criteria would remain in poor condition/unknown condition, based on analysis conducted under Water Resources and Fisheries and Aquatic Habitat, the Plateau Thin Project would not contribute to the degraded conditions documented for the analysis area.

**G. CONSISTANCY WITH AQUATIC CONSERVATION STRATEGY**

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. How the four components of ACS relate to the Plateau Thin 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 ACS and are listed in the PDFs for the Plateau Thin Forest Management Project.

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 Jenny Creek 5th field watershed is a Tier 1 Key Watershed.

3. **Watershed Analysis:** BLM completed the Jenny Creek Watershed Analysis in 1995.

4. **Watershed Restoration:** There are no plans for watershed restoration with this project or any other project planned in the future.
Evaluation of this Action’s Consistency with ACS Objectives

Objective 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 Jenny Creek watershed. One of the results of forest treatments would be to restore more fire resilient species within project treatment units. This would be noticeable at the site level and drainage level, but would have only a minor benefit at the watershed scale, as less than one percent of the Jenny Creek watershed would be treated.

Objective 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.

The proposed Plateau Thin Project would not affect spatial and temporal connectivity within the Jenny Creek Watershed or the analysis area. One culvert replacement would occur on an intermittent, non-fish bearing stream. Connectivity for aquatic and riparian dependent species would be maintained within the analysis area.

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

In the long-term, rock surfacing would reduce the amount of soil moving off the road surface, resulting in less sediment entering streams. Adding water dips would further disperse road runoff and decrease the rapid, concentrated routing of water to streams during storm events. This would help to reduce the amount of sediment delivered to streams connected to the road network. The rock surfacing and drainage improvements would help to minimize the sediment input from roads. These benefits would only be noticeable at the site, as the road work would only be completed in headwater reaches far from the main drainage channels, hence undetectable the drainage and watershed scale.

Objective 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 the project would not remove shade producing vegetation along any stream channels. Short term, there would likely be some amount of fine sediment entering stream channels in the vicinity of the road maintenance activities and haul routes. 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. In the long term, the riparian road maintenance would reduce fine sediment inputs to channels to below what is currently occurring. Any sediment increases resulting from the proposed timber sale activities would be minor relative to existing sediment levels and would be offset by the sediment decrease resulting from road maintenance activities. This would ultimately benefit aquatic systems at both the site and drainage scales. The beneficial effects of these actions would be unnoticeable at the large spatial scale of the Jenny Creek Watershed, due to continuing water quality problems from historical and present-day activities.
Objective 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.

Any sediment increases resulting from the proposed activities would be minor relative to existing sediment levels and would be offset by the sediment decrease resulting from road maintenance activities. This would ultimately benefit aquatic systems at the site level. The beneficial effects of these actions would be unnoticeable at the large spatial scale of the Jenny Creek Watershed, due to continuing water quality problems from historical and present-day activities.

Objective 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 Plateau Thin Project. Please see the Water Resources section above for details. Any effects on ground water availability from the project would be too insignificant to be noticeable at the site, much less the drainage or watershed scale. Water withdrawals for agriculture use are having the most substantial impacts on instream flows throughout the watershed.

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

Vegetation within riparian reserves would not be treated, therefore, any additional water released would likely be used by these trees and riparian vegetation along channels. It is very unlikely that the few riparian meadows and wet areas would experience any restoration of water table inundation. Any extra water in the soil would be used by the trees and shrubs within riparian reserves and would not be measurable in the adjacent streams. At the drainage and watershed scales, the adverse impacts from over a century of road network development, agricultural irrigation, and settlement in the floodplains dwarfs any impacts from this project.

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

The Riparian Reserves as a whole have been reduced from expected historic conditions (greater percentage of mature conifers), and are likely not functioning at their full potential to provide shade to stream channels. As more Riparian Reserves mature over time, 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. In the short term, riparian conditions would be maintained. In the long term riparian areas would improve throughout the analysis area because reserves are no longer managed for timber production. As a result, the younger stands are recovering and eventually will provide a good supply of large wood and increased shade levels. Full recovery of Riparian Reserves would likely take 80 to 120 years.

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

Site level benefits to aquatic and riparian habitat would, at a minimum, maintain populations of native plant, invertebrate, and vertebrate dependent species at particular sites. The amount of habitat affected at the project scale would likely not be measureable at the watershed scale as other past and ongoing landuses continue to contribute to watershed degradation.
H. BOTANY

1. Affected Environment

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 do not contribute to the need for the species to become listed.

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 July 2007 ROD and to include species additions and deletions from the application of the most recent scientific data. This list was finalized with the February 6, 2008 Instruction Memorandum No. OR-2008-038.

Of the four federal endangered (Arabis macdonaldiana, Fritillaria gentneri, Limnanthes floccosa ssp. grandiflora, Lomatium cookii) and one candidate (Calochortus persistens) plants on the Medford District, the Plateau Thin Project Area is within the range of none. No occurrences of listed or candidate plants have been found within the project area. Any sites of listed or candidate plants found outside their defined range would have been reported.

Surveys for all species, except fungi, on the Medford District SSP list were conducted from 2006 through 2008. These surveys also included all 2001 Record of Decision Survey & Manage Category A and C (where pre-disturbance surveys are required) species plus amendments made by the Annual Species Reviews. Surveys were conducted using the intuitive controlled survey method (see definitions). These surveys found no occurrences of either the 2007 Bureau SSP listed species or the 2001 S&M plus ASR listed species within or adjacent to the proposed treatment areas.

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). Surveys for Survey and Manage species not specifically searched for in 2006 to 2008 are being conducted currently for the project area.

Of the 20 species of fungi that are on the Medford District SSP list, 19 are Survey and Manage (S&M) Category B species whose status determined that pre-disturbance surveys were impractical and not required, see Table 3-26. One species of the 20 fungi is not a former S&M species but is a hypogeous (underground) fungus, as are other of the previously referenced fungi where pre-disturbance surveys were impractical. Oregon State Office Information Bulletin No. OR-2004-145 reaffirmed that these surveys were impractical and further stated that Bureau policy (Manual Section 6840) would be met by known site protection and large-scale inventory work (strategic surveys) through fiscal year 2004.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>S&amp;M</th>
<th>ORNHIC Rank</th>
<th>ORNHIC List</th>
<th>NWFP Sites</th>
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<td>G2?/S1</td>
<td>1</td>
<td>5</td>
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<tr>
<td>Otidea smithii</td>
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<td>10</td>
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<td>B</td>
<td>G2?/S2?</td>
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Table 3-26. Sensitive Fungi with Suitable Habitat within the Plateau Thin Project Area

Plateau Thin Project 3-77 Environmental Assessment
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>S&amp;M</th>
<th>ORNHIC Rank</th>
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<th>NWFP Sites</th>
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<td>G3/S3?</td>
<td>3</td>
<td>47</td>
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<tr>
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<td>B</td>
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</tbody>
</table>

S&M = Survey and Manage Category  
ORNHIC = Oregon Natural Heritage Information Center  
G = Global Rank  
S = State Rank

**Rank Definitions:**
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.  
U = Unknown rank.

**List Definitions:**
1 = taxa which are endangered or threatened throughout their range or which are presumed extinct  
2 = taxa which are threatened, endangered or possibly extirpated form 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.

### a. Sensitive Fungi with Suitable Habitat within Project Area

**Boletus pulcherrimus** is the red-pored bolete mushroom. It is listed as endemic to the Pacific Northwest, including northern California, but has also been reported from New Mexico. In the range of the NFP, there are 44 known sites. Within the boundary of the Medford District, four sites are on BLM in the vicinity of Hyatt and Howard Prairie Lakes, one is on the Rogue River National Forest, and one is on private land near Shale City. One other Rogue River National Forest site and six Winema National Forest sites border the Medford District. All four Medford District sites are located in the Jenny Creek fifth field watershed with one of these located within the project area but not in or adjacent to a proposed treatment unit. NFP habitat data is available for only the Medford and Winema sites. Plant community data shows this species occurs on White fir/Douglas-fir early mature forests, Douglas-fir/White fir/Ponderosa pine young forest, White fir/chinquapin communities, and Shasta red fir/chinquapin communities. Elevation ranges from 4,620 to 5,640 feet. Habitat data for other NFP sites is in humus in association with roots of mixed conifers (Grand fir, Douglas-fir) and hardwoods (tanoak) in coastal forests. It is also associated with bigleaf maple, and vine maple. The species is a mycorrhizal fungus dependent on the health of its symbiotic partnership with mixed conifers.

**Dermocybe humboldtensis** is a green-brown cap mushroom with olive-yellow gills. It is endemic to California and Oregon. In the range of the NFP, there are four known sites. The nearest two sites occur on the BLM Roseburg District approximately 69.0 air miles away from the project area. Habitat data for the Roseburg sites is incomplete; community type is listed as Ponderosa Pine-Douglas-fir for one site. Other NFP habitat data lists suitable community types as coastal dune Redwood/Douglas-fir and Redwood/Sitka spruce. The species is an ectomycorrhizal fungus dependent on the health of its symbiotic partnership with species in the genus Pinus. It is also associated with Douglas-fir and Ponderosa pine.
**Gastroboletus vividus** is a bright yellow and red bolete mushroom that is formed beneath the soil surface. It is endemic to California and Oregon. In the range of the NFP, there are five known sites; one site occurs on the Rogue River National Forest. Nearest site to the project area is in the Applegate Ranger District and is approximately 26.4 air miles away. Habitat data reports an association with various Pinaceae, particularly red fir and mountain hemlock.

**Gomphus kauffmanii** is a tan-colored false chanterelle. It is endemic to western North America being found in Oregon, Washington, California, Idaho, and British Columbia. In the range of the NFP, there are 72 known sites with four sites occurring on the Medford District. The site nearest to the project area is 19.8 air miles away in the vicinity of Bald Mountain, south of Talent, Oregon. This site is in a young conifer plantation stocked with Douglas-fir and white fir. The species is an ectomycorrhizal fungus dependent on the health of its symbiotic partner, presumed to be Abies or Tsuga. It is also associated with Pacific silver fir, subalpine fir, Shasta red fir, Noble fir, lodgepole pine, Douglas fir, Pacific yew, western red cedar, western hemlock, mountain hemlock, Pacific dogwood, oak species, vine maple, chinquapin, salal, and huckleberry.

**Gymnomyces fragrans** is a pale cinnamon brown false truffle. It is known from only six collections in Oregon, California, and Idaho. In the range of the NFP, there are two known sites with one site occurring within the boundary of the Medford District on Forest Service land. The site nearest to the project area is 26.2 air miles away on Rogue River-Siskiyou National Forest land in the vicinity of Dutchman Peak. The species is a mycorrhizal fungus dependent on the health of its symbiotic partnership with Douglas-fir and mountain hemlock, especially of middle elevation Douglas-fir forests.

**Helvella crassitunicata** is often found in moderately high elevations in the true fir and mountain hemlock zones, and in drier or at least well-drained sites. This species seems to tolerate mild disturbance such as well-established hiking paths but not large-scale disturbance such as logging, mining, and construction. There are 28 sites in the range of the NFP with the nearest known site documented south of Williams, Oregon in Josephine County on BLM land 41.8 air miles away. This Josephine County site is located under a Quercus kelloggi

**Leucogaster citrinus** is a pale to dark yellow false truffle. It is endemic to the Pacific Northwest. In the range of the NFP, there are 46 known sites with one site occurring on the Medford District. The site nearest to the project area is 3.3 air miles away in the vicinity of the Dead Indian Summit. This site is in a white fir forest with western white pine. The species is a mycorrhizal fungus dependent on the health of its symbiotic partnership with white fir, subalpine fir, lodgepole pine, western white pine, Douglas-fir, and western hemlock and seems to be abundant in lower elevation Douglas-fir forests. Other associated trees and woody species include Pacific silver fir, grand fir, mountain hemlock, tanoak, California laurel, vine maple, pinemat manzanita, Oregon grape, salal, rhododendron, salmonberry, and huckleberry.

**Otidea smithii** is a deep purple brown cup fungus. It is known from Washington, Oregon, and northern California with some reports from Idaho and British Columbia. In the range of the NFP, there are ten known sites with one site occurring within the Medford District boundary but on Forest Service land. The site nearest the project area is 36.2 air miles away on Rogue River-Siskiyou National Forest land in the vicinity of Applegate Lake. This site is in a Ponderosa pine-Douglas-fir association with poison oak and mountain hemlock, tanoak, California laurel, vine maple, pinemat manzanita, Oregon grape, salal, rhododendron, salmonberry, and huckleberry.

**Phaeocollybia californica** is an orange-brown gilled mushroom with a long pseudorhiza. It is endemic to the Pacific Northwest. In the range of the NFP, there are 38 known sites. There are two sites occurring
within the Medford District boundary. The site nearest the project area is approximately 53.5 air miles away in the vicinity of Wilderville. The plant association at this site is Douglas-fir—California black oak/poison oak. NFP habitat data shows this species is associated with Douglas-fir, western hemlock, and tanoak communities. Other habitat data reports additional associations with Pacific silver fir, Sitka spruce and redwood.

*Phaeocollybia olivacea* is a dark olive, glutinous, gilled mushroom with a long pseudorhiza. It is endemic to Washington, Oregon, and northern California. There are 110 known sites in the NFP area and an additional four sites outside the NFP area. Nine sites are within the Medford District boundary with the site nearest the project area being approximately 46.6 air miles away in the vicinity of Grants Pass. Medford District habitat data shows an association with Douglas-fir and Port Orford cedar. Other habitat data reports additional associations with western hemlock, redwood, Sitka spruce, tanoak, white fir, and mixed conifer forests with Fagaceae and Pinaceae. Elevation ranges from sea level to 3,060 feet.

*Phaeocollybia oregonensis* is a gray-brown, glutinous, gilled mushroom with a long pseudorhiza. In the range of the NFP, it is known only from 13 sites in Oregon. The site nearest the project area is approximately 87.7 air miles away on the BLM Coos Bay District. Habitat data reports an association with Douglas-fir, western hemlock, and pacific silver fir. It has been reported from late successional forests but has also been reported from a 30 year old Douglas-fir plantation. Elevation ranges from 550 to 4,056 feet.

*Phaeocollybia pseudofestiva* is a dark to olive green, glutinous, gilled mushroom with a long pseudorhiza. It is endemic to western North America occurring in British Columbia, Washington, Oregon, and northern California. There are 47 sites in the GeoBOB database. Four sites are within the Medford District boundary with the site nearest the project area being approximately 47.0 air miles away in the vicinity of Grants Pass. Medford District habitat data for one site near Lake Selmac has the site located in a Tanoak-Douglas-fir-Canyon live oak forest. The other two Medford District sites are also valley bottom sites, Blue gulch which is west of Grants Pass and Reeves creek north of Kerby. Other habitat data reports a mycorrhizal association with species of Pinaceae, mixed conifers and hardwoods.

*Pseudorhizina californica* is an olive-brown to grey-brown false morel. It is endemic to western North America occurring in British Columbia, Washington, Oregon, California, Idaho, western Montana, and western Wyoming. There are 42 sites in the GeoBOB database. There are two known sites occurring within the Medford District boundary but on Forest Service land. The site nearest the project area is 8.4 air miles away on Winema National Forest land in the vicinity of Buck Lake in Klamath County. This fungus is found fruiting on or adjacent to well-rotted stumps or logs of coniferous trees or on soil rich in brown rotted wood.

*Ramaria largentii* is a pale orange to deep orange coral mushroom. It is endemic to the Pacific Northwest (Washington, Oregon, and northern California). There are 20 known sites in the GeoBOB database. Two sites are on the Medford District. One site is located in the project area but its exact location of the identified fruiting body needs to be verified. However, it is generally recognized that the fruiting body is a small but visible part of the fungus individual or population. It was discovered and mapped in 1998 by a regional survey team in T38S R3E Section 23. This is an ectomycorrhizal species that depends on forest components of Douglas-fir, western hemlock, western white pine, or true firs. This species has been found in young to mature Douglas-fir forests.

*Ramaria spinulosa* var. *diminutiva* is a brown coral fungus known from only one site in the range of the NFP. It is also known from Europe. The single Oregon site is on the BLM Roseburg District in a late successional Douglas-fir forest at 1,200 feet elevation. This site is approximately 67.5 air miles from the project area and is southeast of Roseburg. Other habitat data reports an association with species in the Pinaceae family.

*Rhizopogon chamaleontinus* is a white globose underground truffle fungus. It is known from one site in the range of the NFP but is also known from Idaho. The single NFP site is within the Medford District.
boundary but mapped on Oregon Department of Forestry land near Galice. The site is approximately 62.5 air miles from the project area. Habitat data for this site is Douglas-fir forest at 3300 feet elevation.

*Rhizopogon clavitisporus* is an underground truffle fungus with little published information. The Oregon Natural Heritage Information Center tracks three sites within the range of the NFP. There is also one known site in Idaho. The ecology and biology of this species is unknown and requires further research. One site is within the boundary of the Medford District and is closest to the project area being 33.0 air miles away in the vicinity of McKee Bridge. The habitat at this site is Douglas-fir and Ponderosa pine forest. Other habitat data includes forests of Douglas-fir, lodgepole pine, Englemann spruce, and subalpine spruce. This species is an ectomycorrhizal fungus dependent on the health of its presumed symbiotic partnership with members of the Pinaceae family.

*Rhizopogon ellipsosporus* is a brown subglobose underground truffle fungus. It is known from only five sites in the NFP area; four within the Medford District boundary (two on Forest Service and two on BLM) and one in the northern Oregon Cascades. The nearest site is approximately 35.4 air miles from the project area near Cantrall-Buckley Park. Habitat data lists an association with Douglas-fir and Sugar Pine.

*Rhizopogon exiguus* is a white mottled globose underground truffle fungus. It is endemic to Oregon with only three sites known in the NFP area. The nearest site is within the boundary of the Medford District but located on Siskiyou National Forest land. It is approximately 54.8 miles away in the vicinity of Waters Creek near Wonder, Oregon. The elevation of this site is 2800 feet. Habitat data lists an association with Douglas-fir and western hemlock.

*Sowerbyella rhenana* is a bright orange to yellow-orange stalked cup fungus. It is known from 64 sites in Washington, Oregon, and California. It is also found in Europe and Japan. There are 13 sites on the BLM Medford District. The site nearest the project area is 8.9 air miles away in the vicinity of Chimney Rock. The forest type is mixed conifer-hardwood with the dominant species of Ponderosa pine and Douglas-fir. The understory and forb layer is sparse. It is 10 meters from the edge of an oak-chaparral forest type. The elevation of this site is 2900 feet. The general habitat description is moist, relatively undisturbed, older conifer forests.

2. ENVIRONMENTAL CONSEQUENCES

a. Alternative 1 - No Action

*Special Status & Survey and Manage Plants, Sensitive Fungi*

No Special Status or Survey and Manage Plant, Lichen, or Fungus sites are known from any proposed unit, however, without vegetation treatment, potentially occupied suitable habitat conditions would continue to decline due mainly to fire suppression. Plant communities would continue to become overly dense, decadent thickets with increased competition for resources. Because of the unnaturally high fuel loading and structure, fire risk and fire hazard would remain high. A resulting intense fire would destroy the forest habitat and preclude its use by the seeds and spores of rare botanical species.

The potential remains, in some areas, for a stand replacement fire that would produce early seral habitat conditions that are favorable for weed invasion. While a few rare plants can be found in disturbed habitats, such as burned areas, they are also found in natural habitats, such as forest openings or woodlands. In these disturbed habitats, competition for resources from noxious weeds and invasive nonnative plants would normally preclude rare plant survival.

In the watershed, natural plant communities, including rare plant habitat, would continue to degrade due largely to private land use and condition. Suitable habitat would continue to be lost due to conversion of land for human uses, e.g. home sites, farming (including tree plantations), ranching, industrial, etc. Converted land is often cleared of trees and shrubs, the soil tilled, compacted, or covered with asphalt or concrete, buildings erected, and nonnative species planted or sown. These human uses are generally
exclusive of a healthy properly functioning ecosystem.

b. Alternative 2 (Proposed Action)

**Special Status & Survey and Manage Plants, Sensitive Fungi**

Since there are no known sites of Special Status Plants, Lichens, or Fungi, there would be no direct effects to these species. However, proposed vegetation treatments would produce slightly more soil disturbance and compaction because of harvest method (tractor and harvester-forwarder). Previous harvest entries result in degraded baseline site conditions. Soil conditions for all native plants and fungi, including rare, would be slightly degraded while conditions favoring noxious weeds and introduced plants would improve.

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, we have no information that would cause us to find that the proposed action would have any effect on any of these 20 species.

One site of the Sensitive fungus, *Ramaria largentii*, has a general mapped location of a discovered fruiting body in T38S R3E Section 23. Neither the exact location of the fruiting body nor the boundary of the individual or population is known. This site does not meet the definition of a known site (see definitions), however, it is recognized that a mapped location of a fruiting body cannot describe the aerial extent of the population; the actual size of the population may be quite large. Removal or damage of *Ramaria largentii*’s host trees (Douglas-fir, western hemlock, western white pine, and true firs), altering current habitat and micro-climate conditions, and ground based logging systems may be harmful to the survival of the population. Treating an occupied stand to minimize loss of host trees due to diseases could be beneficial to the population’s persistence. In Section 23, 172 acres (27%) of 640 acres is in proposed units. The prescription acres are 86 acres in Mixed Conifer, 39 acres in White Fir Site, 28 acres in Group Selection Disease Control, and 19 acres in Regeneration Harvest).

Vegetation composition and structure conditions for all native plants and fungi, including rare, would improve, except for areas of Regeneration Harvest. The vegetation condition would resemble historic stand conditions prior to timber harvest and fire suppression. The small, scattered areas of Regeneration Harvest (110 acres, 5.2% of treated land) would mimic patches of intense fire in a natural wildfire, albeit, in a watershed heavily cut by private land owners.

The treatment of logging slash and pre-commercial material would reduce the risk of an intense wildfire. Disturbance by fire would open areas to weed establishment. Pile burn scars or a low intensity broadcast burn would open less area to weeds than an intense wildfire.

Past vegetation treatments on forested land in the watershed have been primarily clearcuts on private lands and clearcuts and partial cuts on government lands. Proposed vegetation treatments on Federal lands in the watershed include a blowdown salvage sale and a commercial thinning timber sale. These proposed projects would not contribute to the temporary, but long term, loss of native plant communities and native biodiversity.

Because much of the watershed has been clearcut, the small amount of Regeneration Harvest in the Plateau Thin project is not expected to greatly contribute to native habitat and biodiversity loss. Associated with these past clearcuts, we expect that the number of species and the number of individuals

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of native pollinators have declined in the watershed. These past clearcut areas would be unavailable for connectivity pathways, population expansion, or new establishment sites for rare plants, lichens, and fungi that require mature conifer forest conditions. Connectivity, landscape patterns of the ecosystem that provide for biological flows that sustain animal and plant populations, are provided for by reserve blocks and riparian reserves of old growth forests in the Northwest Forest Plan area.

Timber sale activity on private land is incompletely known. However, we assume that most timber sale actions on private land will have adverse affects on native plant communities (including rare plants and fungi) due to timber removal prescriptions, logging methods, and less resource protection measures since federal laws and policies protecting endangered and special status plants do not apply to private land without a federal nexus. Noxious weed control treatments are expected to be very limited, i.e. restricted to residential areas and federal projects conducted on private lands. Private land totals 52% (69,942 acres, not all forestland) of the Jenny Creek watershed. Private forestland managed for timber production would be unavailable for connectivity pathways, population expansion, or new establishment sites for rare plants and fungi that require mature conifer forest conditions.

Implementation of this project would comply with the Medford District Resource Management Plan (RMP 1995) and Bureau Policy on Special Status Species Management, Manual Section 6840.

I. NOXIOUS WEEDS AND INTRODUCED PLANTS

1. Affected Environment

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 weeds and introduced plants are found throughout the project area and adjacent private lands, see Table 3-27. Noxious weed populations in the project area are small and mostly associated with roads and landings. The five species of noxious weeds in the project area are on the Oregon Department of Agriculture List B. List B designated weeds are weeds of economic importance which are regionally abundant but may have limited distribution in some counties.

Table 3-27. Noxious weeds and Introduced plants within Plateau Thin Project Area

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<th>Scientific Name</th>
<th>Common Name</th>
<th>ODA List*</th>
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<td><em>Anthemis cotula</em></td>
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</tr>
<tr>
<td>Daucus carota</td>
<td>Queen Anne’s lace</td>
<td></td>
</tr>
<tr>
<td>Gastridium phleoides</td>
<td>nit grass</td>
<td></td>
</tr>
<tr>
<td>Holcus lanatus</td>
<td>common velvetgrass</td>
<td></td>
</tr>
<tr>
<td>Hypericum perforatum</td>
<td>common St. Johnswort</td>
<td>B</td>
</tr>
<tr>
<td>Hypochaerus radicata</td>
<td>hairy catsear</td>
<td></td>
</tr>
<tr>
<td>Lactuca serriola</td>
<td>prickly lettuce</td>
<td></td>
</tr>
<tr>
<td>Lepidium campestre</td>
<td>field pepperweed</td>
<td></td>
</tr>
<tr>
<td>Leucanthemum vulgare</td>
<td>oxeye daisy</td>
<td></td>
</tr>
<tr>
<td>Mentha pulegium</td>
<td>pennyroyal</td>
<td></td>
</tr>
<tr>
<td>Myosotis discolor</td>
<td>changing forget-me-not</td>
<td></td>
</tr>
<tr>
<td>Phleum pretense</td>
<td>timothy</td>
<td></td>
</tr>
<tr>
<td>Plantago lanceolata</td>
<td>narrowleaf plantain</td>
<td></td>
</tr>
<tr>
<td>Poa bulbosa</td>
<td>bulbous bluegrass</td>
<td></td>
</tr>
<tr>
<td>Poa pratensis</td>
<td>Kentucky bluegrass</td>
<td></td>
</tr>
<tr>
<td>Rumex acetosela</td>
<td>garden sorrel</td>
<td></td>
</tr>
<tr>
<td>Rumex crispus</td>
<td>curly dock</td>
<td></td>
</tr>
<tr>
<td>Sanguisorba minor ssp. balearica</td>
<td>small burnet</td>
<td></td>
</tr>
<tr>
<td>Schedonorus pratensis</td>
<td>meadow fescue</td>
<td></td>
</tr>
<tr>
<td>Schedonorus phoenice</td>
<td>tall fescue</td>
<td></td>
</tr>
<tr>
<td>Sonchus asper</td>
<td>spiny sowthistle</td>
<td></td>
</tr>
<tr>
<td>Sonchus oleraceus</td>
<td>common sowthistle</td>
<td></td>
</tr>
<tr>
<td>Spergularia rubra</td>
<td>red sandspurry</td>
<td></td>
</tr>
<tr>
<td>Taraxacum officinale</td>
<td>common dandelion</td>
<td></td>
</tr>
<tr>
<td>Torilis arvensis</td>
<td>spreading hedgeparsley</td>
<td></td>
</tr>
<tr>
<td>Tragopogon dubius</td>
<td>yellow salsify</td>
<td></td>
</tr>
<tr>
<td>Trifolium dubium</td>
<td>suckling clover</td>
<td></td>
</tr>
<tr>
<td>Trifolium pretense</td>
<td>red clover</td>
<td></td>
</tr>
<tr>
<td>Trifolium repens</td>
<td>white clover</td>
<td></td>
</tr>
<tr>
<td>Valerianella locusta</td>
<td>Lewiston cornsalad</td>
<td></td>
</tr>
<tr>
<td>Verbascum thapsis</td>
<td>common mullein</td>
<td></td>
</tr>
<tr>
<td>Vulpia myuros</td>
<td>rat-tail fescue</td>
<td></td>
</tr>
</tbody>
</table>

a. Oregon Department of Agriculture List B Noxious Weeds

Diffuse knapweed (*Centaurea diffusa*) is a biennial or short-lived perennial forb. The plants first form low rosettes and may remain in this form for one to several years. After they reach a threshold size they will bolt, flower, set seed, and then die. Diffuse knapweed is a pioneer species that can quickly invade disturbed and undisturbed grassland, shrubland, and riparian communities. Once established, diffuse knapweed outcompetes and reduces the abundance of native species. Diffuse knapweed contains an allelopathic chemical that can suppress the growth of other species which allows the formation of dense single-species stands. There are 22 sites reported for the Medford District and one site in the project area. The site in the project area is located in an existing rock quarry that may be used to supply road rock for this timber sale. This weed is a native of Eurasia and has limited forage value, increases ranching and haying costs, displaces native plants, and decreases plant diversity. Lasting control will require a combination of various methods of land management, biological control, physical control, chemical control, and suppression by desirable vegetation.
Meadow knapweed (*Centaurea nigrescens*) is a perennial that blooms in midsummer to fall. It grows from a woody root crown to a height up to 3 ½ feet tall. Stems are many-branched and tipped by a solitary flower head. It is native to Europe originally introduced as a potential forage species. Meadow knapweed prefers moister and cooler conditions than the other knapweeds, occurring predominantly in coastal Washington and Oregon but is also found in moister, cooler habitats of the interior, e.g. forest openings along rivers and streams. In Oregon, meadow knapweed is most abundant near Roseburg (Douglas County), where it was cultivated for winter forage prior to 1959. There are 396 sites reported for the Medford District and one site in the project area. The site in the project area is located 40 feet from a road and unit. Meadow knapweed out-competes grasses and other pasture species, causing productivity to decline. It is susceptible to herbicide treatments, but control efforts must persist for the long-term. It has the potential to invade native prairie and oak savannah. Meadow knapweed favors moist roadsides, sand or gravel bars, river banks, irrigated pastures, moist meadows, and forest openings. It also can invade industrial sites, tree farms, and grasslands. Meadow knapweed seeds are carried in rivers, streams, or irrigation water, in hay or by vehicles along roadsides.

Canada thistle (*Cirsium arvense*) is a perennial with an extensive root system. This prickly rose-purple flowered plant can produce up to 1500 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. There are 1092 sites reported for the Medford District and 8 sites for the project area. This weed is a native of Eurasia. Detrimental effects 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 (*Cirsium 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 1540 sites reported for the Medford District. This weed is under-reported on the Medford District as active control methods are not usually employed. Personal knowledge of the Botanist and recent records have verified sites within the project area and along haul routes. 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 under-reported on the Medford District as 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 have verified sites within the project area and along haul routes. Detrimental effects include displacement of native species, decrease of plant diversity, and reduced forage. Successful control methods include biological and chemical.

### 2. Environmental Consequences

#### a. Alternative 1 - No Action

No change. Noxious weed inventory and treatment would occur per BLM, Ashland Resource Area Weed Control strategy. 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.
Weed populations would be limited to existing weed sites and weed spread would occur, mostly, into adjacent disturbed areas. New weed establishments would be limited to existing disturbed areas and areas of open canopy. 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. Alternative 2 (Proposed Action)

With vegetation treatment and the ground based harvest method, site conditions would be slightly more favorable for noxious weeds and introduced plants over native plant species because of the increased disturbance to the existing vegetation and the soil surface, the increased amount of light reaching the ground, and the increased area of compacted soil.

Many of the clearcuts on private land have large populations of noxious weeds and introduced plants. Some roadides also support vigorous populations of weeds. All these neighboring weed sites are sources of weed seed and plant material that could be transported to the project area and become established. Weed seed and plant material may be transported by wind, water, wildlife, motorized and non-motorized vehicles, and recreationists.

With the implementation of the project design features, weed spread would be avoided and existing roadside weed populations would be controlled within the project area.

J. WILDLIFE

This section discusses terrestrial wildlife habitats and the impacts to threatened, endangered and special status wildlife species. Analysis areas used in this section include: Jenny Creek Watershed, Plateau Thin Planning Area, and Plateau Thin Project Area. These areas are defined as follows: The Jenny Creek Watershed is the area drained by Jenny Creek (see Jenny Creek Watershed Assessment and Analysis (USDI 1995)). The Plateau Thin Planning Area is the area including and immediately surrounding proposed treatment areas. The Plateau Thin Project Area is the actual area proposed for on the ground vegetation treatment.

The No Action Alternative describes anticipated effects of not implementing an action at this time.

1. Affected Environment

a. Vegetation Condition Classes

The vegetation condition classes presented in the table below provide habitat for the terrestrial wildlife species found in the Plateau Thin Planning Area. Current habitat conditions reflect past actions—both natural and anthropogenic. The most influential of these actions include timber harvest, fire, and livestock grazing. Acreage of each vegetation condition class and several wildlife species that are representative of the various habitats are also displayed. Approximately 255 vertebrate terrestrial wildlife species are known or suspected (based on known range and habitat associations) to occur in the proposed planning area. This includes species that migrate through the area.

The Plateau Thin project is located within the Jenny Creek watershed. The Jenny Creek Watershed Assessment and Analysis (USDI 1995) provides a general overview and background information for the habitats and wildlife species present within the Jenny Creek Watershed, which can be generalized to the smaller Plateau Thin Planning Area.
Table 3-28. Current Vegetation Condition

<table>
<thead>
<tr>
<th>Vegetation Condition Class</th>
<th>Approximate Acres in the Planning Area (BLM Administered Land)</th>
<th>Representative Species (from Brown 1985)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassland</td>
<td>292</td>
<td>gopher snake, California ground squirrel, western meadowlark</td>
</tr>
<tr>
<td>Brushland/Shrubland</td>
<td>142</td>
<td>western fence lizard, wrentit, dusky-footed woodrat</td>
</tr>
<tr>
<td>Hardwood/Woodland</td>
<td>11</td>
<td>acorn woodpecker, western gray squirrel, common garter snake</td>
</tr>
<tr>
<td>Seedling/Sapling</td>
<td>704</td>
<td>Cassin’s vireo, deer mouse, black-tailed deer</td>
</tr>
<tr>
<td>Small Conifer</td>
<td>504</td>
<td>Golden-crowned kinglet, porcupine,</td>
</tr>
<tr>
<td>Large Conifer</td>
<td>942</td>
<td>Hutton’s Vireo, pine marten</td>
</tr>
<tr>
<td>Mature Conifer</td>
<td>2,999</td>
<td>northern spotted owl, northern flying squirrel, pileated woodpecker</td>
</tr>
</tbody>
</table>

b. Special Status Species

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

Generally, Bureau Sensitive Species have restricted ranges and have natural or human-caused threats to survival (USDI 1991). Where BLM actions could have a significant effect on their range-wide status, management direction is to protect and manage the species and their habitat so that the Bureau actions will not contribute to the need to list the species as federally threatened or endangered.

Table 3-29. Special Status Species (Terrestrial Wildlife)

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald Eagle</td>
<td>Haliaeetus leucocephalus</td>
<td>BS - Known</td>
</tr>
<tr>
<td>Chase Sideband Snail</td>
<td>Monadenia chaceana</td>
<td>BS and S&amp;M- Known</td>
</tr>
<tr>
<td>Coronis Fritillary</td>
<td>Speyeria coronis coronis</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Crater Lake Tightcoil</td>
<td>Pristiloma arcticum crateri</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Evening Fieldslug</td>
<td>Deroseras hesperium</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Fisher</td>
<td>Martes pennanti</td>
<td>FC – Known</td>
</tr>
<tr>
<td>Foothill Yellow-legged Frog</td>
<td>Rana boylii</td>
<td>BS - Suspected</td>
</tr>
<tr>
<td>Franklin’s Bumblebee</td>
<td>Bombus franklini</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Fringed Myotis</td>
<td>Myotis thysanodes</td>
<td>BS - Suspected</td>
</tr>
<tr>
<td>Great Gray Owl</td>
<td>Strix nebulosa</td>
<td>S&amp;M – Known</td>
</tr>
<tr>
<td>Johnson’s Hairstreak Butterfly</td>
<td>Callophrys johnsoni</td>
<td>BS--Known</td>
</tr>
<tr>
<td>Lewis’ Woodpecker</td>
<td>Melanerpes lewis</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Mardon Skipper Butterfly</td>
<td>Polites mardon</td>
<td>FC - Known</td>
</tr>
<tr>
<td>Northern Spotted Owl</td>
<td>Strix occidentalis caurina</td>
<td>FT -Known</td>
</tr>
<tr>
<td>Northwestern Pond Turtle</td>
<td>Actinemys marmorata marmorata</td>
<td>BS - Known</td>
</tr>
<tr>
<td>Oregon Shoulderband Snail</td>
<td>Helmithoglypta hertleini</td>
<td>BS and S&amp;M – Suspected</td>
</tr>
<tr>
<td>Oregon Spotted Frog</td>
<td>Rana pretiosa</td>
<td>FC – Suspected</td>
</tr>
<tr>
<td>Pallid Bat</td>
<td>Antrozous pallidus</td>
<td>BS - Suspected</td>
</tr>
<tr>
<td>Purple Martin</td>
<td>Progne subis</td>
<td>BS - Suspected</td>
</tr>
<tr>
<td>Species</td>
<td>Scientific Name</td>
<td>Status</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Siskiyou Hesperian Snail</td>
<td>Vespericola sierranus</td>
<td>BS - Suspected</td>
</tr>
<tr>
<td>Siskiyou Short-horned Grasshopper</td>
<td>Chloealtis aspasma</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Travelling Sideband Snail</td>
<td>Monadenia tidelis celeuthia</td>
<td>BS – Suspected</td>
</tr>
<tr>
<td>Western Bumblebee</td>
<td>Bombus occidentalis</td>
<td>BS – Known</td>
</tr>
<tr>
<td>White-headed Woodpecker</td>
<td>Picoides albolarvatus</td>
<td>BS – Suspected</td>
</tr>
</tbody>
</table>

**Northern Spotted Owl**

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 is comprised 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 (NSO). 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

Anthony et al. (2004, 2006) is the most recent 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 reports 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 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 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). There are 7 northern spotted owl sites with some portion of their provincial home range on BLM administered land within the proposed planning area. Two (2) of these sites are historic northern spotted owl locations. The remaining five (5) are sites generated through the Owl Estimation Model process. Generated (“G”) Sites are estimated locations of spotted owl activity centers created by the use of a methodology developed by an interagency team to estimate the number of northern spotted owl home ranges that are likely to occur in unsurveyed habitat within the area affected by a proposed action. Generated sites are based on the amount and distribution of suitable owl habitat (on Federal and non-Federal land) and best available information on known owl locations and spacing patterns for that area. The methodology relies upon known spotted owl locations derived from surveys as the foundation for a “northern spotted owl occupancy” map (NSOOM) (USDI et al. 2008). A limited number of surveys have been conducted at the 2 historic sites over the past 10 years. For the purposes of this analysis all sites are assumed to be occupied.

**Northern Spotted Owl Critical Habitat**

No proposed treatment units are located in designated critical habitat (1992 designated) for the northern spotted owl. Critical habitat is designated under the auspices of the Endangered Species Act of 1973. The designated critical habitat in the analysis area was established to provide for nesting, roosting, and foraging habitat in an area of high habitat fragmentation and to help in providing a habitat link between the Western Cascade and Klamath Mountains physiographic provinces (USDI, FWS 1994).

**Northern Spotted Owl Habitat**

Within the Jenny Creek watershed, wildlife habitat was typed into habitat categories pertinent to the Northern Spotted Owl (NSO). 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 characters such as canopy closure of 60 percent or greater, trees with large crowns, multiple canopy layers, snags and down wood. The best quality NRF habitat has forest stands with 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 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 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. This habitat typing system was designed specifically for spotted owls, but can be used to assess habitat availability for other species because the habitat typing accounts for habitat condition and structure important to other species, especially those that utilize late-successional forest habitat, including the Pacific fisher (see KS Wild v. US BLM, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Approximately 20,600 acres of the BLM lands within the Jenny Creek watershed are classified as NRF habitat, or approximately 36% of the BLM administered lands in the watershed. There are approximately 1226 acres of NRF habitat and 618 acres of dispersal-only habitat on BLM administered land within the proposed Plateau Thin Project Area. Not all lands in the analysis area are capable of becoming NRF habitat due to the natural limitations of some soil types, and agricultural and rural development.

**Fisher (Martes pennanti)**

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 20,600 acres of suitable fisher denning and resting habitat exists within the Jenny Creek watershed. 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 1994b). This checkerboard ownership pattern was created by the Congressional acts that provided land grants, and is outside of BLM’s control.

The habitat requirements of fishers in the Pacific Northwest are poorly understood. 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 throughout the Ashland Resource Area and have detected one fisher within the Plateau Thin Project Area. The extent (dispersal, foraging, or breeding) to which the Plateau Thin Project Area is used by fisher is not fully known.

**Molluscs**

Potential habitat exists throughout the project area for four Bureau Sensitive molluscs, *Helminthoglypta hertleini, Monadenia fidelis celeuthia, Monadenia chaceana,* and *Vespericola sierranus* (USDA USDI 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 molluscs were conducted throughout the Plateau Thin Project Area and were completed in the 2008. These surveys detected one target mollusc species -- *Monadenia chaceana*.

c. Survey and Manage Species

**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 Plateau Thin 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 30 miles to the west in the Applegate River Drainage.

**Great Gray Owl**
The great gray owl is a NWFP Survey and Manage species. Great gray owls (*Strix nebulosa*) nest in open forests adjacent to meadows. 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). Large amounts of habitat suitable for great gray owl reproduction exist in and around the Plateau Thin Project Area. Protocol surveys were conducted for great gray owls in the Plateau Thin Project Area in 2007 and 2008. Three (3) reproductive sites were located. Each reproductive site will be protected with a ¼ mile (or equivalent area polygon) no harvest buffer.

**Molluscs**
Potential habitat exists throughout the project area for two (2) Survey and Manage terrestrial mollusk species-- *Helminthoglypta hertleini* and *Monadenia chaceana*. *Helminthoglypta hertleini* 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 and Survey and Manage species) is associated with rocky areas, talus deposits, associated riparian areas, and coarse woody material (USDA, USDI 2003).

Protocol Surveys for terrestrial molluscs were conducted throughout the Plateau Thin Project Area and were completed in 2008. These surveys detected one target mollusc species (*Monadenia chaceana*) at one location. This species location will be protected with a no harvest buffer. Potential habitat that occurs within treated units will remain suitable after treatments due to retention of forest canopy and woody debris.

d. Other Species of Concern

**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 U.S. 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 project area.
Table 3-30. Bird Species of Conservation Concern

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band-tailed Pigeon <em>(Patagioenas fasciata)</em></td>
<td>GBBDC</td>
</tr>
<tr>
<td>Flammulated Owl <em>(Otus flammeolus)</em></td>
<td>BCC</td>
</tr>
<tr>
<td>Lewis’ Woodpecker <em>(Melanerpes lewis)</em></td>
<td>BCC</td>
</tr>
<tr>
<td>Mallard <em>(Anas platyrhynchos)</em></td>
<td>GBBDC</td>
</tr>
<tr>
<td>Mourning Dove <em>(Zenaida macroura)</em></td>
<td>GBBDC</td>
</tr>
<tr>
<td>Olive-sided Flycatcher <em>(Contopus cooperi)</em></td>
<td>BCC</td>
</tr>
<tr>
<td>Rufous Hummingbird <em>(Selasphorus rufus)</em></td>
<td>BCC</td>
</tr>
<tr>
<td>Wood Duck <em>(Aix sponsa)</em></td>
<td>GBBDC</td>
</tr>
</tbody>
</table>

**BCC** - Bird of Conservation Concern  
**GBBDC** - Game Birds Below Desired Condition

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., Orange Crowned Warblers and Rufous Hummingbirds). Some of the recovering clearcuts and pine savannahs in the project 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 Plateau Thin Project 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).

**Northern Goshawk**
Northern goshawks utilize approximately the same habitat type as northern spotted owls; therefore, have roughly the same acres of habitat in the analysis area. There are no known Northern Goshawk nests within the project area.

**Deer and Elk**
Roosevelt elk and black-tailed deer are other species of management concern present in the Plateau Thin Project Area. These animals receive considerable public attention due to their recreational value: both consumptive and non-consumptive. These species use the Plateau Thin Project Area predominately for birthing grounds and general foraging during the spring, summer, and fall seasons.

2. **Environmental Consequences**

a. **Alternative 1 - No Action**

Because no projects are planned under this alternative, the effects to wildlife that are discussed in the action alternative would not immediately occur. However, habitat conditions in the proposed planning area are dynamic and various natural processes will continue to change the character of the habitat over time. For example, drought and overstocking have stressed many of the large remnant trees in the project area, particularly pine, and these trees will continue to be lost. As snags, these trees would continue to benefit wildlife, but data indicate that snags are present in adequate numbers across the landscape to meet wildlife needs – in the various conditions there are 10-20 snags per acre (See Vegetation, Section B). The larger live trees add an element of diversity to the landscape and provide adequate tree size for nesting, roosting, foraging, and denning by wildlife species in the project area, e.g.; red-tailed hawk, porcupine, and black bear.
Encroachment of shrubs and conifers into the grassland/meadow habitat is prevalent in the planning area and this encroachment will continue without some type of intervention/disturbance, whether human-caused or natural, e.g., fire. Unfortunately, if fire is the disturbance agent, fuel loads are so high due to tree and shrub encroachment and the suppression of fire in the area that fire occurring during the dry portions of the year may be stand replacing in intensity.

b. Alternative 2 (Proposed Action)

1) Timber Harvest & Road Effects – General

An overview of the effects of timber management on wildlife/wildlife habitat is provided in Chapter 4, pages 51-83, of the BLM Medford District Resource Management Plan (RMP). Additional site-specific impacts are addressed in the following discussion.

In order to accomplish the timber management objectives in the proposed project area, existing wildlife habitat conditions would be modified on approximately 2,113 acres of commercial conifer forest stands. Due to the variety of stand conditions in the proposed project area, numerous prescriptions/marketing guidelines have been developed. With the exception of the approximately 110 acres of regeneration, all prescriptions have the stated objective of improving existing tree/stand vigor and growth. Conifer stands that have been selected for treatment are primarily in the small conifer and mature/large conifer vegetation condition classes.

All prescribed treatments would reduce canopy closure, remove some snags, and reduce understory vegetation where it currently exists. It is inherent with forest disturbance, whether natural or anthropogenic, that some species of wildlife are winners and others are losers. The habitat components described above (canopy closure, vertical structure, and snags) are important to a variety of wildlife species associated with the conifer stands proposed for treatment.

The winner/loser scenario is played out by innumerable species throughout all forested habitats when there is disturbance. As practical examples, Janes (2003), Hayes et al (1997) and Hayes et al (2003) found that thinning in mixed conifer and Douglas-fir forests (respectively) benefited some bird species and was detrimental to others. Janes noted population increases in terrestrial insectivores and declines in bark and foliage gleaners. The declines were attributed to decreases in canopy foliage, stem density and snags. The increases were attributed to the presence of more woody debris on the forest floor. Similarly, Hayes et al (2003) found that detections of 9 breeding bird species decreased and detections of 8 species increased relative to controls following thinning in young Douglas fir stands.

Although some species in the project area would be adversely affected by changes in the habitat conditions described above, these impacts would be mitigated on both landscape and project scales by land use allocations and management actions adopted in the Medford District RMP, and by measures incorporated in the design of the project.

Under Alternative 2, the BLM proposes to maintain about 26.5 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). About 0.7 miles of temporary routes would be reopened or constructed to minimum standards, and closed immediately following completion of operations. The proposed new roads traverse a variety of habitat types, and would remove approximately 3.6 acres of habitat. In relation to the size of the proposed planning area, the loss of this amount of habitat would be inconsequential. However, 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.

The new construction would be blocked or barricaded to vehicular traffic (i.e., automobile and truck) after construction as a mitigation measure. However, barricades are seldom 100 percent effective in
eliminating autos and trucks, and they don’t stop any of the OHV-type of vehicle use. Consequently, even with barricades in place the negative impacts of noise disturbance, increased poaching potential, and the potential for over hunting remain. However, these impacts would be reduced to some extent because many vehicles would be deterred by the barricades.

Barricades, however, don’t mitigate the edge effects and microclimatic changes that roads produce. Various studies (e.g., Ortega and Capen 1999; Marsh and Beckman 2004) show that the negative impacts of roads to wildlife habitat are not limited to the road prism - there is a zone of influence that extends into the adjacent habitat. For example, Marsh and Beckman (2004) found that some terrestrial salamanders decreased in abundance up to 80 meters from the edge of a forest road due to soil desiccation from the edge effects. Ortega and Capen (1999) found that ovenbird (a forest-interior species) nesting density was reduced within 150 meters of forest roads. This study suggests that even narrow forest roads fragment habitat and exert negative effects on the quality of habitat for forest-interior species.

While roads are generally not good for wildlife, some species take advantage of the edge created by roads. These are the opportunistic habitat generalists that thrive on human disturbance of natural landscapes, e.g., some rodent species, brown-headed cowbirds, and some sparrows. Generally, these species, are not threatened in any way, and do not necessarily need additional habitat.

In summary, although closing and barricading/gating provide mitigation for some of the negative impacts of roads to wildlife, there are long-term negative impacts of roads that aren’t mitigated by these measures. Impacts to wildlife species from roads is due primarily to loss of habitat and connectivity of habitat. (p 4-51, PRMP, 1994)

Snags are not targeted for removal; therefore the only snags that would be removed are those that would be cut for safety concerns. Snags in adequate numbers to support 100 percent of the current snag-dependent species in the planning area would likely remain on the landscape. In the mid-sized stands snag density is approximately 14.3 snags/acre with an average DBH of 17.6 inches, and in the mature stands snag density is approximately 13.2 snags/acre with an average DBH of 22.6 inches (Vegetation, Section B).

In summary, within the proposed project area, the distribution and numbers of individual species would change. However, with the required Project Design Features, adequate habitat would remain in the project area to support the full complement of species that are now present.

2) Effects to Special Status Species – Threatened/Endangered

Northern Spotted Owl

The northern spotted owl is listed as a threatened species under the auspices of the Endangered Species Act of 1973, as amended (Act). There are approximately 1,226 acres of suitable spotted owl habitat, and 618 acres of dispersal-only habitat in the proposed treatment area. It is estimated that Alternative 2 would remove or downgrade approximately 1,090 acres of suitable habitat (approximately 5 acres would be removed and 1,085 acres would be downgraded to dispersal-only habitat). Additionally, 10 acres of dispersal-only habitat would be removed, and 558 acres would be maintained. The table below displays the estimated pre and post-project spotted owl habitat conditions in the proposed project area.

| Table 3-31 Estimated Effects on Spotted Owl | Alternative 2 – Estimated Effects on Spotted Owl Habitat Within the Proposed Treatment Units |
| Suitable Habitat (Acres) | Dispersal-only Habitat |
| Pre-project | Post-project | Pre-project | Post-project |
| 1226 | 136 | 618 | 1693 |

The Plateau Thin project would take place within portions of the median home range radius (1.2 miles) of 2 historic northern spotted owl sites. These sites have been monitored at various intensities during the last 10 years (see Affected Environment for more detail). The removal and downgrading of...
approximately 1090 acres of suitable habitat in the Jenny Creek watershed (approximately 5 percent of the suitable habitat in the Jenny Creek watershed) may impair the ability of the owls to breed, feed, and shelter in the treated areas. Some mitigation is provided for this site by the Standards and Guidelines of the NWFP. One historic site was found prior to January 1994, and approximately 100 acres of the best habitat is protected at this site. These reserves are intended to preserve an intensively used portion of the breeding season home range (USFS/USDI 1994). The ultimate fate of the owls as a result of the proposed habitat modification is unknown due to the variability in individual owl response to habitat modification.

The Plateau Thin project would also take place within portions of the median home range radii of 5 northern spotted owl sites generated through the Owl Estimation Model process. Generated (“G”) Sites are estimated locations of spotted owl activity centers created by the use of a methodology developed by an interagency team to estimate the number of northern spotted owl home ranges that are likely to occur in unsurveyed habitat within the area affected by a proposed action. Generated sites are based on the amount and distribution of suitable owl habitat (on Federal and non-Federal land) and best available information on known owl locations and spacing patterns for that area. The methodology relies upon known spotted owl locations derived from surveys as the foundation for a “northern spotted owl occupancy” map (NSOOM) (USDI et al. 2008).

**Northern Spotted Owl Consultation**

Northern spotted owls would likely be adversely affected by the proposed project; therefore formal consultation with the U.S. Fish and Wildlife Service (Service) is required.

Lawsuits on ESA consultation for the northern spotted owl have resulted in withdrawn consultation documents and consequently in the need to reinitiate consultation.

The Plateau Thin timber sale was originally consulted on programmatically in a combined Forest Service and Medford BLM BA covering forest management activities planned for 2004-2008 (USDA and USDI 2003b). The Service issued a Biological Opinion (BO) for these projects in 2003 (FWS Log #1-15-03-F-511). In response to the Ninth Circuit opinion in NEDC v. Allen/USFWS (NEDC I), No. 05-1279 (D. Or.), the Service sent a letter on November 2, 2005, recommending the Forest Service and the Medford BLM reinitiate and reevaluate critical habitat impacts using critical habitat definitions of the ESA, rather than the Service’s regulations (50 CFR Part 402).

Plateau Thin was reinitiated in the Medford BLM District’s Biological Assessment for FY 2006-2008 Projects (USDI 2006). The BLM received a BO (FWS Log# 1-15-06-F-162) and a separate Letter of Concurrence (LOC) (FWS Log#1-155-06-I-0165) from the FWS in August 2006. In response to the Ninth Circuit opinion in ONRC v. Allen, No. 05-35830 (9th Cir.), the Service withdrew several BOs and LOCs in March 2007, including FWS Log# 1-15-06-F-162 and FWS Log#1-155-06-I-0165 and requested reinitiation of ESA section 7 consultation.

In October 2008, the BLM submitted a reinitiated programmatic BA for LAA projects, including Plateau Thin, in District Analysis and Biological Assessment of Forest Habitat, DA BA FH (USDI 2008). A separate reinitiated BA for NLAA vegetation treatments originally analyzed in DA BA FH was submitted to the Service and the BLM received an LOC in 2009 (Tails #1342-2009-I-0093). On March 5, 2010, the Service sent BLM a memo requesting the District revise the 2008 DA BA FH due to changes in the proposed action. The sales covered in this Medford Summer 2010 BA will not be included in the revised DA BA FH.

The Plateau Thin timber sale, in the form of the mitigation measure outlined below (the Swinning Project), has been submitted to the USFWS for consultation under MEDFORD Summer 2010 LAA BA. This document and all previous consultation documents are available for review at the Medford District BLM office.
**Northern Spotted Owl Mitigation**

In 2008, the U.S. Fish and Wildlife Service issued a Recovery Plan for the Northern Spotted Owl (NSO). The recovery plan was subsequently challenged in Court, and efforts to revise the recovery plan are underway. Recovery plans are not regulatory documents; rather, they provide guidance to bring about recovery and establish criteria to be used in evaluating when recovery has been achieved. The BLM continues to work with the Service to incorporate Recovery Goals and Actions that are consistent with BLM laws and regulations. In order to maintain future options in the Plateau Thin Project Area for aiding in the recovery of the northern spotted owl, the Responsible Official directed the project leader to identify a subset of Alternative 2 that would avoid treatment within the home range radius of northern spotted owl sites, or that would treat and maintain all existing nesting roosting, foraging and dispersal habitat within the home range radius of owl sites. This subset of units, identified in Chapter 2, is the result of applying mitigation for the northern spotted owl. Additionally, this subset of units is also the result of avoiding forest thinning in 240 acres of stands identified as Recovery Action 32 stands. Recovery Action 32 (RA 32) developed under the 2008 Recovery Plan for the Northern Spotted Owl, 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.

For planning and consultation purposes this project with mitigation measure applied is referred to as Swinning.

It is estimated that the Swinning Alternative would remove or downgrade approximately 318 acres of suitable habitat (approximately 91 acres would be removed and 227 acres would be downgraded to dispersal-only habitat). Additionally, 0 acres of dispersal-only habitat would be removed, and 233 acres would be maintained. The majority of timber harvest, 466 acres, will occur outside the provincial homorange of northern spotted owls. Habitat within northern spotted owl provincial homranges (3 acres) which is proposed for harvest will be treated in such a manner as to maintain current habitat function post harvest. No timber harvest is proposed in northern spotted owl nest patches or 0.5 mile radius core areas.

**Northern 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, the primary prey of owls in our area, 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 and they often use areas previously disturbed by fire (Carey 1991).

Regeneration harvest will remove habitat for arboreal prey species (flying squirrels, woodrats, and red tree voles), but may improve habitat for non-arboreal species (western red backed voles and deer mice). A dispersal stand which resulted from the downgrade of NRF habitat would begin to develop the pretreatment habitat within 25 to 40 years, depending on treatment type, plant association, and location. Residual trees, snags, and down wood that are retained in the thinned stands will provide some cover for prey species over time, and will help minimize harvest impacts to some prey species. Lemkuhl 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 some tree canopy, provided it is not too extreme, will 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 food would increase 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 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. Some minor changes in prey availability may occur as cover is disturbed and animals 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 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) within the nest site. Therefore, effects to prey species are most critical at the nest patch and core areas. Effects to spotted owl sites at the nest patch and core areas are analyzed in Section 4.3 above and the indirect effects to prey species can be derived from this data. For all projects, treatment implementation would be spread out temporally and spatially within the project area, which would provide areas for spotted owl foraging during project implementation and reduce the impact of these short term effects at the project level.

PDF and normal operating procedures applied by the Medford BLM reduce the impacts to the extent possible, while still facilitating tree harvest and other projects. Treatment areas are small enough and dispersed enough that many resident prey species could move to adjacent patches until the stand recovers.

Disturbance to Northern Spotted Owls
Mandatory PDF will be incorporated into all proposed action activities. Applying the Mandatory PDF should avoid harm to nesting owls and their young that might occur from noise or activity, but may not reduce the adverse effects of habitat removal. 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 will follow mandatory PDFs, that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds (Chapter 2), no harm to nesting owls, or their young, is expected from project related noise or activities.

3) Special Status Species - Sensitive Species Documented in Planning Area

Bald Eagle (Haliaeetus leucocephalus)
The Bald Eagle is a Bureau Sensitive Species and is also protected under the Bald and Golden Eagle Protection Act and receives protection under the Medford BLM District RMP. Bald Eagles are associated with lakes, reservoirs, and rivers which provide them with their primary foods: fish and waterfowl. Four Bald Eagle nests have been located within the project area. Bald Eagles may be impacted by removal of large overstory trees favored for perches and nest sites, and through disturbance due to increased activity in the area. These impacts will be minimized through implementation of project design features (noted in Chapter 2) as follows: Manage approximately 30-acre core area around nest sites. Retain older forests within ½ mile of nests. Large overstory trees and dominant trees along ridges in the vicinity of nests should be retained. Develop HMP for sites. Avoid disturbance within ½ mile from February 1 through August 15. (RMP p. 57)

Chase sideband snail (Monadenia chaceana)
The Chase sideband, a Bureau Sensitive species, is a terrestrial snail associated with forested habitats which possess a rocky soil substrate. One location was found within the proposed project boundary for this snail species. This species may be impacted through removal of overstory canopy, disturbance of rocky substrates, or physical damage from falling trees or equipment operating in their habitat. This species location will be protected with a site-specific no-treatment buffer in order to maintain microsite conditions. “Mitigation measures for terrestrial snails include “retaining canopy coverage, providing log and slash piles, and maintaining a moist forest floor environment.” (B-66, NWFP FSEIS Feb. 1994) The maintenance of these microsite conditions is necessarily conducted in a site by site manner with actual buffer distance dependent on stand structure in the area in which the snail was located.
Fisher (Martes pennanti)
The Fisher is a Bureau of Land Management sensitive species and a Federal Candidate species under the Endangered Species Act. The Fisher is associated with older forests and other complex habitats that provide suitable habitat for foraging, denning, and sheltering. One Fisher has been documented within the Plateau Thin Project Area through the use of a motion-sensing camera at a bait station. Timber harvest will remove or alter 1090 acres of habitat currently considered to be suitable for Fisher. The Fisher is a highly mobile species and able to adapt to habitat alterations through moving across the landscape to locate the habitats it requires as long as corridors of habitat are retained through which it can safely make such movements. There is little information available about the direct impact of logging such as noise, road construction, etc. According to Harris and Ogan (1997) there is evidence that fishers avoid roaded areas. Proposed road construction for this project totals 07. miles and 26.5 miles of existing roads would be utilized in the course of carrying out the proposed action. Fishers have also been found to avoid recent clearcuts and forested stand with less than 40% canopy cover (Aubry and Lewis 2003). Silvicultural prescriptions call project post harvest canopy closure to be greater than 44% in Douglas –fir sites, 35-44 % in pine and Douglas-fir regeneration sites, and not less than 32 % in pine sites. Under these guidelines 183 acres may be expected to have less than 40% canopy closure after harvest.

The project area is currently well roaded and habitat within the area is a mosaic of canopy closure densities. The proposed action would not be expected to cause direct mortality to fishers. There would be disturbance from the action due to timber harvest and work activities, and loss of habitat due to regeneration harvest and pine site thinning operations. Fisher have large home ranges and could move out of the area during the disturbing activities. After the conclusion of the proposed action, habitat conditions would allow fisher to continue to utilize suitable habitat within this area.

Mardon Skipper (Polites mardon)
The Mardon Skipper butterfly is a Bureau of Land Management sensitive species and a Federal Candidate species under the Endangered Species Act. The Mardon Skipper is associated with native bunchgrasses in meadow settings. The treatments proposed in this project will not impact meadow areas. Three known populations of Mardon Skipper have been documented within the Plateau Thin Project Area.

Johnson’s hairstreak (Callophrys johnsoni)
The Johnson’s hairstreak butterfly, a Bureau Sensitive species, is dependent on conifer mistletoe for egg-laying and for food in its larval stage. It spends much of it lifespan in and near the tops of conifer trees, although it descends to ground level for nectaring and to visit moist muddy areas as a source of water. This butterfly species has 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. Silvicultural guidelines call for retaining one ½-acre patch of infected trees for every 20-acres (an infected patch every 660 feet). As mistletoe will not be eradicated from the project area, this butterfly will likely continue to persist.

Northwestern Pond Turtle (Actinemys marmorata marmorata)
This turtle, a Bureau Sensitive species, may be found in association with permanent and intermittent water bodies (e.g. marshes, streams, rivers, ponds, lakes). Females lay eggs in upland areas up to ½ mile from the nearest water source. Riparian zone buffers will 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. However, no operations would occur during wet weather conditions (October 15 to June 15) unless there is at least 18 inches of snow thus the potential for incidental impacts to individuals is very low.

Western Bumblebee (Bombus occidentalis)
The Western Bumblebee, a Bureau Sensitive species, is associated with open areas with abundant flowering plants and abandoned small mammal burrows suitable for nesting. The Western Bumblebee is unlikely to be impacted by the proposed action as its preferred habitat is open moist meadows which
support adequate flower and shrub species from which this bumblebee can collect nectar and pollen. This type of habitat will not be treated as part of the Plateau Thin project.

**White-headed Woodpecker (Picoides albolarvatus)**
This Bureau Sensitive species is found primarily in open coniferous forest. They nest in and feed on the seeds of ponderosa pine and sugar pine. Silvicultural prescriptions proposed in this project are designed to retain and promote regeneration of pine species and will likely result in an increase in habitat suitable for use by the white-headed woodpecker.

4) **Special Status Species – Sensitive Species Suspected in the Planning Area**

**Oregon Spotted Frog (Rana pretiosa)**
Oregon Spotted Frogs, a Federal Candidate species, are found in or near perennial water bodies. They are associated with non-woody wetland plant communities such as sedges, rushes, and grasses. Their habitat will be protected by riparian buffers within the Plateau Thin Project Area.

**Coronis Fritallary (Speyeria coronis coronis)**
The Coronis fritallary butterfly, a Bureau Sensitive species, uses open areas for the majority of its life cycle. It favors bull thistle and chokecherry for nectarating, and the caterpillars feed on violets. This species is unlikely to be impacted by the proposed action as it is not associated with forest habitats of the type proposed for treatment.

**Siskiyou Short-horned Grasshopper (Chloealtis aspasma)**
The Siskiyou short-horned grasshopper, a Bureau Sensitive species, is associated with open grassland with an elderberry shrub component. No activities are proposed for this habitat type in the Plateau Thin Project Area. They are unlikely to be impacted by the proposed action as it is not associated with forest habitats of the type proposed for treatment.

**Franklin’s bumblebee (Bombus franklini)**
Franklin’s bumblebee, a Bureau Sensitive species, is associated with open areas with abundant flowering plants and abandoned small mammal burrows suitable for nesting. The Franklin’s bumblebee is unlikely to be impacted by the proposed action as its preferred habitat is open moist meadows which support adequate flower and shrub species from which this bumblebee can collect nectar and pollen. This type of habitat will not be treated as part of the Plateau Thin project.

**Lewis’ Woodpecker (Asyndesmus lewis)**
In Southwest Oregon, Lewis’ woodpeckers, a Bureau Sensitive species, are primarily a winter population (Janes et al 2001); however, some limited nesting may occur. Lewis’ woodpeckers are associated with open oak-pine woodland habitat. The treatments prescribed for the commercial portions of the project are not likely to adversely affect this species since the treatments normally target dense conifer stands. Some of the pine restoration treatments could potentially benefit this species in the long-term by promoting development of the historic open pine forests.

**Foothill Yellow-legged Frog (Rana boylii)**
Habitat for these frogs, a Bureau Sensitive species, is low-gradient streams with bedrock and gravel substrates, along with the adjacent grass/sedge banks (Corkran and Thoms 1996). The required stream buffers will protect the habitat of this species.

**Fringed Myotis (Myotis thysonodes)**
Fringed myotis, a Bureau Sensitive species, are associated with a variety of habitats including conifer forests and oak-woodlands. They roost in mines, caves, abandoned buildings, and crevices and cavities in large trees. There are no known mine sites within the planning area. Some trees that would be harvested could be used by bats as roost sites. Riparian and other reserves and the snag retention guidelines would mitigate this potential impact (USDI 1994). Also of benefit to this species are “standards and guidelines that would: increase large reserves; provide riparian protection and analysis; retain live, old-growth trees;
and provide for retention of green trees, snags, and coarse woody debris within the matrix.” (3&4-189, NWFP FSEIS Feb. 1994)

**Pacific Pallid Bat (Antrozous pallidus)**
Preferred habitat for this Bureau Sensitive species is canyons and other rocky areas near water sources in arid areas. This species is known to roost in large snags in the general area of the project. This species could use snags and rock outcrops throughout the planning area. Prescriptions call for snag retention which will mitigate impacts to this species. Also of benefit to this species are “standards and guidelines that would: increase large reserves; provide riparian protection and analysis; retain live, old-growth trees; and provide for retention of green trees, snags, and coarse woody debris within the matrix.” (3&4-189, NWFP FSEIS Feb. 1994)

**Terrestrial Mollusks**
Potential habitat exists throughout the project area for four Bureau Sensitive molluscs, *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 perenni-ally 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 molluscs were conducted throughout the Plateau Thin Project Area and were completed in the 2008. These surveys detected one target mollusc species -- *Monadenia chaceana*. This species location will be protected with a no harvest buffer. Potential habitat that occurs within commercial thinning treatment units will remain suitable after treatments due to retention of forest canopy and woody debris. Regeneration harvest may alter microsite conditions to the extent that these units become unsuitable habitat for terrestrial mollusks in the short term. Large amounts of habitat will remain across the landscape. As these units revegetate mollusks will recolonize previously populated areas.

**5) Effects to Survey and Manage Species**

**Great Gray Owl**

Regeneration and commercial thinning treatments may remove individual potential nest trees, the thinning treatments are not expected to affect the majority of the stands or individual nest trees found throughout the planning area.

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 success. Long term beneficial effects include accelerated development of late-successional forest habitat suitable for potential GGO nesting and improved potential GGO foraging as understories respond from increased light penetrating to the forest floor.

The hazardous 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 GGO habitat, as the trees removed by this type of treatment do not provide nesting habitat for GGOs. These treatments have the potential to improve foraging conditions in treated stands by opening the understory and increasing access to prey species.

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Specific mitigation measures for great gray owl, within the range of the northern spotted owl, include the following: “Provide a no-harvest buffer of 300 feet around meadows and natural openings and establish ¼ mile protection zones around known nest sites.” (B-70, NWFP FSEIS Feb. 1994)

6) Other Species of Concern

**Deer and Elk**
Roosevelt elk and black-tailed deer use the Plateau Thin Planning Area predominately for birthing grounds and general foraging during the spring, summer, and fall seasons. No treatment will occur in grassland or shrub/brush habitat. Both of these habitat types provide forage for deer and elk. Thinning treatments in conifer stands will result in increased penetration of sunlight to the forest floor. This will result in stimulation of understory herbaceous and woody vegetation. Regeneration treatments will also stimulate growth of grass and shrub species. This new growth will provide deer and elk with increased forage. Regeneration treatments may result in drier condition on these sites which may cause vegetation to dry out and cease vigorous growth earlier in the season than on more shaded sites. Large tree canopy cover will be maintained in most stands to maintain habitat for the northern spotted owl highest level. Large tree shade is important for maintaining soil moisture and big-game forage later in the summer season. Late summer forage is important for lactating cow elk. Overall forage conditions should improve for deer and elk in the project area.

**Northern Goshawks**
The proposed action would modify approximately (same as spotted owl NRF) acres of potentially suitable habitat for the northern goshawk. This habitat modification may adversely affect the ability of goshawks to breed, feed and shelter should they be present in the planning area. Once located, Northern Goshawk nests receive a no treatment buffer of approximately 30 acre. Although the proposed project could adversely affect the goshawk at the project level if it is present, the Standards and Guidelines of the NWFP accommodate the habitat requirements of the northern goshawk within the NWFP area and provides for persistence of the species at that scale. The proposed project conforms to the Standards and Guidelines of the NWFP; therefore, the project would not lead to listing the species as threatened or endangered which complies with the BLM Special Status Species policy.

7) Cumulative effects

Cumulative effects are defined as the collective environmental impact of all past, present, and reasonably foreseeable future actions in the affected area. For this analysis the affected area is defined as the upper Jenny Creek watershed. Watershed analysis facilitates cumulative effects analysis (RMP ROD pg.96). Also, various animals including spotted owls tend to concentrate their activities in watersheds where they breed (Irwin et al 2004). Due to these factors, the upper Jenny Creek Watershed is an appropriate scale for cumulative effects analysis.

The proposed project implements the objectives of the NWFP. A primary focus of the NWFP is conservation and recovery of the northern spotted owl; therefore, the cumulative effects analysis focuses on spotted owl habitat.

Since 1995 the focus on federally-managed land in the analysis area has been thinning/density management in overstocked stands to improve forest health and reduce fire hazard. An exception to these goals is in regeneration harvest units where the goal is to initiate a new stand of trees.

On private land, timber harvest continues to focus on larger diameter timber stands where they exist. However, for analysis purposes it is assumed that all large-diameter timber stands have been removed from private land in the analysis area or will be removed soon.

The suitable spotted owl habitat baseline in the watershed at the time the NWFP was signed in 1994 is estimated to have been approximately 20,600 acres on federal land. The 1994 baseline acreage accounts for habitat lost through timber harvest and natural causes and for suitable habitat in growth up to that
point. The baseline acreage was derived from watershed analysis data (USDI BLM 1995). The baseline
data assume that all functional suitable habitat was removed from private land by that time, which is not
an unreasonable assumption given the harvesting history in the area.

Since 1994 no timber harvest has occurred in the analysis area on BLM managed land, and there has been
no loss due to natural disturbance, e.g., wildfire. Therefore, the current spotted owl suitable habitat
acreage in the watershed is approximately 20,600 acres. The Plateau Thin project would remove or
downgrade approximately 1090 acres; thus, reducing suitable habitat to approximately 19,510 acres. The
Swinning mitigation measure alternative would remove or downgrade approximately 318 acres; thus,
reducing suitable habitat to approximately 20,282 acres.

Upcoming projects in the analysis area have been planned through fiscal year 2012. Therefore, for the
analysis, 2012 is considered the “reasonably foreseeable future”. Through this period it is estimated that
timber harvest would remove or downgrade (to dispersal habitat) an additional 1000 acres of suitable
spotted owl habitat. This estimate is based on the amount of suitable spotted owl habitat in the proposed
project areas and the percentage of suitable spotted owl habitat that has been treated in similar projects.
Therefore, at the end of this period there would be approximately 18,510-19,282 acres of suitable spotted
owl habitat in the analysis area. This value does not account for development of suitable habitat during
that period because a method to predict in-growth of suitable habitat is not available. However, the
amount of unsuitable habitat developing into suitable habitat in a 2-year period would be expected to be
minimal.

Based on the 1994 baseline, this represents approximately a 6-10 percent loss of suitable spotted owl
habitat in the analysis area due to present, and reasonably foreseeable actions. Habitat loss of this
magnitude impedes the ability of some spotted owls in the analysis area to feed, breed and shelter in the
treated areas.

K. VISUAL RESOURCE MANAGEMENT & RECREATION

The project area is comprised of lands which are Visual Resource Management (VRM), Class II and
within the Hyatt-Howard Prairie Special Recreation Management Area (SRMA). The management
objective for Class II lands is to retain the existing character of the landscape. The level of change to the
characteristic landscape should be low. Management activities may be seen, but should not attract the
attention of the casual observer.

As a side note the VRM system is based on the view of the casual observer.

According to the 1995 Medford District ROD/RMP (Map 10) all land within the Plateau Thin Planning
Area is designated as VRM Class II.

1. Affected Environment

The landscape is characterized by flat prairie lands, a lake, and gently rolling terrain. The area is covered
by a mosaic of commercial timber comprised mainly of mixed conifer stands including pine and fir. VRM
analysis focused on views from Dead Indian Memorial Highway, Hyatt Prairie Road, and Keno Access
Road (Figure 3-9).
2. Environmental Consequences

Heading east on Dead Indian Memorial Highway the views consist of large open area of prairie, lake bed, and gentle rolling hills. As a result of distance from the harvest area (0.5-1 mile), landscape layout, foreground screening, and speed of travel (between 45-55 mph), harvest views are mostly obscured from view with the exception of a section of ridgeline. The ridge that is visible should not be a distraction to the casual observer but increased coarseness in texture and brownish hues may appear across the landscape.

Looking to the east from the same point (Dead Indian Memorial Highway) is a mixed conifer stand. On this section of highway there is substantial foreground screening and the casual observer will be traveling at a moderate to high rate of speed (45-55 mph). In this area the proposed treatments are thinnings which would leave a substantial number of trees. Therefore, although they may notice light harvest activity it should not detract from their experience.

At the second viewpoint on Dead Indian Memorial Highway no effect to the casual observer traveling 45-55 mph down the highway is expected due to foreground screening and trees obscuring the view from the highway.

Heading south on Hyatt Prairie Road views of the ridgeline will be sustained and users will drive directly through an overstory/regeneration harvest unit. However, due to the rolling nature of this hillside, foreground screening, and large trees that are to be left, the units in view should not detract from the view of the casual observer. There could be slight change in texture (more coarse) and color (more brown).
Continuing down Hyatt Prairie Road toward Hyatt Lake viewers will pass through a variety of treatment areas. Viewers will intermittently drive along the edge of and through two small units prescribed for group tree removal but since the treatments along this road are primarily thinning areas resulting in changes in texture and color. These changes should not detract from the view of the casual observer.

Along Keno Access Road and Willow Creek Road back to Hyatt Prairie Road, treatment units should not be a distraction to the casual observer. Other than several small regeneration units, the primary treatments along these roads will be single and group tree selection, light and overstory thinning. With the flat to gentle terrain in this area foreground screening and the low impact treatments prescribed should mitigate visual impacts and ensure conformance with the VRM objectives. The proposed treatments should not result in a drastic change in appearance from the current condition since private timber lands along the road are in a variety of forest development stages. As a result the existing views are made up of a mixture of tree sizes, species, textures, and stand ages.

Contrast rating worksheets were completed for the viewsheds found at the identified key observation points. Based on the proposed prescriptions and project design features for the units within the project area, the project will meet visual resource management objectives for VRM Class 2 and Class 3 as designated in the 1995 Medford Resource Management Plan.

L. RECREATION

1. Affected Environment

Recreation in the project area consists of both summer and winter activities. This includes but is not limited to boating, fishing, camping (organized & dispersed), horseback riding, OHV riding, driving for pleasure, and hiking within the Hyatt-Howard Prairie Special Recreation Management Area (SRMA) or along the Pacific Crest National Scenic Trail (PCT). In the winter use on the Table Mountain winter trails system may be disrupted. Specifically around Keno Access Road, Hyatt Lake-Howard Prairie Road, Dead Indian Memorial Highway, and Deadwood as these routes are used by snowmobiles, nordic skiers, and snowshoers to access USDA Forest Service Lands, recreational trails and areas such as Table Mountain, Fish Lake, and Lake of the Woods (Figure 3-10).

2. Environmental Consequences

Short term effects will result during the harvest and timber hauling activities. During the summer months when use is highest recreational users would encounter log trucks hauling timber, noise from machinery, and some traffic congestion during falling activities near roadways. However, to provide for public safety during harvest operations increased signage would be placed along major routes of travel and flaggers used where appropriate.

If harvest activities occur on Keno Access Road during winter months the normal snowmobile use would be impacted. This route is used to access US Forest Service Lands to the north or used to come south off US Forest Service to access Hyatt-Howard Prairie SRMA.

In all users can expect to experience some short term effects as a result of timber harvesting activities but in the long term, effects to recreational users and the casual observer are not anticipated.
Figure 3-10. Jackson-Klamath Winter Trails Guide Map, showing multiple use trails (orange), nordic trails (blue), and Pacific Crest National Scenic Trail (PCT, dotted red) in the vicinity of Hyatt-Howard Prairie SRMA.

M. AIR QUALITY

Prior to Euro-American settlement, Native Americans created long periods of smoke by frequently burning the forests to create the necessary conditions to satisfy food, ceremonial, and cultural needs. With the advent of mining in the 1850’s, miners burned off large tracts of forest generating smoke. In the 1930’s to present day, organized wildland fire suppression resulted in much less smoke than prior to organized firefighting, except during wildfire events, especially in 1987 and 2002. As community development occurred in the Medford/Ashland Air Quality Management Area, increasing amounts of smoke (wood stoves, agriculture, and dust, from users on forest roads) increased particulates reducing air quality. Industrial particulates increased as lumber mills and the agricultural industry grew. An increase in the use of prescribed fire for fire and fuels management in the 1980’s added smoke to the Medford/Ashland area.

1. Affected Environment

In the recent past, the population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls have been in violation of the national ambient air quality standards for PM-10 and were 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 nonattainment area is smoke from woodstoves, 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 nine years the population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM-10. These areas are now (since January 2008) classified as Smoke Sensitive Receptor Areas (SSRA).
Air Quality - Pollutants

Air pollutants—called particulates—include dust, dirt, soot, and smoke. Particulates are emitted directly into the air by sources such as motorized vehicles, construction activity and fires, natural or prescribed. 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 (PM) smaller than 2.5 micrometers (PM 2.5) is a term used to describe airborne solid and liquid particles. Because of its small size, PM 2.5 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.
The pollutant most associated with the Medford District’s resource management activities is PM 2.5 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 2.5 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 smoke management and air quality conditions.

### 2. Environmental Consequences

**a. Alternative 1 - No Action**

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 Plateau Thin Project described under the Affected Environment.

Although sources of air particulates vary, air quality standards measure particulates regardless of their source. Prescribed burning activities unrelated to the Plateau Thin Project would comply with the guidelines established by the ODF Oregon Smoke Management Plan and the DEQ Visibility Protection Plan. Therefore, air quality standards for the communities of Grants Pass and Medford/Ashland will continue to be met, as current pollution standards and air quality measures continue to control the amount of PM 2.5 emissions.

Although no action would occur in association with the Plateau Thin Project, there is always a potential for wildfires occurring within forest lands surrounding the Rogue Valley Area. Air quality would be impacted in the event of a large wildfire. As has been experienced during past, smoke can enter the valleys as result of wildfires throughout southwest Oregon, impacting air quality for short periods throughout the Rogue Valley generally during the months of July, August, and September. Emissions from wildfires are substantially higher than from prescribed burning (RMP/EIS p. 4-10, 4-12). The wildfires which occurred in southern Oregon in 1987 emitted as much particulate matter as all the burning that occurred within the state that year.
b. Alternative 2 (Proposed Action)

This alternative proposes to use prescribed fire so consequently there would be some smoke related impacts. Prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan (OSMP) and the Visibility Protection Plan. Prescribed burning under this alternative is not expected to affect visibility within the Crater Lake National and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes) during the visibility protection period (July 1 to September 15). Prescribed burning is not routinely conducted during this period primarily due to the risk of an escaped wildfire.

Prescribed burning emissions, under this alternative is not expected to adversely effect annual PM 2.5 attainment within the Grants Pass, Klamath Falls, and Medford/Ashland SSRA. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

Prescribed burning would be scheduled primarily during the period starting in November and ending in June. This treatment period minimizes the amount of smoke emissions by burning when duff and dead woody fuel have the highest moisture content, which reduces the amount of material actually burned. Smoke dispersal is easier to achieve due to the general weather conditions that occur at this time of year.

Smoke effects are further reduced because burn sites would include mop-up to be completed as soon as practical after the fire, and hand piles would be covered to keep the material dry to permit burning during the rainy season when there is a stronger possibility of atmospheric mixing and/or scrubbing, thus dispersing the smoke.

The greatest potential for impacts from smoke intrusions is from underburning to localized drainages within and adjacent to the project area. Because underburning requires a low intensity burn, there is not the energy to lift the smoke away from the project site. Smoke retained on site could be transported into portions of non-attainment areas if it is not dispersed and diluted by anticipated weather conditions. Localized concentration of smoke in rural areas away from non-attainment areas may continue to occur during prescribed burning operations.

Because of actions to minimize smoke effects and because of DEQ smoke regulations, smoke associated with this alternative would not reduce the air quality of the Medford/Ashland Area. However, despite these measures, a few individuals would still be affected by a few hours (short duration) of smoke perhaps causing discomfort. Relief for these individuals is simply leaving the area for a short time. While smoke effects to these individuals are real, the effect of smoke from this alternative is very minor because it may affect only a few out of 150,000+ people (approximate population in the Medford/Ashland area).

Because smoke impacts are well within PM 2.5 standards there are no direct or indirect effects of any consequence to incrementally add to past, ongoing, and reasonably foreseeable air quality impacts. Hence, there are no cumulative effects from this alternative.
N. OTHER EFFECTS

a. Public Health and Safety

No aspects of the Plateau Thin Project have been identified as having the potential to significantly and adversely impact public health or safety.

b. Cultural Resources

This 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).

This project would have no effect on Indian Trust Resources as none exist in the project area. This project was determined to have no adverse effects on properties listed or eligible for listing on the National Register of Historic Places. This includes Native American religious or cultural sites, archaeological sites, or historic properties. The proposed project would have no adverse effects on known cultural resources.

c. 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

Scoping has occurred for the Plateau Thin Project. The Plateau Thin Forest Management Project appeared in the Ashland Resource Area’s Schedule of Proposed Actions published in Medford’s Messenger (BLM's quarterly newsletter) beginning with the fall 2007 edition and continuing through the Spring 2009 edition; the project was resubmitted for the Summer 2010 edition. Letters were sent November 30, 2007 to interested organizations, community groups, other agencies, tribes, adjacent land owners, and other individuals. The letter described the purpose and need for the proposed action and included a detailed description and map of the activities proposed. Several letters of comment and/or interest were received by the BLM in response to this public outreach. A copy of this Environmental Assessment was sent to individuals and the following businesses, organizations, and tribes:

Organizations and Agencies
Bureau of Reclamation
Cascadia Wildlands Project
Friends of the Greensprings
Indian Hill LLC
Klamath Siskiyou Wildlands Center
Mountcrest Limited Partnership
Oregon Wild
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Pacific Crest Trail Association – Northern California/Southern Oregon
Siskiyou Project
Small Woodlands Services
Soda Mountain Wilderness Council
Southern Oregon University Library

Federally Recognized Tribes
Confederated Tribes of the Grand Ronde Community of Oregon

Other Tribes
Latgawa Native American Indian Tribe
REFERENCES


Brady, J.; Robichaud, P.R.; Pierson, F.B. 2001. Infiltration rates after wildfires in the Bitterroot Valley. ASAE paper number 01-8003, presented at the 2001 ASAE Annual International Meeting sponsored by American Society of Agricultural Engineers, Sacramento Convention Center,


Clayton, James L. 1981. Soil Disturbance Caused by Clearcutting and Helicopter Yarding in the Idaho Batholith. Intermountain Forest and Experiment Station. Research Note INT-305


Countryman, C.M. 1955. Old-Growth Conversion Also Converts Fire Climate. Fire Control Notes: 15-19.


Oregon Climate Service. 2008. Climate of Klamath County.


Pullen, Reg. 1995. Overview of the Environment of Native Inhabitants of Southwest Oregon, Late Prehistoric Era. Medford BLM


Squyres, David. 2006. Personal conversation. BLM


Swanson and Dyrness. 1975. Reported in Amaranthus, 1985, p.233 (see above).


USDA, Forest Service (a). Pacific Northwest Region. Forest Disease Management Notes (503) 221-2727.


USDA, Forest Service and USDI, Bureau of Land Management. 1994a. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Portland, OR.


USDA, Forest Service and USDI, Bureau of Land Management. 2003b. Rogue River/South Coast Biological Assessment FY 04-08 for Activities that May Affect Listed Species in the Rogue River/South Coast Province for Medford District Bureau of Land Management, Rogue River and Siskiyou National Forests, 11 July 2003

USDA, Forest Service and USDI, Bureau of Land Management. 2004a. Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines. Portland, OR.


USDI, Bureau of Land Management. 2006. Formal consultation on activities that may affect listed species on public lands administered by the Medford District BLM (District) during fiscal years 2006 through 2008 (FY 06-08) (FWS Log #: 1-15-06-F-0162).


