ENVIRONMENTAL ASSESSMENT

for

BALD LICK LANDSCAPE PROJECT

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

EA No. OR-116-05-01

This environmental assessment (EA) for the proposed Bald Lick Landscape Project was prepared utilizing a systematic interdisciplinary approach integrating the natural and social sciences and the environmental design arts with planning and decision-making.

Public notice of the availability of this EA was provided through advertisement in Medford's *Mail Tribune* newspaper.

Errata #1

For the

2005 Bald Lick Environmental Assessment

Pg 1-6. Paragraph 2 reads: "3. There is a need to manage the transportation system within the project area to better serve the management of resource program areas (RMP p. including…)".

This sentence is missing the RMP page number and a right parenthesis. Insert page number 86 and a right parenthesis after RMP p.

Pgs. 2-4 through 2-9. Table 2-3. Alternatives 2 and 3 – Commercial Harvest Units by Silvicultural Prescription, Yarding System, and Fuels Treatments.

This table contains inconsistent abbreviations for the silvicultural prescriptions in the third column, Silvicultrual Prescriptions (Rx). Replace Table 2-3 with the attached Table 2-3 which has corrected the inconsistencies.

Pgs. 2-11 through 2-13. Table 2-5. Alternative 4 – Commercial Harvest Units by Silvicultural Prescription, Yarding System, and Fuels Treatments.

This table contains inconsistent abbreviations for the silvicultural prescriptions in the third column, Silvicultrual Prescriptions (Rx) and incorrectly listed the acreage for three units in the yarding system column. Replace Table 2-5 with the attached Table 2-5 which has corrected the inconsistencies and placed the acreages for units 29, 30/36, and 38/53 in the correct column.

Pg. 2-16. Paragraph 5, also labeled bullet (b). The last sentence of the paragraph incorrectly references bullet #1 above.

Change bullet #1 to bullet (a).

Pg. 2-20. The last sentence of paragraph 6, beginning with "This allows smoke to be lofted…" incorrectly references discussion on fall burning, section D, this Chapter.

This should be changed to read (see Chapter 4, Fire & Fuels).

Pg. 2-20. (1) Roads (see Appendix D for details)

This sentence incorrectly references Appendix D; the correct reference is Appendix C.

Pg. 2-27. Paragraph 1 sentence 2 reads: "In order to ensure that all areas needing Riparian Reserve protection were covered, BLM conducted exhaustive surveys of each drainage within the Bobar project area.

This sentence should be corrected to read: "In order to ensure that all areas needing Riparian Reserve protection were covered, BLM conducted exhaustive surveys of each drainage within the Bald Lick planning area (including the previously planned Bobar project area).

Pg. 3-23. Paragraph 2 beginning with "In another respect the historic fire regimen of these lower elevation areas..." and paragraph 3 beginning with "Several analyses of fire behavior types…"

These paragraphs were inadvertently duplicated and should be deleted to eliminate redundancy.

Pg.3-36. Footnotes #13-15 are incorrectly followed by a question mark.

Delete the question mark at the end of 1998 on footnotes #13-15.

Pg. 4-3. Footnote #1, last sentence of the second paragraph was inadvertently cut off.

This sentence should be corrected to read: The original location of the Bald Lime planning area boundary may have overlapped the McKee Bridge Applegate Watershed; however, this has since changed.

Pg. 4-73. Last paragraph, first sentence. This sentence is partially incorrect and incomplete.

This sentence should be corrected to read: While forest health and fuel hazard reduction would not occur under the No-Action Alternative, about 1,000 acres of fuels reduction would still occur in the planning area in association with the Little Applegate Fuels Reduction project, and another 2,164 acres of fuels reduction occurred in 2003/04 in association with the Bobar Landscape project.

Pg. 4-81. Paragraph five, last sentence beginning "If predicted climate changes do occur…"

This sentence referenced a paragraph that was inadvertently left out of the EA. The last sentence of paragraph five should be deleted and the following paragraph inserted after paragraph five:

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 Dacadal 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. Under the no action alternative, high fire hazard would remain in the project area, with a higher potential than the action alternatives for increased fire behavior if predicted climate changes do occur.

Pg. 4-82. Paragraph five. The reference listed, Wagtendonk 1996, is incorrect.

This reference should be corrected to read VanWagtendonk 1996.

Pg. 4-85. Paragraph two, beginning with About 1,000 acres of fuels reduction treatments.

The following sentence should be added to the end of paragraph two: Alternative 2 would treat the most acres and would therefore have the greatest effect on reducing the potential fire behavior in the event of a wildfire. Therefore, this alternative would also best mitigate the potential effects of predicted climate changes described under the No-Action Alternative.

Pg. 4-91. Paragraph 4, beginning with, "For one of the nine species (*Phaeocollybia californica…*" The Table referenced mid paragraph (Table 4-x) is incorrectly labeled.

This table reference should be corrected to read (Table 4-6).

Pg. 4-115. Fifth paragraph, last sentence. This sentence beginning with, "An analysis was completed to…" incorrectly references a table.

The table reference (Table 4-xx), should be corrected to read (Table 4-11).

Pg. 4-117. Second paragraph, first sentence. This sentence beginning with, "An analysis was completed to compare…" incorrectly references a table.

The table reference (Table 4-xx), should be corrected to read (Table 4-12).

References. The references section was updated to include a few references inadvertently left out as well as to correct several editorial errors. The corrected references section is attached.

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

EA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Bald Lick Landscape Project

EA NUMBER: OR-110-05-01

LOCATION: T. 39 S., R. 2 W., in sections 11-15, 17, 19-29, 33-36; T. 39 S., R. 1 W., in sections 17-21, 27-30; T. 40 S., R. 2 W., in section 2; W.M., Jackson County Oregon.

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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 Bald Lick Landscape proposal. This document 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 manual guidance on the National Environmental Policy Act of 1969 (516 DM 1-7).

B. WHAT IS BLM PROPOSING?

The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the Bald Lick Landscape Project, a forest management project, designed to implement the Bureau of Land Management's Medford District Record of Decision and Resource Management Plan (RMP) (USDI 1995). The overall effects of implementing the Medford District Resource Management Plan were analyzed and disclosed in the Medford District Proposed Resource Management Plan/Environmental Impact Statement (RMP/EIS) (USDI 1994).

The 5,939-acre Bald Lick Landscape project would thin trees and shrubs in conifer forest stands, woodlands (hardwoods such as oaks and madrone), and shrublands on BLM-administered lands in the Little Applegate and Applegate River-McKee Bridge Watersheds. The proposed action would utilize a combination of commercial timber sale contract(s) and service contracts to complete the proposed thinning. An estimated 5,113 acres of conifer forest thinning are proposed to be accomplished through one or more commercial timber sales. An estimated 1,675 acres are proposed for non-commercial thinning (an estimated 849 acres of pre-commercial thinning are within the commercial treatment units described above). An estimated 11.8 miles of new road construction is proposed to facilitate vehicle access to commercial thinning units. An estimated 16.4 miles of roads are proposed for decommissioning; 50.9 miles of roads are proposed for renovation work (road grading, rock surfacing, and water drainage improvements).

Four alternatives were considered and analyzed in detail, a No-Action Alternative, the Proposed Action (Alternative 2) and alternatives to the Proposed Action (Alternatives 3 and 4). A detailed description of BLMs Proposed Action and the alternatives is contained in Chapter 2, Alternatives.

The proposed Bald Lick Landscape Project is located in the Little Applegate and Applegate/McKee Bridge Watersheds, the legal description is: T. 39 S., R. 1 W., in sections 17-21, 28-31; T. 39 S., R. 2 W., in sections 7, 11, 13-15, 17-36; T. 39 S., R. 3 W., in sections 1,2, 10-15, 22-28, 33-36; T. 40 S., R. 2 W., in sections 2, 5, 6, 7; and T. 40 S., R. 3 W., in section 1, W.M., Jackson County Oregon (Map 2-1).

The Bald Lick Landscape Project is located within a 27,112 acre planning area. Of these acres, an estimated 21,000 acres are BLM-administered Oregon and California Railroad (O&C) lands; 163 acres are BLM-administered public domain lands; 160 acres are National Forest System lands, and an estimated 5,782 acres are privately owned. The project area is defined as the area where action is proposed. The planning area represents the consideration area for assessing current and desired forest, vegetation, and transportation system conditions related to the goals and objectives outlined in BLM's Medford District RMP.

C. NEED FOR THE BALD LICK PROJECT

The overall need for the Bald Lick Project is to implement the Management Actions/Direction of the Medford District Record of Decision and Resource Management Plan (RMP) within the Bald Lick planning area located in the Little Applegate and Applegate McKee-Bridge Watersheds. The following site-specific needs would be met through the implementation of the Bald Lick Project:

1. There is a need to thin forest stands using a combination of silvicultural systems described in the RMP (Appendix E p. 180-186, 192-194) to maintain and promote vigorously growing conifer forests composed of fire resilient tree species, to reduce tree mortality, to maintain individual or groups of trees with old-growth characteristics, and to maintain and promote large tree structure. (ROD/RMP p.62, 72-73).

Fire is recognized as a key natural disturbance process throughout southwest Oregon (Atzet and Wheeler 1982) (Agee 1993) (Applegate-Star/Boaz WA p. 46) (Little Applegate River Watershed Analysis p. 9). Historically, frequent, low intensity fires[1] maintained Douglas-fir and pine forest types in more open conditions than exist today (Agee 1993). While portions of the Bald Lick Project Area have been affected by wildfire in the last two to three decades (1987 Cantrall Fire, 1987 Lick Gulch Fire, the 2001 Quartz Fire, other miscellaneous small fires) large wildfires have not been recorded for much of the planning area since the early 1900s (Chapter 3, Fire & Fuels).

Because of the lack of frequent, low-intensity fire in recent history, the landscape in the Little Applegate and Applegate McKee Bridge Watersheds has changed (Star/Boaz WA p. 46), forest stand densities are increasing. Along with increases in stand densities there has been the shift in species composition. Douglas-fir, the climax species for some of the forested area, is replacing ponderosa pine, sugar pine, and incense cedar because of its more shade-tolerant nature. In some areas white fir is migrating to lower elevations and encroaching upon the Douglas-fir tree series

Many trees with old-growth characteristics are dying as a result of increased competition for limited resources from younger trees more recently established on the site. Douglas-fir trees, occurring on harsh dry sites historically occupied by pine, are experiencing moisture stress and are also being killed by Douglas-fir bark beetles. Pine series stands have experienced high levels of tree mortality due to stress caused by the competition from Douglas-fir trees and subsequent attacks by the western pine beetle. Mortality is also occurring in mid to mature vegetation classes due to Douglas-fir dwarf mistletoe infections (Appendix B, Silvicultural Prescriptions for Bald Lick)(Applegate-Star/Boaz WA p. 47-48, 110-111).

Relative density index is one measurement used to quantify the densities of forest stands. Imminent mortality and stem exclusion (forest stands begin to self-thin) is reached when the relative density index is 0.55 or greater. Relative Stand densities have been measured for the project area and range from 0.6 to 1.4. The Applegate-Star/Boaz and Little Applegate Watershed Analyses also identified concerns for declining forest health within the project area (Applegate-Star/Boaz WA, p. 110-111; Little Applegate Watershed Analysis p. 17-18).

[1] Some stand replacement fires may have occurred periodically prior to Euro-Amercian settlement, but were likely infrequent and of smaller size in comparison to fires experienced today (LAWA Veg report p. 10).

Forest thinning treatments are designed to maintain forest stands which are more fire resilient and resistant to insect and disease attacks. When exposed to drought, wildfire, insect attack, and human-induced changes, these forest stands remain productive and resilient over time. The same conditions that have led to high stand densities in upland areas also place Riparian Reserve habitats at risk to loss from insects and drought. Forest thinning treatments are designed for specific Riparian Reserves to maintain species composition and structural characteristics important to Riparian Reserve function

- The relative density index of stands within the project area should range between 0.30 and 0.50 to maintain vigor and growth (Applegate-Star/Boaz WA, p.129).

- Dry Douglas fir and ponderosa pine sites within the project area should be maintained at 60 to 120 ft^2 BA/AC[2] sites (USDA/USDI 1994 p.68 - Ecosystem Health Assess.) (Applegate River Watershed Assessment p. VIII-92).

- On harsh sites the species composition of stands should contain at least 25 percent ponderosa pine, which is a drought resistant species.

2. There is a need to treat hazardous fuels to reduce the risk of high intensity, stand replacing wildfires to protect and support land use allocations (RMP p. 91) and to reduce fuel hazards in rural interface areas (RMP p. 89).

As a result of the absence of fire, there is a build-up of fuels and a change to more fire-prone vegetative conditions. In most areas, surface fuels and ladder fuels have increased, which has increased the threat of fire spreading to the canopies of trees. While some disagree with the cause of fuels build-up or whether the level of fuels build up is greater than pre-fire exclusion levels (see Appendix E, Public Involvement), the fact remains that 40 percent of the Bald Lick planning area is characterized with a moderate fire hazard and 59 percent as high fire hazard. These hazard ratings developed for the project area characterize an existing fuel profile which represents a moderate to high resistance to control of fire under average climatic conditions, (see Chapter 3, Affected Environment, Fire & Fuels). Both BLM-managed resources and rural residential areas are threatened from a potential for high-intensity stand replacing wildfires.

The same conditions that have led to high stand densities and hazardous fuels in upland areas also place Riparian Reserve habitats at risk to loss from wildfire. Forest thinning and hazardous fuels reduction are designed for specific Riparian Reserves to maintain species composition and structural characteristics important to Riparian Reserve function while reducing fire hazard.

The following discussion describes the desired conditions with a reduced threat of high intensity, stand replacing wildfires.

A low fire hazard rating usually results in lower fire line intensity in the event of a wildfire, allowing for a more direct approach to fire suppression.

Agee (1996) also describes vegetation conditions that lead to manageable fire behavior:

- Surface fuel conditions that would limit the surface fireline intensity (flame lengths);

- Forested conditions comprised of fire tolerant trees and vegetation, described in terms of species, sizes and structures (arrangement and condition); and

- A low probability for crown fires (fire burning through the canopies of trees) to be initiated or spread through the forest (Agee 1996).

[2] Basal area is another measurement that is used to quantify the densities of forest stands

The Bald Lick Project is designed to retain and promote more fire tolerant trees such as pine and incense cedar to reduce surface, ladder, and aerial fuels such that the potential fire behavior and the initiation of crown a fire is reduced.

3. There is a need to manage the transportation system within the project area to better serve the management of resource program areas (RMP p. including timber resources, forest health, rural interface areas, water and soils, wildlife, and the Aquatic Conservation Strategy Objectives.

Currently the existing transportation system is insufficient to provide access to BLM-administered lands in need of forest management (see Need #1) making the management of those lands difficult and more expensive. Some roads are located in areas no longer serving resource program needs, some of these roads are located within Riparian Reserves, paralleling streams and contributing to sedimentation and riparian habitat fragmentation.

Roads throughout the project area have also been identified in need of maintenance to restore, repair, or improve road surfaces, culverts, and roadside drainage ditches in order to reduce road related erosion and sedimentation to stream courses.

Road construction, decommissioning and renovation is designed for the Bald Lick Project to improve road access to areas in need of forest management, reduce road densities in areas where the road system no longer serves resource program needs, and to maintain roads to reduce road related erosion and sedimentation to stream courses.

D. PURPOSE

This section describes the purposes to be accomplished while implementing the Bald Lick Project. These purposes are considered when evaluating and selecting a course of action among the alternatives considered.

Purpose #1: Maintain and promote Northern Spotted Owl Habitat within Critical Habitat within CHU OR-75.

Critical Habitat Unit OR-75 overlaps the Bald Lick planning area. Prior to the ROD/RMP and the NWFP, the US Fish and Wildlife Service (USFWS) designated critical habitat to protect the northern spotted owl as critical habitat units (CHUs) across Washington, Oregon, and northern California. The ROD/RMP and the NWFP designated a network of reserves (Late-Succesional, Riparian and other land use allocations) to provide habitat for northern spotted owl recovery. These reserves were not identical to the CHUs designated by the USFWS. This resulted in the RMP designating areas within the CHUs as Matrix lands which are allocated to the production of a sustainable supply of timber and other forest commodities.

Declining conifer forest conditions described under Purpose #1 are being experienced in CHU OR-75 as well. Silvicultural prescriptions would contribute to long-term maintenance of large tree structure and trees with old-growth characteristics.

Purpose #2. Design a project that is economically practical (RMP Appendix E, p. 180).

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. Portions of the project area are inaccessible from existing forest roads increasing the cost associated with forest treatments. The Bald Lick project is designed to improve the economic efficiency of implementing silvicultural systems to achieve forest health and timber management objectives.

Purpose #3. Contribution towards the Districts Allowable Sale Quantity

The Bald Lick Project Area is located on BLM-administered lands allocated to produce a sustainable supply of timber. There is a need to sell timber products produced from forest thinning treatments, in support of the District's Allowable Sale Quantity in order to meet Timber Resource Objectives (ROD/RMP p.17, 72-73).

Purpose #4. Consider the interests of rural residential land owners (RMP p. 88).

BLM-administered lands within ¼ of private rural residential lands are described and Rural Interface Areas in the Medford District RMP. The RMP provides guidance to the agency to determine how land owners might be affected by management activities on BLM-administered lands and to use project design features or mitigation to avoid or minimize impacts to health, life, property, and the quality of life (RMP p. 88).

Due to hazardous fuels conditions on BLM administer lands (as determined by fire hazard ratings described above) forest resources and residents living in the Rural Interface Areas threatened by the potential for high intensity stand replacing wildfire. The RMP guides the agency to reduce natural fuel hazards on BLM lands in rural interface areas.

E. CONFORMANCE WITH EXISTING LAND USE PLANS

The proposed activities are in conformance with and tiered to the *Medford District Record of Decision and Resource Management Plan* (RMP), and the Proposed Resource Management Plan Environmental Impact Statement (USDI 1995b), as amended by the March 22, 2004 *Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and *by the Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl to Clarify Provisions Relating to the Aquatic Conservation Strategy*. 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). These documents are available at the Medford BLM office and the Medford BLM web site at http://www.or.blm.gov/Medford/>.

F. RELATIONSHIP TO STATUTES, REGULATIONS, AND OTHER PLANS

The proposed action and alternatives are in conformance with the direction given for the management of public lands in the Medford District by the Oregon and California Lands Act of 1937 (O&C Act), Federal Land Policy and Management Act of 1976 (FLPMA), the Endangered Species Act (ESA), and the Clean Water Act.

Through implementation of the RMP, Aquatic Conservation Strategy, and Best Management Practices, the proposed action and alternatives are designed to attain the Oregon Department of Environmental Quality's Applegate Subbasin Total Maximum Daily Load (ODEQ 2003) for 303(d) listed streams on federal lands. Recovery goals for listed streams on federal lands in the Applegate Subbasin are identified in the *Water Quality Restoration Plan for the Applegate Subbasin* (BLM, USFS 2005:45-47). The proposed action and alternatives draw upon the passive and active restoration management actions recommended for achieving federal recovery goals.

G. RELEVANT ASSESSMENTS & PLANS

1. Watershed Analysis (USDA/USDI 1995 & USDI 1998)

Watershed Analysis is a procedure used to characterize conditions, processes and functions related to human, aquatic, riparian and terrestrial features within a watershed. Watershed analysis is issue driven; analysis teams of resource specialists identify and describe ecological processes of greatest concern establishing how those processes are functioning and recommend restoration activities and under what conditions management activities should occur. Watershed analysis is not a decision making process, rather watershed analyses establish the context for subsequent planning, project development, regulatory compliance and agency decisions (Federal Guide for Watershed Analysis 1995 p. 1).

The Bald Lick Project Area falls within portions of two separate watershed analysis areas; the Little Applegate and the Applegate-Star/Boaz Watershed Analysis Areas. Watershed analysis generally 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 Bald Lick Landscape project, has been collected and is considered along with existing information provided by the 1995 Little Applegate and the 1998 Applegate-Star/Boaz Watershed Analysis documents. Management Objectives and Recommendations of each Watershed Analysis document were considered and addressed as they applied to the Bald Lick proposal.

2. Applegate Adaptive Management Area (AMA) Ecosystem Health Assessment (USDA/USDI 1994)

An increase in dead and dying forest trees in southwest Oregon prompted land managers in from the Bureau of Land Management, Forest Service to appoint an interagency group to conduct and ecological assessment of the Applegate Watershed. The assessment was based on existing information and addressed primarily on terrestrial components of the ecosystem, focusing on long term health. Stand level recommendations for the attainment of forest health and fuels reduction are included in the Ecosystem Health Assessment (p. 64-68, and 70). Information included in the AMA Ecosystem Health Assessment was considered during the development and planning of the Bald Lick Landscape project.

3. Applegate Communities' Collaborative Fire Protection Strategy (2002 Applegate Fire Plan)

The Applegate Fire Plan is the result of a collaborative effort between local citizens and local and federal agencies to develop a strategy for addressing the high fire danger throughout the Applegate Valley. The main components of the plan include fire protection and suppression, fuel hazard reduction, and emergency communications. The plan is based on a foundation of neighbors cooperating with neighbors. The Applegate Fire Plan developed recommendations for nineteen strategic planning areas across the Applegate Watershed. The Bald Lick Project Area falls within portions of the Upper and Lower Little Applegate and Star Strategic Planning Areas of the Applegate Fire Plan. A common recommendation for all three Strategic Planning Areas is to plan and complete fire hazard reduction work associated with the Bald Lick and Bobar projects.

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

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

5. Applegate River Watershed Assessment: Aquatic, Wildlife, and Special Plant Habitat (USDI/USDA 1995);

The Applegate River Watershed Assessment, based on existing information, is not a decision document; the assessment provides an overview of conditions and trends related to aquatic, wildlife, and special plant habitats in the Applegate Watershed. The assessment includes recommendations for maintaining these habitats over the long-term; recommendations were considered during the development and planning of the Bald Lick Landscape project.

6. Applegate Adaptive Management Area (AMA) Guide (USDI/USDA 1998)

The Applegate AMA Guide was developed as a working document outlining how agencies expect to do business in the Applegate Watershed for the next several years. The guide is not a decision document. Key questions and strategies are outlined in the AMA Guide provides an overview of the physical, biological and social setting of the Applegate Watershed and includes key questions and strategies or approaches for management.

7. 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.

H. DECISIONS TO BE MADE

The Ashland Resource Area Field Manager must decide whether to implement the Proposed Action as designed or to select one of the alternatives considered (including 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 those impacts analyzed in the Medford District Resource Management Plan/EIS (USDI 1995) and the Northwest Forest Plan (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.

I. 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, (3) alternatives to the proposed action, and (4) potential environmental impacts of the proposed action.

Scoping has occurred for the Bald Lick Landscape Project. The Bald Lick Project as originally proposed in May 2003 was expanded in January 2004 when the Ashland Resource Area Field Manager decided to include treatment units that were previously analyzed under the Bobar Landscape Project Environmental Assessment (Appendix F, Project Development). Public outreach occurred for the original Bald Lick Landscape project, the previously planned Bobar project, and for the expanded Bald Lick project. Outreach included mailings to interested organizations, community groups, other agencies, tribes, adjacent land owners, and other individuals; newsletters; public meetings; public field trips; and meetings

with neighbors and organized neighborhood groups. Many letters and comments were received by the BLM in response to 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. Some issues identified as relevant to this project proposal were analyzed at a broader scale in association with the 1994 *Final Environmental Impact Statement for the Bureau of Land Management Medford District Proposed Resource Management Plan* and the 1994 *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(as amended)*. This EA will focus on addressing those issues ripe for decision at this level of environmental review, and will incorporate by reference broader level NEPA analysis where appropriate.

Issues were identified through specialist review and public input received. The following issues were determined by the ID Team to be ***key*** to the Bald Lick project development and/or analysis. Other issues were also identified. Those issues were also considered and addressed during project development (including project design features), environmental analysis (documented in this EA), and in Appendix E, Analysis of Comments Received.

1. Key Issues

Impacts to Hydrologic Function and Water Quality

- A small portion of the planning area is located within in a Key Watershed (upper portions of the Little Applegate, including First Water Gulch and other tributaries). The project needs to be designed to ensure no net increase in road density in the Key watershed.
- Even with planned decommissioning contributing to long-term improvements in watershed conditions, there are short-term increases in road densities and impacts on watershed conditions with new road construction. While there are immediate positive effects related to decreased channelization of water runoff and sediment routing, it takes time for vegetation to reclaim decommissioned roads and decades for full recovery (depending on the method of decommissioning and the condition of the road at the time it is decommissioned).
- Streams in the project area are listed as **303(d) streams** for varying reasons. Non-point source pollution (sedimentation) from management activities has the potential to degrade the aquatic ecosystem (e.g., reduced water quality for salmon, steelhead, and trout).
- Concerns were raised that logging and road construction could adversely effect hydrologic flow, peak flow and low flow, and potentially increase the adverse effects of flooding.

Potential for Impacts to Fish in the Little Applegate River.

Little Applegate River is an important fish stream (coho, steelhead, Pacific Lamprey). Fish populations are low and there is a coordinated effort among agencies and Applegate River Watershed Council to restore aquatic habitat in the Little Applegate. The upper Little Applegate is designated as Key Watershed for the recovery of at risk stocks of fish, a portion of the Key Watershed is within the planning area. There is concern that the Bald Lick proposal could potentially impact fish habitat and the recovery of fish populations in the Little Applegate River.

Watershed Condition - Cumulative Effects

There is potential for cumulative effects on watershed conditions within the Little Applegate Watershed from activities on BLM, Forest Service, and private lands.

Impacts Associated with Rural Interface Areas and Social Values

Noise

- Residents are concerned about reduced quality of life from increased noise associated with project operations (helicopters and increased traffic).

Roads

- Residents are concerned that new road construction would lead to increased access for Off-highway Vehicles (OHVs) and other vehicles increasing noise, fire risk, and the potential for vandalism on private property.
- There is a concern for public safety on roads accessing the project area during timber hauling operations.

Aesthetic Qualities and Undeveloped Character

- Some local residents and visitors value portions of the project area for its visual, aesthetic, and spiritual qualities which are provided by undeveloped landscapes (or the perception there of).
- Some people are concerned the Bald Lick proposal would target the removal of large trees.

Commercial use of Forest Products

- Some people are generally opposed to the commercial extraction of timber from public lands.
- Others value the use of timber products and support multiple resource use on public lands.

Impacts Associated with Economics

- There is potential for impacts to the economic feasibility of the overall project implementation due the high costs associated with handling large amounts of small diameter commercial and noncommercial material, limited road access in some areas, and road improvements that are needed for watershed maintenance and protection.

CHAPTER 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

A. INTRODUCTION

This chapter describes three action alternatives developed by the ID Team, one of which is the proposed action. In addition, a "No Action" alternative is presented to form a base line for analysis. An essential part of the Proposed Action and Alternatives are project design features (PDFs), which incorporate Best Management Practices as outlined in Appendix D of the RMP. The PDFs are included for the purpose of reducing or eliminating anticipated adverse environmental impacts. This chapter also describes optional mitigation measures that if selected may reduce potential impacts on physical, biological, or human environments of the project area.

B. ALTERNATIVES CONSIDERED IN DETAIL

1. Alternative 1 - No Action Alternative

The No Action alternative describes a baseline against which the effects of the action alternatives can be compared. This alternative describes the existing condition and the continuing trends. Under the No-Action Alternative, no vegetation management projects would be implemented; there would be no commercial cutting of trees, no roads would be constructed, decommissioned, or renovated, and there would be no hazardous fuels reduction. Only normal programmed road maintenance would be performed. Other management activities, including timber harvest and fuels reduction, would occur at other locations within Matrix (AMA) lands under separate NEPA analysis. Selection of the No-Action Alternative would not constitute a decision to reallocate these lands to non-commodity uses. Future harvesting, fuels reduction, and road management in this area would not be precluded and could be analyzed under a subsequent EA.

2. The Action Alternatives

This section describes the three action alternatives considered in detail, along with project design features. The components of the action alternatives summarized below are described in detail above.

a. Alternative 2 (Proposed Action)

Alternative 2, the Proposed Action, was developed to respond to the purposes and needs described in Chapter 1, Purpose and Need. The Proposed Action would treat 5,939 acres of vegetation using the various silvicultural prescriptions and treatment methods as described in Section B(3), Components of the Action Alternatives. Of these acres an estimated 5,113 acres are proposed for commercial timber harvesting using one or more timber sales to accomplish the proposed silvicultural treatments. Another 1,675 acres are proposed for non-commercial vegetation treatments; an estimated 1,341 acres of pre-commercial thinning (849 acres occurring within proposed commercial units; 492 acres pre-commercial thinning only) and 334 acres of non-commercial fuels reduction. Table 2-1 summarizes the vegetation treatments and methods prescribed. Unit specific information is displayed in Table 2-3.

This alternative would construct 11.8 miles of new road to provide access to proposed treatment areas. An estimated 50.9 miles would be renovated to maintain and improve watershed conditions and infrastructure investments. An estimated 16.4 miles of roads are proposed for decommissioning; 8.2 miles would be decommissioned naturally and 8.2 miles would be decommissioned mechanically.

There are twenty-nine existing helicopter landings to be used under both action alternatives. There are nineteen new helicopter landings planned under the Proposed Action.

Table 2-1. Vegetation Treatments-Alternative 2:

Commercial Silvicultural Prescriptions	**Acres**
Moist Douglas-fir Thinning	158
Dry Douglas-fir Thinning	2,643
Pine Site Thinning	1,684
Regeneration Harvest	254
Pole Stand Thinning	326
Mistletoe Treatments	48
Total	**5,113**
Non-commercial Prescriptions	
Pre-commercial thinning in conifer stands	1,341
Within proposed commercial treatment units	849
Pre-commercial thinning only	492
Fuels Reduction Treatments	334
Total	**1,675**
Treatment Methods	**Acres**
Commercial Timber Harvest	**5,113**
Helicopter Yarding	2,655
Cable Yarding	2,147
Tractor Yarding	312
Non-commercial Treatments	**1,675**
Cut, Handpile, and burn	1,457
Slashbuster Machine	79
Cut, lop & scatter (plantation thinning)	139

b. Alternative 3

This Alternative was developed to respond to the ecological and social concerns associated with new road construction. Alternative 3 reduces the miles of new road construction by 4.7 miles in comparison to the Proposed Action and would require an increase in the number of treatment acres that would require helicopter yarding due to reduced road access.

Alternative 3 would treat 5,939 acres of vegetation, the same as the Proposed Action, using the various silvicultural prescriptions and treatment methods as described in Section B(3), Components of the Action Alternatives. Of these acres an estimated 5,113 acres are proposed for commercial timber harvesting using one or more timber sales to accomplish the proposed silvicultural treatments. Another 1,675 acres are proposed for non-commercial vegetation treatments; an estimated 1,341 acres of pre-commercial thinning (849 acres occurring within proposed commercial units) and 334 acres of non-commercial fuels reduction. Table 2-2 summarizes the vegetation treatments and methods prescribed. Unit specific information is displayed in Table 2-3.

This alternative would construct 7.1 miles of new road to provide access to proposed treatment areas. An estimated 50.9 miles would be renovated to maintain and improve watershed conditions and infrastructure investments. An estimated 17.5 miles of roads are proposed for decommissioning; 8.2 miles would be decommissioned naturally and 9.3 miles would be decommissioned mechanically.

There are twenty-nine existing landings to be used under both action alternatives. There are sixteen new landings proposed under Alternative 3.

Table 2-2. Vegetation Treatments – Alternative 3:

Commercial Silvicultural Prescriptions	**Acres**
Moist Douglas-fir Thinning	158
Dry Douglas-fir Thinning	2643
Pine Site Thinning	1,684
Regeneration Harvest	254
Pole Stand Thinning	326
Mistletoe Treatments	48
Total	**5,113**
Non-commercial Prescriptions	
Pre-commercial thinning in conifer stands	1,341
Within proposed commercial treatment units	849
Pre-commercial thinning only	492
Fuels Reduction Treatments	334
Total	**1,675**
Treatment Methods	
Commercial Timber Harvest	**5,113**
Helicopter Yarding	2,987
Cable Yarding	1,833
Tractor Yarding	293
Non-commercial Treatments	**1,675**
Cut, Handpile, and burn	1,457
Slashbuster Machine	79
Cut, lop and scatter (precommercial thinning)	139

Table 2-3. Alternatives 2 and 3 - Commercial Harvest Units by Silvicultural Prescription, Yarding System, and Fuels Treatments

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 2 Yarding System	Alternative 3 Yarding System	Fuels Treatments
1	3	P	H	H	HP/UB/SL
2a	2	P	H	H	HP/UB/SL
2b	1	P	H	H	HP/UB/SL
3a	1	P	H	H	HP/UB/SL
3b	2	P	H	H	HP/UB/SL
3c	1	P	H	H	HP/UB/SL
4a	4	P	H	H	HP/UB/SL
4b	7	P	H	H	HP/UB/SL
4c	1	P	CR	CR	HP/UB/SL
5	1	P	H	H	HP/UB/SL
6	4	P	H	H	HP/UB/SL
7	13	P	H	H	HP/UB/SL
8	8	DDF	H	H	HP/UB/SL
9	9	P	H	H	HP/UB/SL
9	4	P	CR	CR	HP/UB/SL
10	12	P	CR	CR	HP/UB/SL
11	9	DDF	H	H	HP/UB/SL
11	54	DDF	PS	PS	HP/UB/SL
12	12	DDF	PS	PS	HP/UB/SL
12	2	DDF	H	H	HP/UB/SL
13	17	P	H	H	HP/UB/SL
13	3	DDF	H	H	HP/UB/SL
14	6	DDP	CR/H	CR/H	HP/UB/SL
17	33	DDP/P	H	H	HP/UB/SL
18a	100	DDF	CR/PS/H	CR/PS/H	HP/UB/SL
18b	34	DDF	CR/PS/H	CR/PS/H	HP/UB/SL
19	39	DFP/DDF	H	H	HP/UB/SL
20	47	DFP/DDF	H	H	HP/UB/SL
24	40	DDF	H	H	HP/UB/SL
25	17	DDF	H	H	HP/UB/SL
27	15	DDF	PS	PS	HP/UB/SL
29	20	DDF/DDF/P	PS/H	PS/H	HP/UB/SL
30/36	74	DDP/DDF	H	H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 2 Yarding System	Alternative 3 Yarding System	Fuels Treatments
31	3	DDF	H	H	HP/UB/SL
32a	13	DDF	H	H	HP/UB/SL
32b	3	DDF	H	H	HP/UB/SL
33	1	DDF	H	H	HP/UB/SL
34	12	DDF	PS/H	PS/H	HP/UB/SL
35	5	DDF	H	H	HP/UB/SL
37	12	DDF	H	H	HP/UB/SL
38/53	200	DDF/DFR/P	PS/H	PS/H	HP/UB/SL
40	3	P	H	H	HP/UB/SL
41a	1	DDF	H	H	HP/UB/SL
41b	4	DDF	H	H	HP/UB/SL
42n	2	DDF	PS	PS	HP/UB/SL
42	53	DDF/DFR	CR/PS	CR/PS	HP/UB/SL
43	6	DDF	H	H	HP/UB/SL
46/47	36	DDF/P	PS/H	PS/H	HP/UB/SL
48	28	DDFDFR/P	PS/H	PS/H	HP/UB/SL
49	27	DDF/DFP	H	H	HP/UB/SL
50	6	DDF	H	H	HP/UB/SL
51	7	DDF	H	H	HP/UB/SL
52	9	DDF	H	H	HP/UB/SL
54	18	DDF	H	H	HP/UB/SL
55	135	DDF/DFP/ DFR	H	H	HP/UB/SL
56a	20	P	H	H	HP/UB/SL
56b	4	P	CR	CR	HP/UB/SL
57	2	DDF	H	H	HP/UB/SL
58	7	P	H	H	HP/UB/SL
59a	4	DDF	H	H	HP/UB/SL
59b	5	DDF	H	H	HP/UB/SL
61	22	DDF	H	H	HP/UB/SL
62	104	DDF/DFP/P	CR/PS/H	CR/PS/H	HP/UB/SL
64a	188	DDF/DFP/P	PS/H	PS/H	HP/UB/SL
64b	28	DDF	H	H	HP/UB/SL
65	5	DDF	PS/H	PS/H	HP/UB/SL
66	6	DDF	H	H	HP/UB/SL
67	3	DDF	H	H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 2 Yarding System	Alternative 3 Yarding System	Fuels Treatments
68	11	DDF/DFP/P	PS/H	PS/H	HP/UB/SL
69	4	P	PS	PS	HP/UB/SL
70	4	DFP	PS	PS	HP/UB/SL
72a	31	DDF/DFP/P	PS/H	PS/H	HP/UB/SL
72b	9	P	PS/H	PS/H	HP/UB/SL
73	25	DDF/DFP/P	H	H	HP/UB/SL
74a	6	P	CR/PS	CR/PS	HP/UB/SL
74b	6	P	CR/PS	H	HP/UB/SL
74c	3	P	PS	H	HP/UB/SL
74d	121	DDF/DFP/ DFR/P	CR/PS/H	CR/PS/H	HP/UB/SL
74e	28	DDF/DFR	CR/PS	CR/PS	HP/UB/SL
74f	67	DDF/DFP/P	PS/H	H	HP/UB/SL
74g	15	P	PS/H	H	HP/UB/SL
75	8	P	H	H	HP/UB/SL
76a	2	P	H	H	HP/UB/SL
76b	3	P	H	H	HP/UB/SL
77	4	DDF	H	H	HP/UB/SL
78	6	DDF	H	H	HP/UB/SL
79	18	DDF	H	H	HP/UB/SL
80	10	DDF	H	H	HP/UB/SL
84	31	DDF	PS/H	PS/H	HP/UB/SL
B1	35	DDF	CR/PS	H	HP/UB/SL
B2	14	DDF	CR	H	HP/UB/SL
B3	31	Pi	H	H	HP/UB/SL
B4	8	DDF,Pi	H	H	HP/UB/SL
B6	38	DDF	H	H	HP/UB/SL
B7	3	Pi	H	H	HP/UB/SL
B8	8	PI,Po	H	H	HP/UB/SL
B9	24	Pi,Po	H	H	HP/UB/SL
B10	4	Pi	H	H	HP/UB/SL
B13	30	Pi	H	H	HP/UB/SL
B14	13	Pi	H	H	HP/UB/SL
B15	6	Pi	H	H	HP/UB/SL
B16	10	Pi	H	H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 2 Yarding System	Alternative 3 Yarding System	Fuels Treatments
B17	17	Pi	H	H	HP/UB/SL
B18	19	Pi	H	H	HP/UB/SL
B19	6	DDF	H	H	HP/UB/SL
B21	6	DDF	PS/H	H	HP/UB/SL
B22	13	MDF	PS/H	H	HP/UB/SL
B24	109	DDF, MDF, Pi, Po	CR/PS/H	H	HP/UB/SL
B25	50	MDF,Pi	H	H	HP/UB/SL
B26	28	Pi	H	H	HP/UB/SL
B27	269	DDF,MDF, M,Pi ,Po	CR/PS/H	CR/PS/H	HP/UB/SL
B28	2	M	H	H	HP/UB/SL
B29	4	P*i*	H	H	HP/UB/SL
B30	3	DDF,Pi	H	H	HP/UB/SL
B31	8	DDF	H	H	HP/UB/SL
B32	11	DDF	PS/H	PS/H	HP/UB/SL
B33	252	DDF,MDF,Pi	CR/PS/H	CR/PS/H	HP/UB/SL
B34	8	DDF	H	H	HP/UB/SL
B35	10	Pi	PS/H	PS/H	HP/UB/SL
B36	350	DDF,OGR, M,Pi,Po	CR/PS/H	CR/PS/H	HP/UB/SL
B37	6	DDF	PS/H	PS/H	HP/UB/SL
B38	1	DDF	H	H	HP/UB/SL
B39	2	DDF	H	H	HP/UB/SL
B40	117	DDF,Pi,Po	CR/PS/H	PS/H	HP/UB/SL
B41	28	DDF,Po	CR/PS/H	CR/PS/H	HP/UB/SL
B42	9	DDF,Po	PS	PS	HP/UB/SL
B43	48	Pi,Po	CR/PS/H	CR/PS/H	HP/UB/SL
B44	4	DDF	H	H	HP/UB/SL
B45	2	Pi	PS	PS	HP/UB/SL
B46	47	DDF,Po	PS	PS	HP/UB/SL
B47	1	Pi	H	H	HP/UB/SL
B48	14	Pi	CR/PS	CR/PS	HP/UB/SL
B49	10	Pi	CR/PS/H	CR/PS/H	HP/UB/SL
B50	12	Pi	H	H	HP/UB/SL
B52	308	DDF,MDF. OGR,Pi,Po	CR/PS/H	CR/PS/H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 2 Yarding System	Alternative 3 Yarding System	Fuels Treatments
B53	1	Po	PS	PS	HP/UB/SL
B54	3	Pi	PS	PS	HP/UB/SL
B55	30	Pi	PS/H	H	HP/UB/SL
B56A	58	DDF	H	H	HP/UB/SL
B56B	5	DDF	H	H	HP/UB/SL
B56C	197	DDF,Pi	CR/PS/H	CR/PS/H	HP/UB/SL
B57	13	DDF,Pi	CR/H	CR/H	HP/UB/SL
B58	7	DDF	H	H	HP/UB/SL
B59	16	Pi	CR	CR	HP/UB/SL
B60	3	Pi	PS	PS	HP/UB/SL
B61	119	DDF,Pi,Po	CR/PS/H	CR/PS/H	HP/UB/SL
B62	129	DDF,Pi	PS/H	PS/H	HP/UB/SL
B63	1	OGR	PS	PS	HP/UB/SL
B64	50	DDF,Pi	CR/PS/H	CR/PS/H	HP/UB/SL
B65	1	DDF	H	H	HP/UB/SL
B66	5	Pi	H	H	HP/UB/SL
B67	6	DDF	H	H	HP/UB/SL
B68	9	DDF	H	H	HP/UB/SL
B69	49	DDF,OGR	PS/H	PS/H	HP/UB/SL
B70	113	DDF,MDF,Pi	CR/PS/H	CR/PS/H	HP/UB/SL
B71	52	MDF	PS	PS	HP/UB/SL
B72	5	MDF	PS	PS	HP/UB/SL
B73	1	DDF	PS	PS	HP/UB/SL
B74	2	Pi	CR	CR	HP/UB/SL
B75	5	Pi	CR/H	CR/H	HP/UB/SL
B76	3	Pi	H	H	HP/UB/SL
B77	3	Pi	H	H	HP/UB/SL
B78	15	Pi	H	H	HP/UB/SL
B79	23	Po	H	PS/H	HP/UB/SL
B80	2	Pi	PS	PS	HP/UB/SL
B81	15	Po	H	H	HP/UB/SL
B82	1	Po	H	H	HP/UB/SL
B83	1	M	PS	PS	HP/UB/SL
B84	2	M	PS	PS	HP/UB/SL
B85	1	DDF	H	H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 2 Yarding System	Alternative 3 Yarding System	Fuels Treatments
B86	81	Pi	CR/PS/H	CR/PS/H	HP/UB/SL
B87	16	DDF	PS	PS	HP/UB/SL
B88	6	MDF	PS	PS	HP/UB/SL
B89	7	Pi	PS	PS/H	HP/UB/SL
B90	5	DDF	CR	CR	HP/UB/SL
B91	38	Pi	PS/H	PS/H	HP/UB/SL
R1	15		CR	CR	HP/SL

Silvicultural Prescriptions	Yarding System	Fuels Management
Pi = Pine Site Treatments DDF – Dry Douglas-fir thin MDF – Moist Douglas fir thin M – Mistletoe Prescription OGR- Old growth Reinitiation Po – Pine/Douglas fir Pole thinning	CR – Crawler Tractor PS – Cable H – Helicopter	SL- thin small diameter (<8" diameter) trees and shrubs HP – handpile and burn piles UB –prescribed underburn

c. Alternative 4

This alternative defers forest and vegetation thinning within designated Critical Habitat (specifically, CHU OR-75) at this time to maintain existing northern spotted owl nesting, roosting, foraging, and dispersal habitat in its current condition. Alternative 4 would treat 2,680 acres outside of Critical Habitat Unit OR-75 using the various silvicultural prescriptions and treatment methods, as described in Section B(3), Components of the Action Alternatives, to improve forest stand growth and reduce hazardous fuels. Of these acres an estimated 2,282 acres are proposed for commercial timber harvesting using one or more timber sales to accomplish the proposed silvicultural treatments. Another 887 acres are proposed for non-commercial vegetation treatments; an estimated 786 acres of pre-commercial thinning (538 acres occurring within proposed commercial units) and 150 acres of non-commercial fuels reduction. Table 2-4 summarizes the vegetation treatments and methods prescribed. Unit specific information is displayed in Table 2-5.

This alternative would construct 4 miles of new road outside of CHU OR-75 to provide access to proposed treatment areas. An estimated 20.8 miles would be renovated to maintain and improve watershed conditions and infrastructure investments. An estimated 6.9 miles of roads are proposed for decommissioning; 2.8 miles would be decommissioned naturally and 4.1 miles would be decommissioned mechanically.

Alternative 4 would utilize 18 existing helicopter landings; nine new landings would be constructed under this alternative.

Table 2-4. Vegetation Treatments – Alternative 4:

Commercial Silvicultural Prescriptions	**Acres**
Moist Douglas-fir Thinning	46
Dry Douglas-fir Thinning	1,166
Pine Site Thinning	814
Regeneration Harvest	109
Pole Stand Thinning	99
Mistletoe Treatments	48
Total	**2,282**
Non-commercial Prescriptions	
Pre-commercial thinning in conifer stands	786
Within proposed commercial treatment units	538
Pre-commercial thinning only	248
Fuels Reduction Treatments	150
Total	**936**
Treatment Methods	**Acres**
Commercial Timber Harvest	**2,282**
Helicopter Yarding	1,309
Cable Yarding	820
Tractor Yarding	153
Non-commercial Treatments	
Cut, Handpile, and burn	669
Slashbuster Machine	79
Cut, lop and scatter (precommercial thinning)	139

Table 2-5. Alternative 4 - Commercial Harvest Units by Silvicultural Prescription, Yarding System, and Fuels Treatments

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 4 Yarding System	Fuels Treatments
1	3	P	H	HP/UB/SL
2a	2	P	H	HP/UB/SL
2b	1	P	H	HP/UB/SL
3a	1	P	H	HP/UB/SL
3b	2	P	H	HP/UB/SL
3c	1	P	H	HP/UB/SL
4a	4	P	H	HP/UB/SL
4b	7	P	H	HP/UB/SL
4c	1	P	CR	HP/UB/SL
5	1	P	H	HP/UB/SL
6	4	P	H	HP/UB/SL
7	13	P	H	HP/UB/SL
8	8	DDF	H	HP/UB/SL
9	9	P	H	HP/UB/SL
9	4	P	CR	HP/UB/SL
10	12	P	CR	HP/UB/SL
11	9	DDF	H	HP/UB/SL
11	54	DDF	PS	HP/UB/SL
12	12	DDF	PS	HP/UB/SL
12	2	DDF	H	HP/UB/SL
13	17	P	H	HP/UB/SL
13	3	DDF	H	HP/UB/SL
14	6	DDP	CR/H	HP/UB/SL
14	3			
17	33	DDP/P	H	HP/UB/SL
18a	100	DDF	CR/PS/H	HP/UB/SL
18b	34	DDF	CR/PS/H	HP/UB/SL
19	39	DFP/DDF	H	HP/UB/SL
20	47	DFP/DDF	H	HP/UB/SL
24	40	DDF	H	HP/UB/SL
25	17	DDF	H	HP/UB/SL
27	15	DDF	PS	HP/UB/SL
29	20	DDF/DDF/P	PS/H (19)	HP/UB/SL
30/36	74	DDP/DDF	H (34)	HP/UB/SL
31	3	DDF	H	HP/UB/SL
32a	13	DDF	H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 4 Yarding System	Fuels Treatments
32b	3	DDF	H	HP/UB/SL
37	12	DDF	H	HP/UB/SL
38/53	200	DDF/DFR/P	H (43)	HP/UB/SL
40	3	P	H	HP/UB/SL
41a	1	DDF	H	HP/UB/SL
41b	4	DDF	H	HP/UB/SL
42n	2	DDF	CR/PS	HP/UB/SL
42	53	DDF/DFR	H	HP/UB/SL
55	135	DDF/DFP/ DFR	H	HP/UB/SL
56a	20	P	H	HP/UB/SL
56b	4	P	CR	HP/UB/SL
57	2	DDF	H	HP/UB/SL
65	5	DDF	PS/H	HP/UB/SL
66	6	DDF	H	HP/UB/SL
67	3	DDF	H	HP/UB/SL
69	4	P	PS	HP/UB/SL
76a	2	P	NT	HP/UB/SL
76b	3	P	NT	HP/UB/SL
77	4	DDF	H	HP/UB/SL
78	6	DDF	H	HP/UB/SL
79	18	DDF	H	HP/UB/SL
80	10	DDF	H	HP/UB/SL
B1	35	DDF	C/PS	HP/UB/SL
B2	14	DDF	CR	HP/UB/SL
B21	6	DDF	H	HP/UB/SL
B22	13	MDF	H	HP/UB/SL
B24	109	DDF, MDF, Pi, Po	H	HP/UB/SL
B25	50	MDF,Pi	H	HP/UB/SL
B26	28	Pi	H	HP/UB/SL
B27	269	DDF,MDF, M,Pi ,Po	CR/PS/H	HP/UB/SL
B28	2	M	H	HP/UB/SL
B32	11	DDF	PS/H	HP/UB/SL
B33	252	DDF,MDF,Pi	CR/PS/H	HP/UB/SL
B34	8	DDF	H	HP/UB/SL
B35	10	Pi	PS/H	HP/UB/SL
B36	350	DDF,OGR, M,Pi,Po	CR/PS/H	HP/UB/SL

Unit No.	Acres	Silvicultural Prescription (Rx)	Alternative 4 Yarding System	Fuels Treatments
B37	6	DDF	PS/H	HP/UB/SL
B38	1	DDF	H	HP/UB/SL
B39	2	DDF	H	HP/UB/SL
B74	2	Pi	CR	HP/UB/SL
B75	5	Pi	CR/H	HP/UB/SL
B76	3	Pi	H	HP/UB/SL
B77	3	Pi	H	HP/UB/SL
B78	15	Pi	H	HP/UB/SL
B79	23	Po	PS/H	HP/UB/SL
B80	2	Pi	PS	HP/UB/SL
B81	15	Po	H	HP/UB/SL
B82	1	Po	H	HP/UB/SL
B83	1	M	PS	HP/UB/SL
B84	2	M	PS	HP/UB/SL
B85	1	DDF	H	HP/UB/SL
B86	81	Pi	CR/PS/H	HP/UB/SL
B87	16	DDF	PS	HP/UB/SL
B88	6	MDF	PS	HP/UB/SL
B89	7	Pi	PS	HP/UB/SL
B90	5	DDF	CR	HP/UB/SL
B91	38	Pi	PS/H	HP/UB/SL

Silvicultural Prescriptions	Yarding System	Fuels Management
Pi = Pine Site Treatments DDF – Dry Douglas-fir thin MDF – Moist Douglas fir thin M – Mistletoe Prescription OGR- Old growth Reinitiation Po – Pine/Douglas fir Pole thinning	CR – Crawler Tractor PS – Cable H – Helicopter	SL- thin small diameter (<8” diameter) trees and shrubs HP – handpile and burn piles UB –prescribed underburn

3. Components Common to the Action Alternatives

a. Vegetation Treatments

(1) Commercial Conifer Forest Thinning – Selected conifer stands are proposed for thinning to reduce stand densities to help restore the health and vigor of the remaining trees by reducing competition. Selective tree cutting would generally involve the removal of the smaller diameter trees within a stand allowing the larger, healthier trees to grow. Trees are marked for thinning within proposed treatment units by BLM personnel; oversight is provided by the Ashland Resource Area silviculturist to ensure that treatment units are properly marked according to the silvicultural prescriptions and marking guidelines.

The prescriptions are landscape oriented to respond to variations in forest stand and site conditions. As the BLM tree markers move through a stand, they may transition from homogenous dry Douglas-fir to mixed Douglas-fir forest with scattered old growth trees and an occasional 1-2 acre patch of pine savannah; the prescription would flex accordingly. Overlain over the prescriptions are layers of

instructions to address special situations as they arise. For example, there will be some "group selections", which would clear the trees out from below the crowns of old growth and/or pine trees. Other examples include specifications to leave canopy over large-diameter Coarse-Woody Debris (to retain moisture), thin to manage the special occurrence of pines with healthy native grass understories, and to leave all large-diameter hardwoods for vertical and horizontal structure. Except for within desingated understory reintiation prescription areas, mark no old-growth trees. Locate group selection areas to avoid the harvest of old-growth trees. Old-growth trees also have the following characteristics:

- Significantly 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).

- Exhibits 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.

- Thick bark; Douglas-fir will have 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.

All of these layers serve to make the prescriptions complex. Prescriptions are applied to treatment areas by a BLM tree marking crew. The Resource Area Silviculturist provides oversight and training to the BLM marking crew. The following summarizes variations in prescriptions based on stand types. Detailed silvicultural prescriptions and marking guidelines are included in Appendix B, Silviculture.

Moist Douglas-fir: Moist Douglas-fir sites are typically found on the more northerly facing slopes. The prescription involves thinning from below (the removal of smaller diameter trees within a stand allowing the larger, healthier trees to grow) and creating or maintaining structural diversity. The following treatment variations would occur based on existing forest stand characteristics:

(a) Homogeneous large pole-sized (11 to 21 inches dbh) stands would be thinned to 100 to 160 $ft^{2/}$ basal area (.005454 x tree diameter ^{2} which is calculated for each tree in a plot of designated size), equating to 3 to 15 foot spacing between tree crowns (crown-spacing).
(b) Trees with old-growth characteristics would be retained, and second growth trees would be cut within and surrounding the dripline to create an approximate 25-foot crown spacing surrounding the old-growth tree. 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.
(c) Trees of varying crown classes (intermediate, co-dominant, dominant) would be retained to maintain structural diversity.
(d) Small openings (1/7 to 1/6 acre), also referred to as group selection areas, could be created where openings in the crown canopy already exist (group selection areas must be rock and ravel free). This creates space for the establishment and or the growth of young healthy Douglas-fir trees already in the understory. Openings would be no closer than 300 feet between the edges of openings. The area between created openings can be commercially thinned using the basal area and crown spacing guidelines discussed above and may also be pre-commercially thinned.
(e) Where small patches (1/5 to 1 acre in size) of old-growth trees are encountered, selectively thin only second-growth trees from below trees with old-growth characteristics. For a radius of 200 feet surrounding the patch of old-growth, selectively thin trees leaving the most vigorous trees within various crown classes. In this area leave an average of 16 to 25 trees per acre to maintain at least a 35-foot spacing between the crowns of trees. This prescription can be applied wherever small patches of old-growth trees are found to help create structural diversity.

Dry Douglas-fir: Dry Douglas fir sites typically have west, southwest, southeast, and east aspects. The prescription involves thinning from below, creating openings to allow ponderosa pine to become established, and creating or maintaining structural diversity.

(a) Homogenous Douglas-fir stands would be thinned to 80-140 $ft^{2/}$ basal area per acre; if stands are patchy or have widely spaced trees use crown spacing guidelines and thin stands to 10 to 25 feet between tree crowns. Leave the most vigorous dominant and codominant trees with the best crowns (greater than 30 percent crown ratio).
(b) Trees with old-growth characteristics would be retained.
(c) Create 1/5 to 1-acre openings around individual pine or old-growth trees; leave 20 to 40 ft^2 basal area per acre of healthy pine or incense cedar when they are available in the created opening. Adjacent to openings, for a distance of the average tree height of the stand being treated, thin trees to 80 ft^2 basal area per acre. Openings should be naturally spaced depending on the location of good seed trees, and should be no closer than 100 feet between the edges of openings. For the remaining area between openings, thin trees using the basal area and crown spacing prescription described above.
(d) Where small patches (1/5 to 1 acre in size) of old-growth trees are encountered, selectively thin only second-growth trees from below trees with old-growth characteristics. For a radius of 200 feet surrounding the patch of old-growth, selectively thin trees leaving the most vigorous trees within various crown classes. In this area leave an average of 16 to 25 trees per acre to maintain at least a 35-foot spacing between the crowns of trees.

Pine Site Prescription (Dry Ponderosa Pine): These sites are typically small in size and found on dry ridges and low elevations. Sites have south, southwest, and southeast aspects. These sites are also identified by the presence of ponderosa pine, black or white oak, and whiteleaf manzanita (either live or dead) in the understory. Poison oak may or may not be present. These stands may have developed understories of Douglas-fir as a result of fire exclusion. The objectives of treatment on these sites is the retention of existing large ponderosa pine, the development of young pine, and to reduce stand basal area to reduce competition and improve tree vigor and growth.

(a) Thinning treatments would leave the best, healthiest pine and remove the majority of Douglas-fir trees to allow the pine to once again dominate the site. Suppressed, damaged, or beetle infested pines would be thinned. Approximately 16 to 25 trees per acre would be left; an additional 10 to 20 basal area of conifer trees 7 to 11 inches dbh would also be left if available. The spacing in between the crowns of trees would be approximately 15 to 35 feet. Older Douglas-fir trees that developed as open grown trees along with older pine trees would be favored as leave trees.
(b) Leave all hardwood trees; thin conifers shading oak species.
(c) Create 1/5 to 1-acre openings around individual pine or old-growth trees. Post harvest evaluation would determine the need for inter-planting where natural regeneration is not present and/or where needed to establish desired pine regeneration.

Pine Site Prescription (Predominantly Ponderosa Pine with Grass Savanah): These sites tend to be microenvironments located on ridges, southeast to west aspects, and hot, droughty sites. Sometimes slopes are gentle to flat bench like areas. Common components of this plant association are California fescue and hairy honeysuckle. The objectives of treatment for these sites are to retain the most vigorous pine trees, maintain sites as predominantly pine, and to encourage natural pine regeneration.

(a) Thinning treatments would leave the best, healthiest pine and remove the majority of Douglas-fir trees to allow the pine to once again dominate the site. Thin pine sites to retain 15 to 20-foot spacing between the crowns of trees; leave all healthy dominant and codominant pine trees. Only pine trees that are intermediate or suppressed (less than 30 percent crown ratio) pine, damaged, or beetle infested would be thinned.
(b) The area around pine site patches, for a distance of the average tree height of the stand being treated, would be thinned to 60 to 80 ft^2 basal area per acre.

(c) One acre openings can be created around individual yellow bark, old-growth pine trees. Leave healthy pine and all incense cedar trees in created openings. Post harvest evaluation would determine the need for inter-planting where natural regeneration is not present and/or where needed to establish desired pine regeneration.
(d) Trees with old-growth characteristics would be retained.

Areas of Severe Bark Beetle Infestation: These areas are most likely to be encountered on the dryer sites such as the dry Douglas-fir sites and Pine sites. The objective of thinning is to reduce forest stand density and tree competition to improve the vigor of the remaining trees and increase their ability to pitch out bark beetles.

(a) Thin stands to 15 to 35-foot crown spacing, leaving the most vigorous trees with the best crowns, oak trees 10 inches dbh and greater, and trees with old-growth characteristics. Mark dying trees with dead tops or thinning needles, green Douglas fir with bark removed by woodpeckers, and suppressed trees with crown ratios less than 30 percent. Clear beneath the crowns of pine trees.
(b) When pine or cedar trees are present, create 1/5 to 1-acre openings; leave 20 to 40 ft^2 basal area per acre of healthy pine or incense cedar when they are available. Openings should be positioned with a large ponderosa pine (with old-growth characteristics if available) located in center of openings. Openings should be naturally spaced depending on the location of good seed trees, and no closer than 100 feet between the edges of openings. Adjacent to openings, for a distance of the average tree height of the stand being treated, thin trees to 80 ft^2 basal area per acre. For the remaining area between openings, thin trees using the crown spacing prescription described above (bullet #1).

Douglas-fir Understory Reinitiation (Regeneration Harvest): Forest stands proposed for understory reinitiation or regeneration harvest are stands that have poor vigor, severely declined health, and have overstory trees that are 150 years of age or older. Selective harvest prescriptions focus on maintaining the largest trees while opening up stands to encourage the establishment and growth of young healthy trees and the creation of multi canopied late-successional characteristics. There are 254 (upland) acres of understory reinitiation or "regeneration harvest" (about 5% of the total acres commercially harvested), which will harvest some trees 150 years of age or older. A good portion of these units already have second growth and younger regeneration in the understory. Post harvest evaluation would determine the need for inter-planting where natural regeneration is not present and/or where needed to establish desired species regeneration such as pine.

Three situations are encountered in the these stands: 1) stands with only older large diameter trees; 2) Stands with a variety of age classes including old trees, smaller second growth trees, and seedlings to pole sized trees; and 3) patches of second growth only within a regeneration harvest unit boundary.

(a) For situations 1 and 2, select a minimum of 16 trees per acre (bole spacing 45 to 52 feet) that are 20 inches or larger diameter breast height (dbh) for leave trees when available. When the older trees are widely spaced, then healthier second-growth trees would be left to prevent spaces more than 35 feet between tree crowns. In openings between trees, leave an additional 10 to 20 basal area acre of seedlings through large pole-sized trees. (2 to 2,500 trees per acre).
(b) Where natural regeneration exists or is desired, openings (66-foot tree bole spacing) can be created.
(c) In situation 3, where patches of younger second growth trees occur, thin trees to appropriate spacing/basal area based on site encountered. For moist Douglas-fir sites, thin trees to 3 to 10 foot crown spacing (100 to 160 basal area per acre; 35 to 55 trees per acre); for dry Douglas-fir sites, thin trees to 10 to 25 foot crown spacing (80 to 140 ft^2 basal area per acre; 30 to 45 trees per acre). Select trees from various crown classes (intermediate, codominate, dominate) as leave trees to create as much stand diversity as possible.

(d) In all situations, where healthy pine seed trees are encountered (18 inches dbh or greater) on west and northwest slopes group selection openings (1/5th to 1 acre in size) may be created to maintain the health of the pines and to encourage pine regeneration.

Douglas-fir and Pine Pole Stands (5 to 11 inch dbh): Thrifty, young stands with good crown ratios (30% or more) on cool, moist sites would be thinned to a 3 to 15 foot crown spacing. Dense, decadent pole stands on dry sites would also be thinned to a 3 to 15 foot crown spacing when possible, except that all trees with poor crown ratios (30% or less) and dying trees would be targeted for removal, resulting in a more patchy distribution of remaining trees.

Douglas-fir Mistletoe: The prescription breaks up the areas of Douglas-fir mistletoe infection into three "zones". *Zone 1* is the first 150 feet off the ridge. This zone is thinned the heaviest, as the infection spreads downhill more easily than uphill (the seeds shoot farther down the slope). In Zone 1, all trees with visible mistletoe would be removed unless it made an opening greater than one acre. Trees with greater than or equal to 34 inch dbh with a Dwarf Mistletoe Rating of 1 or 2 (relatively healthy, although infected) would have a 30' crown-spacing cleared around them. In infected patches greater than 1 acre, the worst-affected trees would be removed and the remaining trees thinned to 15-foot crown spacing. The total acreage of the one acre (or less) openings would not comprise more than 1/3 of the total acreage of Zone 1. *Zone 2* comprises the area from 150 feet off the ridge down to the edge of the closest Riparian Reserve. The prescription for Zone 2 is the same as Zone 1, except that openings would not comprise more than $^{1}/_{5}$ the total area of Zone 2. One half-acre patch of infected trees would remain for every 20 acres, with a 30 foot crown spacing of susceptible trees removed around each patch. If the Riparian Reserve adjacent to Zone 2 is infected and Zone 2 is uninfected, then a clearing of a 30-foot crown spacing would be removed along the edge of the Reserve in order to prevent the infected trees from shooting mistletoe seeds in the canopies of adjacent trees in Zone 2. Infected areas adjacent to the edge of the Riparian Reserve would be left where possible and the 30 foot crown spacing buffer would be placed at the edge of the infected Zone 2 area instead. *Zone 3* is the Riparian Reserve. No trees would be harvested in the Reserve. Since wildlife use of riparian areas is usually higher than use of adjacent slopes, this protects mistletoe broom nest areas where they are more likely to be used. No resistant species would be removed from any Zone.

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

(a) Helicopter Yarding: lifts trees bunched together by a cable, moving the trees from the treatment unit to a landing area near a road. Helicopter yarding allows for full suspension of the trees from the treatment unit to the landing area and does not create skid trails or corridors.

Existing helicopter landings would be used whenever possible. Landings shall not exceed one acre in size. The Actual shape of the landing depends on the specific site location. Existing landings may need to be improved; improvements include of removal of encroaching vegetation, widening of clearing limits to meet safety regulations, and smoothing landing surface. Landings would be treated as described in the project design features discussed later in this chapter for helicopter landings (Section B(3)(c)). Helicopter landings would be located on stable locations only. Where possible, landings would be located on ridges or in saddles. New landings are primarily located on the proposed road construction and would be incorporated into the new road construction design.

(b) Skyline Yarding: drags trees with one end suspended, and one end on the ground, up the slope to a landing area on or near a road. This requires narrow skyline corridors about every 200 feet, and parallel to each other, through the treatment unit to operate the skyline cable. Corridors are about 9 to 15 feet wide, depending on the size of trees to be removed and the terrain, and are pre-located and approved by the BLM. Trees removed are end-lined (dragged) to the corridor.

(c) **Tractor Yarding:** utilizes tractors to drag trees to landing locations. Tractor yarding only occurs on lands with less than 35 percent slopes. This method requires narrow skid trails (about 9 to 12 feet wide). Skid trail locations are approximately 150 feet apart, but vary depending on the site-specific terrain, and are pre-located and approved by the BLM sale administrator. Pre-located skid trails minimizes the area of ground a tractor operates on, thus, minimizing soil disturbance.

(3) Fuels Reduction -Although fuels reduction is not the primary purpose for every stand treatment proposed, fuels reduction is an important component and project design feature incorporated into the proposed action. ***Commercial forest thinning would be followed by post treatment fuels reduction.*** This involves cutting and disposing of small diameter (sub-merchantable) trees that are contributing to ladder fuels, along with cutting, piling, and burning of slash created from forest thinning. Post harvest evaluations would determine the extent and method (hand pile and burn versus underburning) of treatments needed. The majority of units would be handpiled and burned then maintained with underburning (see followup maintenance underburning below). The fuels reduction component of this project is best described in three categories: surface fuels, ladder fuels, and crown fuels. The following describes each of these categories:

(a) **Surface fuels** include dead and downed wood on the forest floor and understory vegetation (shrubs and small trees 6 to 8 feet tall). This component of forest structure is managed to reduce the intensity of surface fires. The higher the fire intensity and the higher the flame lengths, the greater the potential for a crown fire to be initiated. By treating the surface fuels, the intensity of surface fires is reduced, along with the potential for crown fire initiation and the severity (fire effects) of wildfire on forested stands.

(b) **Ladder fuels** include vegetation (live and dead) that span between the surface fuels and the canopies of trees that would allow for the vertical spread of fire from the forest floor into tree canopies, initiating a crown fire. The thinning of understory vegetation (shrubs, small conifers, and some hardwoods) and smaller diameter conifer trees to meet forest health prescriptions will also reduce fuel ladders reducing the likelihood of crown fire initiation within the forest stands treated.

(c) **Canopy fuels** include the portion of the forest canopy interacting in the crown fire process. As forest stands are thinned to reduce densities for the purpose of improving tree vigor, crown fuels are also reduced. Thinning prescriptions vary by alternative, depending on the function of each alternative.

(4) Non-commercial thinning - is used to accomplish fuels reduction treatments in conifer forest, woodlands, and shrublands. Non-commercial thinning involves cutting small trees (generally less than 8 inches diameter) and vegetation with chainsaws and disposing of the material by handpiling and burning. The use of track mounted machines with special cutting heads (slashbuster) is also proposed for some units; a slashbuster can cut and grind the undesired vegetation into mulch.

(a) **Oak woodland treatments** – involve the thinning of competing vegetation in areas that have Oregon white oak as the dominant vegetation type. The competing vegetation is typically shrubs or smaller trees that have encroached into the oak woodland due to fire exclusion. Removal can take place by hand cutting and piling, or the use of a machine called the slashbuster.

(b) **Shrubland treatments -** Thinning is used to reduce the density of shrub-dominated vegetation and rejuvenate the remaining trees and shrubs. Thinning can be achieved through mechanical methods such as hand cutting with chainsaws, the slashbuster, or prescribed fire. Prescribed fire is more often used as a follow-up maintenance tool after mechanical treatments have reduced the density of hazardous fuels.

(c) Precommercial Thinning Treatments - ***Non-commercial thinning*** is also used to thin young conifer stands for the purpose of increasing the growth rates and vigor of trees remaining; this practice is also referred to as ***pre-commercial thinning***.

(d) Detailed Non-commercial Thinning Prescriptions

General (all plant community types):
No removal of mountain mahogany, silk tassel, or Pacific yew;

No removal of single stems of manzanita greater than 12-inch diameter at one foot above ground level;

Woodland/Hardwood and Shrubland Plant Communities
Any species of conifer, hardwood, chaparral or brush that comprises less than 5 percent of vegetation coverage within the entire unit shall be left;

Leave hardwoods greater than 6 inches diameter breast height, thin vegetation (except for reserve vegetation described above) below the drip line of oak trees;

Slash Douglas-fir less than 8 inches diameter unless needed to meet spacing requirements.

Thin pine clumps to 20 by 20 foot spacing.

In areas where Oaks or other reserve vegetation do not exist, leave or clumps of shrubs with a 15 to 25 foot diameter spaced 45 to 55 feet apart.

Leave chaparral shall include primarily **single shrubs**; however, **clumps** and **groups** shall also be considered as leave shrubs. Leave chaparral shall be left as 15 to 25-foot diameter singles or groups spaced 45 feet to 55 feet apart.

Approximately 10 percent of the shrubland units would be retained as refugia (1 to 2-acre reserve areas).

Snags would only be felled if needed to provide for worker safety.

Conifer/hardwood Communities
Thin conifer trees 2-feet tall and taller to the following spacings:

- Trees up to 2 inches DBH – 12-foot spacing;
- Trees 2 to 4 inches DBH - 16-foot spacing;
- Trees 4 to 8 inches DBH – 25-foot spacing.
- (Lop trees up to 2-feet in height to a 6 X 8-foot spacing)

The spacing of non commercial trees is independent of trees 8 inches DBH and larger. When spacing trees of different diameter classes, use the spacing for the smaller diameter class. For example, if a 2-inch DBH tree must be left next to a 5 inch DBH tree, the spacing distance would be 10-feet.

When considering a group of trees for thinning, select leave trees by the following order of species preference, sugar pine, knobcone pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.

Select trees for leave with good form and vigor (non-chlorotic) that are free of disease, fire damage, cankers, or blister rust.

When canopy closure is 90 to 100% for trees 8 inches DBH and larger, cut all understory, suppressed trees less than 8 inches DBH with live crown ratios of less than 30%.

Thin madrone trees less than 10 inches diameter to 45 by 45 foot spacing; thin all other hardwoods less than 6 inches diameter to a 35 by 35 foot spacing;

When acceptable leave trees are not available, shrub clumps at least one foot high and 3 to 10 feet in crown diameter shall be selected as leave vegetation.

(5) Follow-up Maintenance Underburning would involve the controlled application of fire to understory vegetation and downed woody material when fuel moisture, soil moisture, and weather and atmospheric conditions allow for the fire to be confined to a predetermined area at a prescribed intensity to achieve the planned resource objectives. Various ignition patterns are used depending on resource objectives and site and weather conditions. The most common ignition technique used is referred to as strip-head ignition. Beginning on the uppermost end of a unit along a control point such as a road or ridgeline, fire is ignited in narrow strips running along the contour of the slope. Working down slope, strips are ignited at intervals and the fire burns upslope toward the previously burned strip of fuels. The speed at which fire is applied and the width between strips adjusts the intensity of fire to address variations in fuel conditions (amount, type, and moisture content), weather, and topography as needed to meet 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.

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

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

c. Project Design Features – Common to the Action Alternatives

The Project Design Features **(**PDF's) 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 achieve the Applegate Subbasin TMDL (ODEQ 2003). BMP effectiveness monitoring would be conducted and where necessary, BMPs modified to ensure compliance with Oregon Water Quality Standards. The following PDFs apply to Alternatives B and C.

(1) Roads (See Appendix D for details)

<u>Road and Landing Construction and Renovation</u>

(a) A seasonal restriction for road and landing construction and renovation from October 15 to May 15 would be placed in the contract. This restriction could be waived under dry conditions and a specific erosion control plan (e.g. rocking, water barring, seeding, mulching, barricading).* Road construction and renovation would not occur during the winter months when there is a higher potential for soil erosion and water quality degradation. All construction and renovation 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 or on approval by the Contract Administrator.

(b) Bare soil due to road construction/renovation would be protected and stabilized prior to fall rains.*

(c) The fill slopes on all new roads would be seeded with native or approved seed, fertilized and mulched. No fertilizer would be spread within Riparian Reserves.*

(d) Where possible, rolling grades and out-sloping would be used on proposed roads that have grades less than 8 percent. These design features would be used to reduce concentration of flows and minimize accumulation of water from road drainage.*

(e) Where possible, on proposed roads with grades that are 8 percent or greater, cross drains or other drainage features would be provided at the spacing provided in the RMP p. 167.

(f) Slash from road construction would be windrowed at the base of the fill slope to catch sediment.*

(g) Temporary roads would be obliterated at the completion of log haul and site preparation. The roads would be waterbarred, mulched and barricaded if use is not completed by October 15.*

(h) Excess earthen material from road construction would be stockpiled away from riparian areas and preferably near ridges and/or saddles.

(i) All new road construction would be barricaded, gated, or surfaced with a minimum of four inches of rock. Newly constructed roads that would be left open all year long would have a minimum of four inches of rock.

(j) Washed river-run rock will be used to improve the Little Applegate ford and approaches (150 feet each side of the stream). The stream bottom would not be disturbed by equipment while adding rock. Working toward the Little Applegate River, the west approach would be rocked first. Then the ford would be rocked incrementally across the stream, being careful to operate equipment only on newly placed rock. The east approach would be rocked last.

(k) The construction of helicopter landings would occur during the dry season (May 15 to Oct. 15). No construction of new landings or expansion of old landings would be allowed in Riparian Reserves.*

(l) Helicopter landings would be treated to reduce soil erosion. Fill slopes of helicopter landings would be seeded with native grasses or other approved seed mixes and mulched, except where rock occurs.* Treatment of the running surface would be dependent on site conditions and would include one of the following:
    1) Subsoil/till or rip, then mulch and seed with native grasses or other approved seed.*
    2) Surface with durable rock material.*
    3) No treatment may be necessary where sufficient natural rock occurs.*

<u>Road Decommissioning</u>

(a) Roads would be decommissioned using both natural and mechanical methods.* Types of decommissioning are as follows:
    1) **Natural Decommission -** some roads are presently well drained and have vegetation growing on them. They may also have trees and brush encroaching from the sides and

trees that have fallen across them. Sections of these roads would be allowed to decommission naturally but may include some selective ripping, removal of drainage structures, construction of water bars and barricades.*

2) **Mechanical Decommission** - Roads would be decommissioned mechanically. This usually includes ripping, removing drainage structures, seeding and/or planting, mulching, constructing water bars and barricades. Ripping would be accomplished with wing-tooth rippers (or other rippers approved by BLMs soil scientist) at a minimum depth of 18 inches when soil moisture levels are less than 12 percent.*

(b) In order to reduce the amount of soil disturbance occurring in one season as a result of road work, road decommissioning would normally occur the final dry season (usually May 15 to October 15) of the contract, while road construction and renovation would normally occur the first year of the contract.*

(c) Stream crossings would be reestablished to the natural stream gradient. This would be accomplished by removing the culvert and the road fill within the stream crossing areas. Fill material would be removed to bank full width. Stream side slopes would be reestablished to natural contours then seeded (with native or approved seed) and mulched. Excavated material would be removed from stream crossing areas and placed at stable locations.* Decommissioned roads would be water barred on each side of stream crossings in order to adequately filter road surface runoff and minimize sediment transport to streams.

(d) Areas of disturbed ground on all decommissioned roads would be seeded with native or approved seed, fertilized, and mulched. No fertilizer would be spread within Riparian Reserves.*

Hauling Restrictions

(a) A seasonal hauling restriction would be required on roads during the wet season (see Appendix C Roads). All hauling 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 hauling is not halted. This would protect roads from damage and decrease the amount of sedimentation that would occur. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions of the roads.

Quarries

(a) Rock would be used to stabilize and minimize erosion on selected roads and landings.* Rock would be obtained from existing quarries the legal descriptions are:

1) E ½, SW ¼, Section 25, and SE ¼, NE ¼, Section 34, T. 39 S., R. 3 W., WM.
2) SE ¼, SW ¼, Section 22, T. 39 S. R. 1 W., WM.
3) W ½, SW ¼, Section 35, T. 39 S. R. 2 W., WM.
4) N ½, Section 32, T. 39 S., R 1 W., WM.

(b) One new quarry is being developed in association with the construction of road segment 39-2-36.3: legal description: SE ¼, SW ¼, section 36 T. 39 S. R. 2 W., WM.

(Note: *This quarry would not be developed under Alternative 4.)*

(c) Rock encountered during construction activities could be used for road stabilization.

Culvert Installation/Replacement

(a) Instream work would occur from July 1 - September 15 for all fish-bearing streams and for nonfish-bearing streams that are flowing during this work period.*

(b) Road approaches at all stream crossings would be as near a right angle to the stream as possible to minimize disturbance to stream banks and riparian habitat.*

(c) Road crossings on all fish-bearing streams would be designed to maintain natural streambed substrate and site gradient where feasible, while minimizing long-term maintenance needs; the specific design would also be based on expected longevity and economics.*

(d) Stream crossing culverts that are replaced would be sized to accommodate 100-year flood events. The width of a crossing structure on fish bearing streams would be at least as wide as the mean bank full width at the crossing site. Deviation from this general rule would be approved by the hydrologist and fisheries biologist on a case-by-case basis.*

(e) During instream work, all perennial streams would be diverted around the work area in a manner (e.g. a pipe or lined ditch) that would minimize stream sedimentation. The contractor would be required to submit a plan for water diversion before instream work begins. Fish screens would be used on all diversions on fish bearing streams. The diverted stream would not be returned to the channel through the project area until all instream work had been completed. The resource area fish biologist would be consulted before deviating from this practice. If it is impractical to dewater a stream channel, the work would be scheduled toward the end of the instream work period.*

(f) The use of settling ponds, straw bales, geotextile fabric or coconut fiber logs/bales would be used to reduce movement of sediment downstream from the project site.*

(g) On fish bearing streams the bottom of stream crossing structures may be lined with 1-3 foot diameter boulders to restore streambed habitat complexity inside new crossing structures. Boulders that are placed in structures must be large (high) enough so that they are not buried by streambed substrate that may have been deposited immediately upstream of the inlet of the original pipe. A prediction model would be used to determine the size of boulder needed to ensure stability at the estimated 100 year peak flow.*

(h) Stream crossing structures would be designed to ensure upstream movement of aquatic species.*

(i) Fill material over stream crossing structures would be stabilized as soon as possible after construction has been completed, before October 15. Exposed soils would be seeded and mulched. Work would be temporarily suspended if rain saturates soils to the extent that there is potential for environmental damage, including movement of sediment from the road to the stream.*

(j) Stockpiles/borrow sites for excess soil would not be located within Riparian Reserves.*

(k) During construction of instream structures the contractor would be responsible for meeting all state and federal requirements for maintaining water quality. Standard contract stipulations would include the following:

(1) Heavy equipment would be inspected and cleaned before moving onto the project site in order to remove oil and grease, noxious weeds and excessive soil.*
(2) Hydraulic fluid and fuel lines on heavy mechanized equipment must be in proper working condition in order to avoid leakage into streams.*
(3) Diesel fuel, oil, hydraulic fluid and other hazardous materials and contaminated soil would be removed from the site and disposed of in accordance with DEQ regulations. Areas that have been saturated with toxic materials would be excavated to a depth of 12 inches beyond the contaminated material or as required by DEQ.*
(4) Equipment refueling would be conducted within a confined area outside Riparian Reserves.*
(5) Spill containment booms or other equipment would be used, as required by DEQ.*
(6) Equipment containing toxic fluids would not be stored in or near (within 300') a stream channel anytime.*

Instream Ford – Road 39-1-30.0

(a) Renovation of Road 39-1-30.0 would adhere to the design specifications identified in RMP Appendix D Section VII G, specifically adding needed improvements (RMP Appendix D Section VII G) utilizing the design specifications in RMP Appendix D Section VII C. Because of existing slope instability along Road 39-1-30.0, among the other BMP requirements contained in these sections, these design specifications shall include a BMP for drainage spacing that meets or exceeds the drainage spacing by soil erosion class and road grade shown in RMP Appendix D Section VIII B[1] on RMP page 167. Drainage spacing at distances less than those shown in the table (taking into account changes in road grade) would not meet the design practice identified in RMP Appendix D Section VII C[2] to avoid accumulation and concentration of water. This is a significant issue for this road.
(b) Construction, renovation, or hauling through the Little Applegate River ford on Road 39-1-30.0 would be limited to the period August 15 to September 15, no waivers should be allowed unless it is determined by a hydrologist that protection objectives would be met and as approved by the Field Manager. This is to meet both the instream work period requirements and avoid the period of highest stream temperatures in the river.
(c) Construction, renovation, or hauling on Road 39-1-30.0 would not occur within three days of cumulative precipitation 0.20 inches or greater at that road, and within 24 hours of precipitation sufficient to cause muddy conditions that could track on truck tires into the river.
(d) All trucks and trailers using the 39-1-30.0 road would be cleaned of all residual dirt and/or dried mud prior to use of the road, and daily during activities that make use of the road.
(e) For the Road 39-1-30.0 stream ford on the Little Applegate River, per OAR 340-041-0036, all practicable turbidity control techniques would be applied.
(f) The stream ford over the Little Applegate River would be renovated prior to any hauling on Road 39-1-30.0, including at a minimum the specifications outlined for low water ford stream crossing construction in RMP Appendix D Section VII D[4], and subject to the seasonal restriction previously identified.
(g) Because turbidity would increase by greater than 10 percent during renovation of and hauling through the Road 39-1-30.0 stream ford on the Little Applegate River (as measured at a point 100' downstream from the activity), per OAR 340-041-0036, if not exempt from doing so, these activities would obtain required permits and/or certification described in OAR 340-041-0036. For non-exempt activities, full implementation of the limitations and conditions governing the activity as set forth in said permits and/or certificates would be required.
(h) For the Road 39-1-30.0 stream ford on the Little Applegate River, vehicles would be limited to a maximum speed of 5 miles per hour (7 feet per second) on the approaches to and within the River. Steady speed should be maintained, with no stopping until clear of the River and approaches.
(i) Washed river-run rock would be used to improve the Little Applegate ford and approaches prior to use. The stream bottom would not be disturbed by equipment while adding rock. Working toward the Little Applegate River, the south approach would be rocked, then the ford (being careful to work incrementally across the ford only operating on newly placed rock) and finally the north approach.
(j) Fish passage would be maintained at all times.

Dust Abatement

(a) Dust abatement would enhance driver safety and protect the road surface by stabilizing and binding the aggregate road surface. Water, lignin, magnesium chloride, or bituminous surface treatment (BST) would be used. BST may appear to be a permanent surface improvement. After log and rock haul, however, the road may be allowed to return to a rocked road.* All dust abatement application activities would comply with State and Federal laws.

Road Maintenance

(a) BLM-administered roads would be maintained on a long-term basis. Minor improvements and design changes may be needed to stabilize and correct conditions that are causing erosion or unsafe situations.*

Road Closures

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

Road Use Agreements

(a) The BLM and some large land owners use road use agreements to share road use and road costs. Road use agreements with Superior Lumber Company (M-2000F), Boise (M-660), and Robertson would be used for access to BLM lands.

(2) Harvest and Logging Systems

(a) Only logging systems which meet all of the project design features would be used for this project.*

(b) When operationally feasible, all units would be yarded in such a way that the coarse woody debris remaining after logging would be maintained at, or become greater than, current levels in order to protect the surface soil and maintain productivity.*

(c) Wherever trees are cut to be removed, directional felling away from Riparian Reserves, dry draws and irrigation ditches would be practiced. Maximum operational suspension would be practiced to alleviate gouging and other disturbance on draw side slopes and headwalls. Trees would be felled to the lead in relation to the skid trails. The intent of falling to the lead is to minimize the yarding damage to leave trees and regeneration under conventional yarding systems.*

(d) All skid trail locations would be approved by BLM. Maximum area in skid trails would be less than 12%. Existing skid trails would be utilized when possible. No use of skid trails in Riparian Reserves. Tractors would be equipped with integral arches to obtain one end log suspension during skidding of the logs. Skid trail locations would avoid ground with slopes over 35 percent and areas with high water tables. 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.*

(e) Where deemed appropriate by contract administrators, skid trails, cable corridors, and fire lines would be water barred according to BLM standards (RMP p. 167) to minimize erosion and routing of overland flow to streams.* Main tractor skid trails would be blocked with an earth and log barricade where they intersect haul roads to reduce disturbance and minimize erosion and routing of overland flow to streams.*

(f) Tractor yarding would occur between May 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. The intent is to minimize off-site erosion and sedimentation to local waterways.*

(g) For all cable yarding, maximum operational suspension would be maintained on slopes greater than 50 percent. A minimal of one-end suspension would be accomplished on all cable yarding activities. Minimum corridor widths (generally less than 15 feet in width) would be utilized to assure silvicultural prescriptions and objectives are met.

(h) Skyline and tractor yarding would be avoided up and down dry draws. The intent is to minimize occurrence of erosion in existing areas of concentrated surface flow.*

(i) No new cable/tractor landings to be constructed in Riparian Reserves. Existing landings should not be expanded and evaluated carefully before use.*

(j) Irrigation ditches in the project area would be protected from damage (no low spots, blockages, or gouging) and kept free from slash to avoid weakening ditch integrity that could lead to ditch failures or overflows during flood events.*

(k) Noise disturbance to local residents would be partially mitigated by regulating operating hours, days, and seasons through portions of the project area. Generally, any helicopter logging closer than ½ mile of a residence would be restricted to an operating period of 8:00 AM to 5:00 PM, Monday through Friday. Any helicopter logging located ½ to one (1.0) mile from a residence would be restricted to an operating period of 6:00 AM to 6:00 PM, Monday through Saturday; and no operating time restrictions would be enforced when helicopter operations are greater than one (1.0) mile from a residence.

(3) Pre-commercial Thinning of Forested Stands and Non-commercial Thinning of Woodlands and Brushlands

(a) Vegetation would be thinned using mechanical and manual techniques of cutting and chipping, such as slashbuster, and/or using hand crews with chainsaws. Slash created by the project would be chipped on site (if using slashbuster), or hand piled and burned if cut by hand crews. No piling in dry draws would be allowed.

(b) To minimize loss in soil productivity and surface erosion, the average unit slope for mechanical operations would be less than 35%.* The maximum slope for the slashbuster would be 45%, but only on short pitches less than 300 feet outside of Riparian Reserves. Any mechanical operations on fragile soils (as shown on the BLM GIS Soils mapping or identified by the Soil Scientist) would be limited to slopes of 25% or less.*

(c) Crossings through dry draws would be limited and approved by authorized officer; mechanical equipment would not drive up or down the draw bottoms.

(d) Old skidroads would not be opened or driven on without the approval of the authorized officer.* Cut material or slashbuster material will be placed on the running surface of old skid roads or jeep roads that are authorized to be used.* Old skidroads would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access.*

(4) Fuels Treatment

An array of fuel treatments would be utilized in the project area to modify vegetative patterns and reduce high fuel levels. Factors such as existing and projected fuel loading, existing vegetative conditions, slope, and access would be taken into consideration when prescribing the type of fuels management treatment that would be implemented. These treatments include mechanical methods, manual treatments, prescribed burning, or a combination of these treatments. All fuel management activities would meet Aquatic Conservation Strategy and Riparian Reserve objectives.

<u>Manual and Mechanical Treatments</u>

(a) Mechanical treatment restrictions would be the same as for pre-commercial and non-commercial thinning as stated above.

(b) Manual treatment of fuels consists of hand cutting of existing ladder fuels and then hand piling this material so it can be burned.*

(c) No piling in the bottoms of dry draws would be allowed.*

(5) Riparian Reserves

Riparian Reserve Determination

Northwest Forest Plan (NWFP) Riparian Reserves are located on federal lands throughout the project area (Map 2-1, 2-1, and 2-3). In order to ensure that all areas needing Riparian Reserve protection were covered, BLM conducted exhaustive surveys of each drainage within the Bobar project area. The survey crew assessed stream condition, documented the location of wetland and unstable areas, and determined whether stream channels were perennial, intermittent, or dry draws (NWFP Standards & Guidelines, pages C30-C31). In addition, existing maps were corrected using the new information.

(a) Riparian Reserve widths were determined site-specifically using the guidelines on page C-30 and 31 of the NWFP Standards and Guidelines. Riparian Reserve widths in the Bobar project area are as follows:
    1) Fish streams: between 360' and 400' slope distance on each side of the stream.
    2) Perennial nonfish-bearing streams: between 160' and 180' slope distance on each side of the stream.
    3) Intermittent nonfish-bearing streams: between 100' and 180' slope distance on each side of the stream.
    4) Unstable and potentially unstable ground: the extent of the unstable and potentially unstable ground. For unstable and potentially unstable areas adjacent to dry draws: 180' slope distance on each side of the draw.
    5) Headwalls of dry draws shall have an adequate amount of trees left to maintain slope stability.
    6) Springs, seeps and other non-stream wetlands less than one acre in size: 100' slope distance from the edge of the wetland and associated vegetation. This is an increase over the Northwest Forest Plan requirement that Riparian Reserves just extend to the edge of the wetland and associated vegetation for such areas.

Vegetation Treatments in Riparian Reserves

(a) Treatments would only take place in Riparian Reserves adjacent to pre-commercial treatments (PCT) and non-commercial treatments (NCT) units. Prior to implementation of any treatments, resource specialists (hydrologist, fisheries, and wildlife biologists) would make a review to assure compliance with the objectives of the Aquatic Conservation Strategy.*

(b) Mechanical vegetation treatments would not occur within Riparian Reserves on: fish-bearing and perennial streams; springs, seeps, and wetlands; and unstable and potentially unstable areas.

(c) Tracked vehicles used for mechanical vegetation treatments would not operate within 75 feet of short- and long-duration intermittent streams, or the top of the slope break, whichever is greater.* The slashbuster cutting arm may reach into the outer edge of this 75-foot buffer (for the distance of the length of the cutting arm) to treat vegetation.

(d) Manual vegetation treatments would not occur in the following areas: within 50 feet of fish-bearing and perennial streams; within 50 feet from the edge of springs, seeps, and wetlands; within Riparian Reserves for unstable and potentially unstable areas; and within 25 feet of long-duration intermittent streams.*

(e) Manual vegetation treatments would occur along short-duration intermittent streams where necessary to reduce fuel loading.Riparian hardwood species such as willow, ash, maple, alder, and black oak would not be thinned.*

(f) Thinned material may be “lopped and scattered” in specific areas where pile burning is not desirable.

(g) Crossing channels with vehicles or equipment, including ATVs and slashbuster, would be limited to existing system roads.*

(h) No machinery would be driven through riparian areas or stream channels. (Riparian Area: Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, and associated high water tables and soils which exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs, and wet meadows). Where this limitation inhibits access to mechanical treatment units, these units would be treated manually.

(i) Piles would not be placed in channel bottoms.

(k) Down large woody debris over 16" diameter would not be damaged, driven over, or used for fire wood.

Table 2-6. Riparian Reserve buffer distances – non-commercial treatment areas

	Manual treatments	**Mechanical treatments**	**Pile burning**
Fish-bearing	50' buffer	Not allowed in RR	50' buffer
Perennial	50' buffer	Not allowed in RR	50' buffer
Long-duration intermittent	25' buffer	75' buffer for machine; can reach in to extent of cutter	25' buffer
Short-duration intermittent	Where necessary (treating through is OK, as prescribed)	75' buffer for machine; can reach in to extent of cutter	No piles in the channel or draw bottoms
Springs/seeps/wetlands	50' buffer	Not allowed in RR	50' buffer
Unstable areas	Not allowed in RR	Not allowed in RR	50' buffer

<u>Prescribed Fire Treatments in Riparian Reserves</u>
PDFs for vegetation treatments in Riparian Reserves would apply to fuels treatments. Site visits by a hydrologist, fish biologist, and/or wildlife biologist may result in more restrictive PDFs for the Riparian Reserve portion of proposed fuel treatment units.*

(a) .No mechanical piling would occur in Riparian Reserves.

(b) .Hand pile burning would not take place within: 50 feet each side of fish-bearing and perennial streams; 50 feet from the edge of springs, seeps, and wetlands; 25 feet each side of long-duration intermittent streams; no piles in channel/draw bottoms of short-duration intermittent streams, or to the top of the slope break for all of the above classifications, whichever is greater.*

(c) .Treated vegetation could be “lopped and scattered” in areas where hand pile burning is not allowed.* Where feasible, this vegetation should be dragged outside the no-treatment zone and piled.

(d) .With underburns, no ignition would occur within Riparian Reserves,* but backing fire may be allowed to burn down into a Reserve, especially into the non-riparian portions with fire dependant vegetation such as ceanothus and white oak. This would depend on site-specific analysis.

(e) .Where possible, avoid fire lines in Riparian Reserves in order to prevent the creation of “mini roads” that could route sediment into water bodies.* Where fire lines are needed in Riparian Reserves for safety and to ensure containment, they would be constructed using hand tools. If constructed on slopes greater than 10 percent or within 100 feet of a stream channel, fire lines would be water-barred and/or rehabilitated prior to the first fall rains.

(f)..Foam would not be used in Riparian Reserves.*

(6) Protection of Water Developments & Irrigation Ditches

(a) Ground disturbing activities would not occur within 25 feet of any actively used irrigation ditch or the associated banks or cutslopes.

(b) A diversion and associated pipeline located in T39S R3W Section 27 NE¼ SW¼, approximately 1420 ft. north and 1420 ft. east of the Southwest Corner, would be protected. The 1-inch pipeline extends from the diversion in the NE¼ SW¼ of Section 27 to its place of use in the NW¼ SW¼ of Section 27. The facilities could be affected by vegetation treatment in Unit 56B and mechanical decommissioning of Road 39-3-27. Location of the facilities would be identified before implementation of any management activities.

(c) A diversion located in T39S R3W Section 27 NE¼ SW¼ would be protected. There may also be a mechanism transporting the water from the point of diversion to SE¼ NW¼ and SW¼ NW¼ of Section 27, but it has not been documented. The diversion could be affected by vegetation treatment in Unit 56B. The transport mechanism, if present, could be affected by vegetation treatments in Units 42 and 56B, Road 39-3-27.1 renovation, and/or mechanical decommissioning of Road 39-3-27. The location of facilities would be identified before implementation of any management activities.

(d) A diversion located on non-BLM in T39S R1W Section 30 SW¼ SW¼ may have a transport facility that crosses BLM in the SW¼ SW¼ of Section 30. The transport facility, if present, could be affected by vegetation treatment in Unit B70. The location of the transport facility would be identified before implementation of any management activities.

(e) A diversion located on Rush Creek in T39S R1W Section 19 SE¼ SW¼ would be protected. The diversion could be affected by pre-commercial vegetation treatment in the SE¼ SW¼ of Section 19. The water appears to be diverted into the Sterling Mine Ditch for delivery for use in the Northwest Corner of Section 30. The ditch would not be filled with woody material derived from the vegetation treatment to maintain uninhibited flow to the place of use. The location of facilities would be identified before implementation of any management activities.

(f) A diversion located in T39S R3W Section 25 NE¼ NE¼, approximately 2780 ft. south and 490 ft. west of the East ¼ Corner of Section 24, would be protected. A transport feature—a 1-inch pipline—located on BLM in T39S R3W Section 25 NE¼ NE¼ and T39S R3W Section 24 SE¼ SE¼ would also be protected. The facilities could be affected by Road 39-3-24 road renovation and mechanical decommissioning of an unnamed spur road that connects with Road 39-3-24 near the section line. The location of facilities would be identified before implementation of any management activities.

(g) Water transport facilities located in T39S R3W Section 13 SE¼ SW¼ would be protected. The 1½-inch pipline extends from a spring and headbox in the SW¼ SW¼ to the SW¼ SE¼ of Section 13. The facilities could be affected by vegetation treatment in Unit 19. Location of the facilities would be identified before implementation of any management activities.

(h) A pumphouse located in T39S R3W Section 13 would be protected. The pumphouse is approximately 4 feet by 4 feet in area and approximately 4 feet from the property boundary. The facility could be affected by vegetation treatment in Unit 9. The location of the facility would be identified before implementation of any management activities.

(7) Northern Spotted Owl (listed as Threatened under the Endangered Species Act)

Disturbance

(a) Work activities that produce noise above ambient levels will not occur within specified distances (see table below) of any nest site or activity center of known pairs and resident single between 1 March and 30 June (or until two weeks after the fledgling period) unless protocol surveys have determined the activity center to be not occupied, non-nesting or failed in their nesting attempt.

Table 2-7. Restricted Operation Zones for Northern Spotted Owl Protection

Type of Activity	Zone of Restricted Operation
Blast of more than 2 pounds of explosive	1 mile
Blast of 2 pounds or less of explosive	360 feet
Impact pile driver, jackhammer, or rock drill	180 feet
Helicopter or single-engine airplane	360 feet
Chainsaws	195 feet
Heavy Equipment	105 feet

(b) Prescribed burning during the nesting season within 0.25 miles of occupied habitat would be dependent upon area biologist review and concurrence. The Service will be notified of all such occurrences.

Habitat

(a) For projects that remove habitat, work activities such as tree felling, yarding, etc, will not occur within 0.25 miles of any **known** nest site or activity center from March 1- September 30, unless protocol surveys have determined the activity center to be not occupied, non-nesting, or failed in a nesting attempt. Waiver of the seasonal restriction is valid until March 1 of the following year.

(8) Wildlife Trees and Dead and Down Material

(a) Reserve from harvest a minimum of 3 snags greater than 17" DBH per acre where available. Retention of snags greater than 17 inches DBH within the interior of the stands would mitigate impacts to cavity-dependent species. Do not target large, broken-top trees and large snags with loose bark for removal. Retain and protect these structures where possible.

(9) Deer Winter Range

(a) In order to minimize disturbance to wintering deer, restrict activities in deer winter range from November 15 to April 1.

(10) Silvicultural Objectives

Commercial Timber Harvest Units

(a) 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 (swamper burning). This site preparation treatment should also be used in the areas marked for heavy mistletoe mortality and in areas where hardwoods may have been harvested so that early seral species can be planted. Prescribed, fall or spring under burning is an option in the pine series forest stands in order to reduce slash and fuel loading while preparing suitable seedbeds for reproduction. All 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. In addition no more than 25% of the pine tree live crown should be scorched for trees 8 inches DBH and larger. Cool burns are

needed so that tree roots and foliage are not killed, stressed or damaged in a manner which predisposes pine to bark beetle infestation.

(b) In moist and dry Douglas-fir units where only commercial thinning is performed, logging slash should be lopped and scattered if the tree tops are removed. If tops are not removed the slash should be handpiled and burned (swamper burning). Prescribed burning would benefit some Douglas-fir timber stands that have dense mats of grass or shrub species.

Precommercial Thinning

(a) After timber harvest, non-merchantable trees with undesirable silvicultural characteristics should be slashed. In areas where precommercial thinning is prescribed, all non-merchantable trees should be cut except the largest live conifer trees that meet the following criteria:

1) Minimum 4-inch terminal leader with at least the top 40 % of the tree containing live limbs.
2) Non-chlorotic, light or dark green with very little or no yellowish tint.
3) Undamaged top.
4) Free of visible disease such as dwarf mistletoe, cankers, fire damage, or blister rust.
5) Demonstrates good form and vigor.
6) No multiple tops or ramiforms.

(b) In all prescription areas, 1/7-acre in size and larger, and where overstory trees were marked to release healthy, Douglas-fir seedlings through saplings, the natural regeneration would be precommercially thinned. Seedlings (0-2 inches DBH) should be thinned to a 12 x 12-foot spacing; saplings (2.1 to 4 inches DBH) to an 20 x 20-foot spacing; and poles (4.1 to 7 inches DBH to a 25 x 30-foot spacing. The thinning of trees less than 8 inches DBH should be independent of the location of trees greater than 8 inches DBH.

(c) 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.

(d) In the absence of conifer trees, hardwoods will be considered acceptable crop trees. The order of preference will be bigleaf maple, Oregon ash, golden chinkapin, cherry species, willow species, any oak species, and Pacific madrone. Space the acceptable conifer and hardwood trees according to respective diameter classes. However, Pacific madrone 8 inches DBH and smaller should be thinned to a 45 x 45-foot spacing.

(e) In all pine prescription areas, create 1/5-acre group selection areas (53-foot radius) around all pine trees greater than 12 inches DBH. Cut all surplus vegetation identified within the group selection areas (All Douglas-fir trees less than 8 inches DBH, all oaks less than 6 inches DBH, all madrone less than 12 inches DBH, and all shrubs).

(11) Botany

Minimize the spread of noxious weeds

(a) Vehicle and equipment use off existing roads in the project area would be limited to the dry season.

(b) 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 high pressure pump, containment mat, filter system, and a holding tank.

(c) Seeding of native grasses and/or an approved seed mix on highly disturbed soil (e.g., landings, new road cut and fill slopes, etc.) would occur.

(d) Roadside noxious weed populations would be treated prior to timber sale activity with subsequent treatments as necessary and as funding is available.

(e) Noxious weed populations in areas proposed for quarry development would be treated prior to ground disturbance.

Protection of Special Status Plant Species

(a) Federal Endangered, State Threatened, Bureau Sensitive and Assessment plant species populations would be protected by one, or a combination of, a) no treatment buffered areas, b) seasonal restrictions, c) method of treatment specification (e.g. manual treatment only), d) and other restrictions (e.g. slashing but no piling).

(b) Some Bureau Tracking plant species may have a level of protection similar to Sensitive and Assessment plant species based on local and global rarity, distribution, ecological requirements, and sensitivity to proposed treatments.

Table 2-8. Bald Lick Special Status Plant Protection Project Design Features

TRS	¼¼	Treatment Rx	SSP	Site #	Protection
39-1w-17	SENW	mDF/PCT	HEST60 (BTO)	2148	30’ buffer. No burning. Previously thinned
	SWNW	dDF	TRLE6 (BAO)	2149	30’ buffer. No noncomm treatments.
	NESE	dDF/PCT	TRLE6 (BAO)	2137	30’ buffer. No noncomm treatments
	SESE	Poles/PCT	LIHE (BTO)	7777	20’buffer. No noncomm treatments. Comm treatments seasonal restriction, no operations 4-15 thru 6-30
	NWSE	mtoe	EUVE (BTO)	2140	30’ buffer. No noncomm treatments.
	SESE	RR	CIEL (BSO)	8101	50’ buffer. No burning 5-15 thru 8-30.
	SWSE	RR	TRLE (BAO)	2142	Protection by riparian reserve
	SWSE	RR	CRLA10 (BAO)	2143	Protection by riparian reserve
	SWSE	RR	TRLE (BAO)	2144	Protection by riparian reserve
	SESE	RR	TRLE (BAO)	2145	Protection by riparian reserve
	SESE	RR	TRLE (BAO)	2146	Protection by riparian reserve
39-1w-18	NWSW	pine	TRLE6 (BAO)	2125	30’ buffer. No noncomm treatments.
39-1w-19	NENW	mDF	CYFA (BSO)	7517	100’ buffer. No treatment
	NENW	mDF/dDF	CYFA (BSO)	7516	100’ buffer. No treatment
	NENE	RR	RIINK (BTO)	7778	Protection by riparian reserve
	SESW	RR	RIINK (BTO)	10000	Protection by riparian reserve
39-1w-20	NESE	new rd/Pine/PCT	SEOB3 (BSO)	3546	50’ buffer. No treatment
	NENE	PCT	CIEL (BSO)	8100	50’ buffer. No burning 5-15 thru 8-30.
	NENE	PCT	CIEL (BSO)	8102	50’ buffer. No burning 5-15 thru 8-30.
	NENE	PCT	CIEL (BSO)	7779	50’ buffer. No burning 5-15 thru 8-30.
	SENE	PCT	CIEL (BSO)	3545	50’ buffer. No burning 5-15 thru 8-30
	NWSE	Pine/PCT/RR	TRLE6 (BAO)	2097	50’ buffer. No burning 5-15 thru 8-30
	SWNW	Pine/PCT	TRLE6 (BAO)	2100	50’ buffer. No burning 5-15 thru 8-30
39-1w-21	NWSE	dDF	SEOB3 (BSO)	3573	Drop 1 ac unit
	NWSE	dDF	TRLE (BAO)	2102	Drop 1 ac unit
	SESE	dDF	TRLE (BAO)	2104	Drop 2 ac unit
	SESE	dDF	SEOB3 (BSO)	3580	Drop 2 ac unit
	SESE	dDF	CYMO2 (BTO)	3577	Drop 2 ac unit
	SWNW	Pine	CIEL (BSO)	8099	150’ buffer. No burning 5-15 thru 8-30
	NWNW	PCT	CIEL (BSO)	2572	50’ buffer. No burning 5-15 thru 8-30.

TRS	¼¼	Treatment Rx	SSP	Site #	Protection
39-1w-28	NENE	dDF	SEOB3 (BSO)	10003	50’ buffer. No treatment. Buffer does not intersect unit boundary; bot field verify 5-4-05
	NWNE	dDF	CIEL (BSO)	3591	50’ buffer. No burning 5-15 thru 8-30.
	NWNE	dDF	TRLE6 (BAO)	2115	Protection by 3591 buffer.
	NWNE	dDF	TRLE6 (BAO)	2113	30’ buffer. No noncomm treatments.
	NWNE	dDF	TRLE6 (BAO)	2112	30’ buffer. No noncomm treatments.
	NWNE	dDF	TRLE6 (BAO)	2121	30’ buffer. No noncomm treatments.
	NENW	dDF	TRLE6 (BAO)	2106	30’ buffer. No noncomm treatments.
	SWNE	dDF	TRLE6 (BAO)	2116	30’ buffer. No noncomm treatments.
	NENW	dDF	TRLE6 (BAO)	3146	30’ buffer. No noncomm treatments.
	SWNE	dDF	SEOB3 (BSO)	10001	50’ buffer. No treatment
	SWNE	dDF	SEOB3 (BSO)	10002	50’ buffer. Botanist visit deemed buffer not necessary.
	NWSW	pine/PCT	SEOB3 (BSO)	3589	50’ buffer. No treatment
39-1w-29	SWNE	PCT	TRLE6 (BAO)	2135	30’ buffer. No noncomm treatments.
	SWSW	dDF	LECOH2 (BTO)	3588	50’ buffer. No noncommercial treatments. Recommend dropping sliver west of draw
	SWSW	dDF	LECOH2 (BTO)	3587	50’ buffer. No noncommercial treatments.
	SWSW	dDF	LECOH2 (BTO)	10005	50’ buffer. No noncommercial treatments.
	SESE	dDF/PCT	CYFA (BSO)	10004	100’ buffer. No treatment.
39-1w-30			x		
39-2w-13	NWSE	mDF	LIHE (BTO)	7762	Protection by 7514
	NWSE	mDF	CIEL (BSO)	7759	Protection by 7514
	NWSE	mDF	CYFA (BSO)	7514	100’ buffer. No treatment.
	NWSE	mDF	TRLE6 (BAO)	2092	30’ buffer. No noncomm treatments.
	NWSE	mDF	TRLE6 (BAO)	2093	30’ buffer. No noncomm treatments.
39-2w-14	NWNE	pine/PCT	CYFA (BSO)	7515	100’ comm. no treatment
	SWNE	pine/PCT	CRLA10 (BAO)	3073	Protection by riparian reserve
	SENW	pine/PCT	TRLE6	3098	30’ buffer. No noncomm treatments.

TRS	¼¼	Treatment Rx	SSP	Site #	Protection
			(BAO)		
	SWNE	pine/PCT	TRLE6 (BAO)	3074	30’ buffer. No noncomm treatments.
	SENW	pine/PCT	FAPU (BTO)	3106	60’ buffer. No piling, burning.
39-2w-15	SWSE	fuels	FAPU (BTO)	10006	40’ buffer. No piling, burning.
39-2w-17			x		
39-2w-18			x		
39-2w-19			x		
39-2w-20			x		
39-2w-21			x		
39-2w-22	SWSE	PCT	CASE2 (BAO)	7789	50’ buffer. No piling, burning.
39-2w-23			x		
39-2w-24			x		
39-2w-25	NWNW	dDF	TRLE6 (BAO)	3518	Protection by 3499
	NWNW	dDF	HEST60 (BTO)	3523	Protection by 3499
	SWNE	OG	TRLE6 (BAO)	3516	0’ buffer. Piling, burning allowed if ≥ 30 piles/ac max.
	SENE	dDF	FRGE (FE)	7706	150’ buffer. No treatment
	SENW	dDF	TRLE6 (BAO)	3521	0’ buffer. No noncommercial treatments
	NWSW	dDF	ENST (BTO)	8060	0’ buffer. No burning 4-1 thru 5-15
	NWSW	dDF	ENST (BTO)	8061	0’ buffer. No burning 4-1 thru 5-15
	SWNE	dDF	ENST (BTO)	8059	0’ buffer. No burning 4-1 thru 5-15
	SESE	dDF	ENST (BTO)	8062	0’ buffer. No burning 4-1 thru 5-15
	SESE	dDF	TRLE6 (BAO)	3522	0’ buffer. No noncommercial treatments
	SENW	dDF	TRLE6 (BAO)	3519	0’ buffer. No noncommercial treatments. 4 part
39-2w-26	NENE	dDF	TRLE6 (BAO)	3499	0’ buffer. Piling, burning allowed if ≥ 30 piles/ac max.
	NENE	dDF	TRLE6 (BAO)	3497	Protection by 3499
	NENE	dDF	TRLE6 (BAO)	3498	Protection by 3499
	NWNE	dDF	TRLE6 (BAO)	3500	Protection by 3499
	NWNE	dDF	TRLE6 (BAO)	3501	Protection by 3499
	SENW	dDF	TRLE6	3506	0’ buffer. Piling, burning allowed if ≥ 30

TRS	¼¼	Treatment Rx	SSP	Site #	Protection
			(BAO)		piles/ac max.
	SENW	dDF	ENST (BTO)	7797	Protection by 3506
39-2w-27	NESW	PCT	CRLA10 (BAO)	8221	Protection by riparian reserve
	SWNE	Pine	ENST (BTO)	8065	0’ buffer. No treatments 3-15 thru 7-1
39-2w-28			x		
39-2w-29			x		
39-2w-33			x		
39-2w-34	NWNW	Pine	CRLA10 (BAO)	2579	Protection by riparian reserve
	NESE	dDF/PCT	EUVI8 (STO)	2581	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning
39-2w-35	NWSW	mDF	CYFA (BSO)	607	100’ buffer. No treatment
	SWSW	mDF/PCT	EUVI8 (STO)	3113	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning. (PCT slash may be lop/scatter or removed)
	SESE	Pine	EUVI8 (STO)	3115	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning
39-2w-36	NWSE	mDF	EUVI8 (STO)	3558	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning
	SENW	PCT	CIEL (BSO)	2223	50’ buffer. No burning 5-15 thru 8-30
	SWNE	mDF	TRLE6 (BAO)	2225	Protection by riparian reserve
	SENW	mDF	TRLE6 (BAO)	2222	0’ buffer. Piling, burning allowed if ≥ 30 piles/ac max.
Former Bobar					
Unit	¼¼	Treatment	SSP	Site #	Protection/mitigation
39-2w-7			x		
39-2w-19			x		
39-2w-29			x		
39-2w-30	SESW	dDF	CYFA (BSO)	7088	150’ buffer + exclusion. New rd thru; location ok’d by botanist (MS)
	SWSE	dDF	CYFA (BSO)	7087	150’ buffer. No treatment
39-2w-31			x		
39-2w-32			x		
39-3w-1			x		
39-3w-2			x		
39-3w-12			x		
39-3w-13			x		
39-3w-14			x		
39-3w-15	SWSE	dDF	SEOB (BSO)	7082	50’ buffer. No treatment

TRS	¼¼	Treatment Rx	SSP	Site #	Protection
	NENE	dDF	ENST (BTO)	264	0’ buffer. No burning 4-1 thru 5-15
39-3w-22			x		
39-3w-23	NESW	dDF	SESPP2 (BTO)	7100	0’ buffer. No piling, burning
	NESW	dDF	LECOH2 (BTO)	7051	0’ buffer. No piling, burning
	NESW	dDF	LECOH2 (BTO)	7022	0’ buffer. No piling, burning
39-3w-24			x		
39-3w-25	NWNW	dDF	FEEL2 (BAO)	8260	No buffer. 70’ from unit
	SENW	dDF	FEEL2 (BAO)	8262	Protection by riparian reserve
	SWSW	dDF	FEEL2 (BAO)	8263	Protection by riparian reserve
	SENE	dDF	CYFA (BSO)	594	100’ buffer. No treatment
	SENE	dDF	CYMO2 (BTO)	5052	100’ buffer. No treatment
	SENE	dDF	CYFA (BSO)	2114	100’ buffer. No treatment
	NWSE	dDF	ENST (BTO)	8266	Protection by riparian reserve
39-3w-26	NENE	dDF	FEEL2 (BAO)	8257	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning
	NENE	dDF	FEEL2 (BAO)	8261	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning
39-3w-27			x		
39-3w-33	SENE	dDF	CYFA (BSO)	2735	100’ buffer. No treatment
39-3w-34	SENE	Pine	LECOH2 (BTO)	8027	0’ buffer. No operations west of road
39-3w-35	SWNE	OG/dDF	FRGE (FE)	8029	100’ buffer. No treatment
	SWNE	dDF	CICI (BSO)	869	No protection. Questionable id
	NWNE	Poles	CICI (BSO)	410	No protection. Questionable id
39-3w-36	NENE	Poles/dDF	CYFA (BSO)	7519	100’ buffer. No treatment
	SENE	dDF	EUVI8 (STO)	7698	100’ buffer. No operations west of road
	SENE	dDF	EUVI8 (STO)	7695	100’ buffer. No treatments from 6-1 thru 10-1. No piling, burning

Commercial Treatments = timber removal
Noncommercial Treatments = slashing, piling, burning, site prep, post-logging slash treatments, PCT
Buffer distances 0’-150’ is distance from plant population edge (0’ buffer does not mean no buffer)

D. ACTIONS AND ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Treatment of forest stands previously protected under the Resource Management Plan, Survey and Manage Mitigation Measure Standards and Guidelines: The March 22, 2004 *Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* released areas for treatment that were previously identified as protection buffers for various species under the Survey and Manage Mitigation Measure Standards and Guidelines. Some of the areas released (along with the species targeted for protection) were considered by the ID Team for forest health and fuels thinning treatments under the Bald Lick Landscape Project.

***Rationale for Elimination*:** One species, the Siskiyou Mountains Salamander (*Plethodon stormi*), is still managed by the BLM as a special status species. Special status species should be managed in a manner so as not to contribute to future listings of a species. The development of a Conservation Strategy is underway for the Siskiyou Mountains Salamander. Treating previously protected habitat was eliminated from detailed study at this time to allow for the development of a Conservation Strategy and better guidance regarding the management of identified habitat. These areas may be considered in the future for treatment.

Areas were excluded around meadow habitat during project development for the Great Gray, consistent with Survey and Manage Mitigation Standards and Guidelines that were effective at the time the project. These previously protected areas can now be considered for active land management. Because the project planning was well underway at the time new SEIS/ROD direction became effective, the field manager had the discretion to proceed with the project as originally designed or to modify the project by including areas released by the SEIS/ROD. Including new areas into the project design would have resulted in extending the timelines for completing the Environmental Assessment, analysis already underway would need reconsideration, and the project implementation would be delayed. Therefore, the consideration of these areas in the proposed action was eliminated from detailed study at this time. It is recognized that individual forest stands not treated would remain in poor vigor and tree mortality would be expected in the future reducing canopy closures in affected areas. However, these areas may be considered for active management in the future.

Extension of road 39-2-36.4 option 1: This road proposal involved extending road 39-2-36.4 for about 2 miles along the upper slope of the dominant ridge beginning in the northeast ¼ of section 25, T. 39 S. R 2 W., and running west into the north half of section 27.

***Rationale for Elimination*:** This road location would have transected steep headwalls of drainages oriented to the north towards the Little Applegate River, potentially accelerating slope instability. While engineering and project design features could have minimized this risk, other options were identified that would avoid the risk altogether. Therefore, this road location was eliminated from detailed study.

Extension of road 39-2-36.4 option 2: This road proposal involved extending road 39-2-36.4 for about 2 miles along the ridgeline (rather than the upper slope as described above) of the dominant ridge beginning in the northwest ¼ of section 25, T. 39 S. R 2 W., and running west into the north half of section 27.

***Rationale for Elimination*:** This road location would have transected meadows along the ridgeline that provide important habitat for a variety of species. Meadows are described as special habitat in the RMP and road building in these special habitats should be avoided (RMP p. 45). Therefore, this road location was eliminated from detailed study.

Extension (estimated 0.9 mile) of road 39-2-34.0: This road would have provided road access to forest stands proposed for management in the north half and central portions of section 35 (T. 39 S., R. 2 W.).

***Rationale for Elimination*:** The forest stands are also accessible by helicopter and are within a reasonable yarding distance; allowing for both operational and economical feasibility. While the potential effects (increased road densities, erosion, sedimentation, etc.) of additional road construction would have been reduced through project design features, the option of helicopter yarding allowed for the avoidance of the effects associated with the construction of this road extension. Existing roads downslope of the treatment areas provide reasonable access for forest workers preparing the stands for thinning and conducting post treatment fuels reduction. Therefore, this action was eliminated from detailed study.

No Helicopter Logging: This alternative would have eliminated helicopter yarding as an option for moving trees from forest stands to landing areas.

Rationale for Elimination: This alternative would have required increased roading to access units not currently accessible from existing forest roads. This alternative would have increased road densities within the project area in comparison to the proposed action, which results in a net decrease in road densities. An overall net increase in road densities would have resulted in greater impacts to affected resources in comparison to the proposed action and would not have met one of the project needs, which is to reduce road densities to contribute to improved watershed conditions (Chapter 1, Purpose and Need). This alternative was therefore eliminated from detailed study.

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 both operationally infeasible and/or uneconomical to manage many of the forest stands identified as in need of thinning to meet the stated purpose and need (Chapter 1) due to the distance from road systems. This would have resulted in no treatment of lands that are identified for management under the Medford District RMP. Therefore, this alternative was eliminated from detailed study.

No helicopter logging - No new roads: This alternative would have eliminated any new road construction needed to improve vehicle access for the purpose of managing forest stands and would have eliminated helicopter yarding as an option.

Rationale for Elimination: Under this alternative it would have been operationally infeasible to manage some forest stands within the project area; many other stands would have been economically impractical. This would have resulted in no treatment of lands that are identified as in need of thinning to meet the stated purpose and need (Chapter 1) due to the distance from road systems. This would have resulted in no treatment of lands that are identified for management under the Medford District RMP. Therefore, this alternative was eliminated from detailed study.

Community Based Alternative for the Bobar/Bald Lick Project: A community based alternative was presented to the BLM for consideration. This alternative would impose a 16-inch diameter on the size of trees that would be cut and removed during a forest stand thinning operation. Only those forest stands, woodlands, and shrublands within ¼ mile of an existing road or private property would be commercially treated. The proposal also called for road decommissioning in addition to BLM's proposal. The proposal would have treated only 55 percent of the lands proposed for treatment by the BLM.

Rationale for Elimination: This proposal was eliminated from detail study since it failed to address the overall need to implement Medford District BLM Resource Management Plan and the project specific purposes and needs identified in Chapter 1 for nearly half of the project area.

Citizens Alternative for the Bald Lick Project: The Citizen's Alternative submitted by TELAV had several components eliminated from detailed study, including the use of a 17 inch diameter limit and the designation of and increase in size of unroaded areas, and road decommissioning. Additionally, other diameter limits were proposed ranging from 6 inches to 20 inches.

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 proven scientific basis for the use of a 17-inch diameter limit (or others suggested) to meet the identified purposes and needs for the Bald Lick 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 17 + inches is required (also see Appendix B, Silvicultural Prescriptions):

- ✓ 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 the silviculturist.
- ✓ 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 an undesirable stand conditions. Often, stand manipulation becomes desirable to control, reduce or inhibit the spread of damaging forest insects and disease, such as dwarf mistletoe and bark beetle outbreaks.
- ✓ Where over-stocking has weakened trees causing imminent mortality among those 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.
- ✓ When a particular stand structure, to improve wildlife habitat and enhance stand biological diversity is favorable, the removal of select individual trees independent of diameter size, is warranted.

Designate and increase the size of unroaded areas: This action was submitted as part of the Citizens Alternative and would involve the designation and enlargement of unroaded areas to preserve blocks of unmanaged lands.

Rationale for Elimination: The Medford District Resource Management Plan allocates lands within the Bald Lick planning area to Matrix/AMA to be managed for timber production. To change the use of these lands to be managed as roadless or wilderness areas is a land use planning decision, not a project level implementation decision. Furthermore, Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) directed the Secretary of the Interior and the BLM to review all public land roadless areas 5,000 acres or more in size, or roadless islands with wilderness characteristics, to determine their suitability or nonsuitability for wilderness designation. However, Section 603 has limited application to the revested Oregon and California lands (O&C lands). The O&C Act takes precedence where mandatory wilderness review of Section 603 would prevent commercial timber management of

O&C lands (Memorandums from Office of the Solicitor, Washington DC, August 27, 1979 and September 5, 1978). The majority of BLM lands (21,000 acres) the within the Bald Lick Planning Area are O&C lands; therefore, these lands are not eligible for Wilderness Study or to be managed as unroaded areas off limits to timber management.

The "Dakubetede" area was nominated by local residents to study its potential as an **Area of Critical Environmental Concern** (ACEC). The area was studied and was eliminated as an ACEC through the Medford District Resource Management Plan analysis process (Draft RMP, Appendix 2-SA-2. Management of Candidate ACECs not selected in the Preferred Alternative; PRMP EIS, Table 2-12, p. 2-139).

Treat more conifer forests using regeneration harvest prescriptions: This alternative would have targeted more acres in the Proposed Action for regeneration harvest prescriptions to improve the economic efficiency of project implementation.

Rationale for Elimination: The Medford District RMP describes that regeneration harvest will generally be prescribed in conifer stands about 150 years of age or older, and generally not within stands younger than 120 years of age within the first decade of RMP implementation. Conifer stands were evaluated by a silviculturist. An estimated 254 acres of conifer stands were identified for regeneration harvest prescription that would both meet the RMP criteria and would benefit from regeneration harvest.

Using only prescribed fire to thin conifer stands, shrublands and oak woodlands. This alternative would have treated vegetation within the planning area using only prescribed burning to reduce vegetation densities and hazardous fuels.

Rationale for Elimination: In conifer stands, using prescribed fire alone would not be effective in reducing stand densities to improve the vigor and health of stands. The energy release from prescribed fire (underburning) as the initial entry would exceed desired intensity levels and have undesirable effects on vegetation and soil. A combination of mechanical or manual treatments with prescribed fire is necessary to insure all resource objectives are met. Prescribed underburning alone would not meet one purpose identified for this project which is to supply timber in contribution of the Medford District's Allowable Sale Quantity.

The shrublands and woodlands selected for treatment are very dense with heavy fuel loads. The application of fire alone without prior fuels reduction increases the difficulty to control the underburn intensity and spread making it difficult to maintain the desired tree species and patches of shrubs. Two to three underburns would be required to effectively reduce fire hazard, and the risk of escaped fire is also increased. Applying manual or mechanical thinning prior to underburning allows for more precise and immediate fuel hazard reduction results and greatly reduces the risk for an escaped fire.

Wildland Fire Use for Resource Benefits: The use of wildland fire for resource benefits is the method of allowing naturally ignited (lightning-caused) fire to burn assisted by fire management response to meet prescribed resource objectives for an area.

Rationale for elimination: The use of natural-caused fires in southwest Oregon is very limited if at all possible. Lightning usually results in fire ignitions during the period from late spring through fall when soil and fuel moistures are dropping or very low. The low fuel moistures combined with heavy fuel loads increase the likelihood of large forest replacing wildfires. BLM lands within the planning area are located in Wildland Urban Interface; there is a high level of concern for protecting lives and property. The use of prescribed fire, during periods when fuel and soil moistures allow for its controlled application, remains the preferred option for reintroducing fire to meet both ecological and social objectives.

Additionally, the use of fire alone would not meet the need to supply timber in contribution of the Medford District's Allowable Sale Quantity and to provide sustainable forest products from lands managed under the Oregon and California Lands Act.

CHAPTER 3. AFFECTED ENVIRONMENT

A. INTRODUCTION

This chapter describes the present conditions within the proposed Bald Lick Landscape Project planning and analysis areas that could be affected by the alternatives. The information included in this chapter serves as a baseline for determining the effects of implementing the alternatives. 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 or Alternatives.

The Medford District Proposed Management Plan and Environmental Impact Statement (RMP/EIS) describes the affected environment for the Medford District Bureau of Land Management RMP/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 (RMP/EIS p. 1-3). The Bald Lick Landscape project is located in the Siskiyou Mountain range in Jackson County. This EA incorporates by reference information included in the RMP/EIS and will provide additional site-specific detail needed for project level planning.

The 1995 Little Applegate Watershed and the 1998 Star-Boaz Watershed Analyses document the reference and current watershed conditions, issues, and recommendations developed by an interdisciplinary team through each watershed analysis process. The watershed analysis process generally utilized information that was available at the time of analysis, and provides for a coarse filter analysis of watershed conditions. Conditions, issues, objectives, and recommendations documented in a watershed analysis provide a place to begin at the time project level planning starts for a landscape project. The Little Applegate and Star-Boaz Watershed Analyses are incorporated by reference to this EA. Intensive field inventories and reconnaissance have occurred in preparation for planning the Bald Lick landscape project; the information collected provides a higher level of detail than what was available during the watershed analysis and is used supplement and update watershed analysis information during project development and analysis in compliance with NEPA.

The terms **project area**, **planning area** and **analysis areas** are used throughout Chapters 3 and 4. 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 decommissioning or renovation, or proposed road construction.
>
> The term **planning area** is used to describe the overall area of consideration that was reviewed for the development of the Bald Lick Proposed Action. The planning area boundary (displayed on Maps 2-1, 2-2, and 2-3 in Chapter 2) was derived mainly using geographic features including watershed boundaries and rivers (Applegate) and some administrative boundaries (i.e., boundaries between BLM and other public or private lands).
>
> **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.

B. AIR RESOURCES

The population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls in the past were in violation of the national ambient air quality standards for PM 10 and are classified as nonattainment for this pollutant. The nonattainment status of these communities was not attributable to prescribed burning. Major sources of particulate matter within the Medford/Ashland nonattainment area is smoke from woodstoves and dust and industrial sources. The contribution to the

nonattainment status of particulate matter from prescribed burning is less than 4% of the annual total for the Medford/Ashland air quality management area. Over the past eight years the population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM 10.

C. SOILS

The soils in the planning area were formed from and overlay Resistant Metavolcanic and Low Elevation Granitic geologic material. Though both the Resistant Metamorphics and Low Elevation Granitics are considered relatively stable, a few hillslopes in the planning area were identified as unstable. Stream surveys also found evidence of past slope failures along streams in the study area (see hydrology report). Existing erosion rates appear to be near natural levels on BLM administered land in the planning area except for the Quartz Fire area (2001). The soils in the Quartz Fire area have become covered with grass and small shrubs with the erosion rates moderately above natural levels but should be near natural levels within the next 3 to 5 years.

Although much of the landscape consist of steep slopes, there is particular concern for the headwalls on the north-facing slopes in T. 39 S., R. 2 W., Section 26. The soils identified on this slope are mainly Caris and Offenbacher series. Both of these soils are in the early stages of soil development and contain a lot of gravelly material both on the surface and subsurface. These gravelly soil lack cohesion and are often prone to surface raveling when disturbed. In some cases, particularly in headwall situations, slope stability could be compromised as a result of extensive disturbance such as clearcutting or road building. Steep 'v-shaped' draws associated with headwalls may also exhibit slope instability as a result of excessive disturbance.

There was also an unstable soil area identified in T. 39 S., R. 1 W., Section 30. The soil in this area is Vannoy and Voorhies series on slopes ranging from 35 to 55 percent. As these soils are generally stable there may be some subsurface water flow influencing this hillslope.

A small landslide was found directly above BLM road 39-3-27.2. This 50 foot by 60 foot slide might be better described as a road related cutslope failure. There is no catchment basin concentrating water into this feature. There is no indication that this feature is migrating upslope, it is located within 150 feet of the ridgetop. Similar, healed features can be seen along this same section of road.

In the planning area approximately 1170 acres have been mechanically treated with the Slashbuster and about 480 acres have been tractor logged in the past 30 years (mostly on private land). In the planning area of the Applegate Rive-McKee Bridge Watershed, approximately 90 acres have been treated with the Slashbuster and about 440 acres have been tractor logged (mostly on private land). The Little Applegate Watershed Analysis Long Term Soil Productivity report identified approximately seven percent of the BLM lands in the area as compacted with four percent being "detrimentally" compacted. Detrimentally compacted is a termed used when over twenty percent of an area in a compacted state. Compaction is caused by management activities that require the use of heavy equipment. Compaction decreases pore space between soil particles. Generally, the soil consists of fifty percent pore space that is usually occupied by water, air and roots. Compaction decreases pore space and increases runoff by concentrating water on the surface rather than permeating into the soil. As soil pore space is reduced, the exchange of water and air between soil and plants is decreased thus reducing plant growth and soil productivity.

A 1997 study, by Amaranthus, that took place in an the south portion of this watershed (Yale Creek) found that after six trips while yarding small-diameter Douglas-Fir with a small tractor that soil bulk density increased 6.7 percent when conditions were dry. Most of this increase in bulk density occurred in the first few trips and no significant increase after the third trip (USDA PNW-RP-504, 1997), (note that 15 percent is the lower limit for detrimental compaction).

The soils in the planning area are identified by soil series using the methodology of the National Cooperative Soil Survey. The major soil series identified in planning area are listed in the table below

along with a brief description of the soil and its characteristics such as permeability, runoff and erosion potential. Erosion potential relates to the ease of detachment and movement of soil particles on the landscape. It is not meant to imply that all the eroded material will enter the aquatic environment. Natural erosion is part of the soil building process but excessive long term erosion would reduce soil productivity. Soil Category refers to the sensitivity of the soil to prescribed fire with category one being highly sensitive. The Medford District Resource Management Plan provides soil management direction based on these categories. For the location of the soil series on the landscape refer to the Bald Lick soils map on file at the Medford District Office.

Table 3-1. Project Area Soil Types

Soil Map Unit #	Soil Map Unit Name	Soil Category	Approx. Acres
25G	Caris-Offenbacher gravelly loams, 50 to 80 percent north slopes	1	1,888
26G	Caris-Offenbacher gravelly loams, 50 to 75 percent south slopes	1	1,242
87G	Jayar very gravelly loam, 45 to 70 percent north slopes	2	174
108E	Manita loam, 20 to 35 percent slopes	3	58
108F	Manita loam, 35 to 50 percent slopes	3	153
113G	McMullin-Rock outcrop complex, 35 to 60 percent slopes	1	127
165E	Shefflein loam, 20 to 35 percent north slopes	2	13
166E	Shefflein loam, 20 to 35 percent south slopes	2	74
188G	Tallowbox gravelly sandy loam, 35 to 70 percent north slopes	1	180
189E	Tallowbox gravelly sandy loam, 20 to 35 percent south slopes	1	17
189G	Tallowbox gravelly sandy loam, 35 to 60 percent south slopes	1	160
195E	Vannoy silt loam, 12 to 35 percent north slopes	2	55
195F	Vannoy silt loam, 35 to 55 percent north slopes	2	526
196E	Vannoy silt loam, 12 to 35 percent south slopes	2	408
197F	Vannoy-Voorhies complex, 35 to 55 percent south slopes	2	1,715

1. Soil Characteristics

Caris-Offenbacher complex

The Caris and Offenbacher soils are intricately intermingled across the landscape in this map unit. These soils have surface textures of gravelly loam but in much of the planning area, rock fragments overlay the soil surface forming talus. Talus is angular rock fragments, mainly of gravel or cobble size, that was derived from and lying at the base of a cliff or on steep, rock slopes. Not all of the talus is easily identified, as it is covered with a layer of needles, leaves, and twigs.

The Caris soil is moderately deep and well drained. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles and twigs about 1 inch thick. The surface layer is very dark grayish brown gravelly loam about 7 inches thick. The upper 13 inches of the subsoil is dark yellowish brown very gravelly clay loam. The lower 11 inches is dark yellowish brown extremely gravelly loam. Bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches. Permeability of the Caris soil is moderate. Runoff is rapid, and the water erosion potential is high. In some areas the surface layer is very gravelly loam or is stony.

The Offenbacher soil is moderately deep and well drained. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is dark grayish brown and dark brown gravelly loam about 9 inches thick. The subsoil is reddish brown and yellowish red loam about 25 inches thick. Bedrock is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches. Permeability of this soil is moderate. Runoff is rapid, and the water erosion potential is high. In some areas the surface layer is very gravelly loam or is stony.

Jayar very gravelly loam

Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is very dark grayish brown very gravelly loam about 5 inches thick. The next layer is dark brown very gravelly loam about 6 inches thick. The subsoil also is dark brown very gravelly loam. It is about 13 inches thick. Bedrock is at a depth of about 24 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony. Permeability is moderate in the Jayar soil. Available water capacity is about 3 inches. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high. This soil is a moderately sensitive soil as related to soil productivity effects from disturbance (i.e., prescribe burning).

McMullin gravelly loam

The McMullin soil is shallow and well drained. It formed in colluvium derived dominantly from igneous and metamorphic rock. Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The subsoil is dark reddish brown gravelly clay loam about 10 inches thick. Bedrock is at a depth of about 17 inches. The depth to bedrock ranges from 12 to 20 inches. Permeability is moderate in the McMullin soil. Available water capacity is about 2 inches. The effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. This is a highly sensitive soil as related to soil productivity effects from disturbance (i.e., prescribed burning). This soil is often associated with rock outcroppings.

Manita loam

This deep, well drained soil is on alluvial fans. It formed in alluvium derived dominantly from metamorphic rock. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 5 inches of the subsoil is dark reddish brown clay loam. The lower 45 inches is yellowish red clay loam. Weathered bedrock is at a depth of about 58 inches. The depth to bedrock ranges from 40 to 60 inches. Permeability of the Manita soil is slow. In some areas the surface layer is gravelly. Permeability is moderately slow in the Manita soil. The effective rooting depth is 40 to 60 inches. On slopes under 35 percent, runoff is moderate and the potential for water erosion is moderate. On slopes over 35 percent, runoff is rapid, and the hazard of water erosion is high.

Shefflein loam

This deep, well-drained soil is on hillslopes. It formed in colluvium and residuum derived from granitic rock. Typically, the surface layer is dark brown loam about 4 inches thick. The next layer is reddish brown loam about 6 inches thick. The upper 30 inches of the subsoil is reddish brown clay loam, the lower 16 inches is reddish brown sandy clay loam. Weathered bedrock is at a depth of about 56 inches. Available water capacity is 8 inches, and the effective rooting depth is 40 to 60 inches. Permeability is moderately slow in the Shefflein soil. Runoff is medium, and the potential of water erosion is moderate.

Tallowbox gravelly sandy loam
This moderately deep, somewhat excessively drained soil is on hillslopes. It formed in colluvium derived from granitic rock. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is dark brown gravelly sandy loam about inches thick. The upper 6 inches of the subsoil is dark brown sandy loam. The lower 11 inches is brown gravelly sandy loam. Weathered bedrock is at a depth of about 23 inches. Permeability of the Tallowbox soil is moderately rapid. The depth to bedrock ranges from 20 to 40 inches. Runoff is medium and the hazard of water erosion is moderate on slopes less than 35 percent. On slopes greater than 35 percent, runoff is rapid and the water erosion potential is high.

Vannoy silt loam
The Vannoy soil is moderately deep, well drained on hillslopes. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles, leaves, and twigs about ¾ inch thick. The surface layer is dark brown silt loam about 4 inches thick. The next layer is reddish brown silt loam about 7 inches thick. The subsoil is yellowish red clay loam about 27 inches thick. Weathered bedrock is at a depth of about 38 inches. Permeability of the Vannoy soil is moderately slow. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is gravelly or very gravelly loam. Runoff is medium and the potential for water erosion is moderate on slopes less than 35 percent. On slopes over 35 percent, runoff is rapid and the water erosion potential is high.

Voorhies very gravelly loam
The Voorhies soil is moderately deep and well drained. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles and twigs about 1 inch thick. The surface layer is very dark grayish brown and dark brown very gravelly loam about 8 inches thick. The upper 10 inches of the subsoil is brown very gravelly clay loam. The lower 18 inches is brown very cobbly clay loam. Weathered bedrock is at a depth of about 36 inches. Permeability of the Voorhies soil is moderate. The depth to bedrock ranges from 20 to 40 inches. As this soil is mainly found on slopes over 35 percent, runoff is rapid and the water erosion potential is high.

D. HYDROLOGY/WATER RESOURCES

The proposed 42 square mile Bald Lick planning area is within the Applegate River-McKee Bridge and Little Applegate River watersheds. The land within the planning area drains into the portion of the Little Applegate River from (and including) Water Gulch on the east down to the confluence with the Applegate River on the west , and on the portion of the Applegate River between Beaver Creek on the south down to the confluence with the Little Applegate River on the north.

While general water resources information is contained below, the specific current condition data and analysis is contained in Appendix A, with the Appendix A information summarized in tables and discussion as part of the analysis of effects in Chapter 4. The analysis of effects (Chapter 4) involves assessing various Risk Factors that identify conditions that affect water resources, such as sedimentation potential, compacted soils, stream channel conditions, etc. The method of analysis used is generally based on guidance provided in the RMP(USDI 1995:153-154), modified as necessary to address site-specific concerns in the planning area. The evaluation of risk factors was done to assess current conditions, including those resulting from past actions, and potential for effects of the alternatives related to hydrology and cumulative watershed effects. Discussion of why each risk factor is important, how it is being assessed and potential limitations in the available data or analysis methods is discussed in the Chapter 4 *Hydrology/Water Resources* section.

Two watershed analysis documents provide general background information for the planning area: The *Little Applegate River Watershed Analysis* (USDI/USDA 1995) covers the portion of the Bald Lick Landscape Project in the Little Applegate River Watershed, and the *Applegate-Star/Boaz Watershed Analysis* (USDI 1998) covers the portion of the Bald Lick Landscape Project in the Applegate River-McKee Bridge Watershed. These watershed analyses reflect some of what was known about these watersheds at the time they were completed; the water resources analysis for this environmental

assessment relies on additional information, much of which is more recent than that contained in the watershed analysis documents.

For purposes of analyzing the affected environment and the proposed project for water resources/hydrology issues, the planning area is divided into drainage areas. In general terms, a watershed is defined as any bounding area where water drains to a specified outlet. To better classify and analyze watersheds they are delineated to nest in a multi-level, hierarchical drainage system. The largest classification of this kind is termed a 1st level hydrologic unit (also called a Region). As part of the ranking system, a 1st level hydrologic unit is delineated into smaller 2nd levels (Subregions) which then can be subdivided into 3rd levels (Basins), then 4th levels (Subbasins), 5th levels (Watersheds), 6th levels (Subwatersheds), and 7th levels (Drainage Areas). The Bald Lick planning area is within the 4th level Applegate Subbasin (HUC #17103009), the 5th level Little Applegate River (HUC #1710030903) and Applegate River-McKee Bridge (HUC #1710030902) watersheds, various 6th level subwatersheds within both watersheds, and the 7th level drainage areas listed in Table 3-H-1. In this document, for ease of use in referring to 5th level watershed HUC numbers, the Little Applegate Watershed is referred to using the code "LA" rather than the full "1710030903", and the Applegate River-McKee Bridge Watershed is referred to using the code "AU" rather than the full "1710030902". So, for example, in Table 3-H-1, the drainage code for Rush Creek, "LA0206", refers to the 7th level drainage "06" (which is Rush Creek) within the 6th level subwatershed "02" (which is the Middle Little Applegate Subwatershed) within the 5th level watershed "LA" (which is the Little Applegate Watershed).

The water resources discussion primarily uses the drainage areas identified in Table 3-H-1. These drainage areas generally fit the watershed delineation guidelines for analysis as listed in the Medford District Resource Management Plan (RMP) (USDI 1995:153). This size of analysis watershed is large enough to assess the cumulative effect of actions that, taken individually (site scale) may not be significant, but when combined with effects from everything else going on in the drainage, may have a potential adverse impact ("cumulative effect"). This size of analysis watershed is 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 (Lindell and Brazier 1986:2,11).

Drainage area numbers for drainages in the Little Applegate Watershed have changed when compared to previous BLM projects and environmental assessments, due to the interagency Regional Ecosystem Office (REO) combining two subwatersheds into one subwatershed in the headwaters of the Little Applegate for purposes of meeting recently adopted national watershed delineation standards. The corresponding change in numbering affected the numbering of subwatersheds for all downstream subwatersheds within the Little Applegate Watershed, including those in the Bald Lick planning area.

The First Water Gulch (Little Applegate), Rush Creek, Birch Creek, Lick Gulch, and Grouse Creek 7th level drainage areas each drain their respective watershed into a single outlet point at their respective confluence points with the Little Applegate River. There are no 7th level drainage areas draining to a single outlet point within the portion of the planning area on the Applegate River. The remaining drainages are frontal watersheds that drain directly into both sides of the Applegate River or the Little Applegate River along the entire river interface either by means of surface flow in small, individual channels or by subsurface flow. Note that five of these drainage areas (AU0218, AU0360, AU0363, LA0124, LA0127) have a portion of the drainage on the opposite side of the river from the project that is not included in the planning area. Obviously, these areas will not be directly affected by project activities that occur on the other side of the river.

Table 3-H-1. Drainage Areas Associated with the Bald Lick Planning Area

Drainage	Location	BLM acres within Planning Area	Non-BLM acres within Planning Area	Total acres within Planning Area	Total Drainage Area (acres)	Total Drainage Area (square miles)
AU0218	Applegate River between Beaver Creek and Star Gulch	1346	108	1454	4018	6.3
AU0360	Applegate River between Star Gulch and Lime Gulch	1877	419	2297	2927	4.6
AU0363	Applegate River from (and including) Lime Gulch, to above Little Applegate River confluence	199	180	379	2327	3.6
LA0124	Little Applegate River below Greely Creek, down to (and including) Water Gulch	109	74	183	824	1.3
LA0127	Little Applegate River between Water Gulch and First Water Gulch	587	0	587	1746	2.7
LA0130	First Water Gulch (Little Applegate River tributary)	979	166	1146	1146	1.8
LA0133	Little Applegate River between First Water Gulch and Glade Creek	1	38	39	221	0.3
LA0145	Glade Creek between Garvin Gulch and the confluence with Little Applegate River	152	0	152	2794	4.4
LA0203	Little Applegate River between Glade Creek and Rush Creek	236	312	548	808	1.3
LA0206	Rush Creek	1650	593	2244	2244	3.5
LA0209	Little Applegate River between Rush Creek and Birch Creek	1338	187	1525	1525	2.4
LA0212	Birch Creek (aka Muddy Gulch)	1625	52	1677	1677	2.6
LA0215	Little Applegate River between Birch Creek and Lick Gulch	2102	504	2606	2606	4.1
LA0218	Lick Gulch	1902	35	1937	2005	3.1
LA0221	Little Applegate River between Lick Gulch, and Yale Creek	714	376	1090	1090	1.7
LA0327	Waters Gulch (Yale Creek tributary)	78	101	178	2350	3.7
LA0330	Yale Creek between Waters Gulch and confluence with Little Applegate River	1094	354	1448	1672	2.6
LA0403	Little Applegate River between Yale Creek and Grouse Creek	1033	779	1812	1812	2.8
LA0406	Grouse Creek	1844	36	1879	1879	2.9
LA0409	Little Applegate River between Grouse Creek and Sterling Creek	377	170	548	548	0.9
LA0439	Sterling Creek between Hukill Hollow and confluence with Little Applegate River	19	0	19	770	1.2
LA0442	Little Applegate River between Sterling Creek and Farmers Ditch Dam	1282	641	1923	2301	3.6
LA0445	Little Applegate River between Farmers Ditch Dam and confluence with Applegate River	623	818	1440	1440	2.3
	Totals	**21167**	**5943**	**27111**	**40730**	**63.6**

Most of the BLM land is located in the upper elevations of the respective drainage areas while the private lands dominate the lower valley along the Applegate and Little Applegate rivers. Some of the private lands are owned by timber companies and their management is guided in part by the Oregon Forest Practices Act. Most of the private land use along the rivers is either residential or agricultural. Portions of the planning area are in drainages containing U.S. Forest Service lands, as well

1. Precipitation Regime

Average annual precipitation in the Bald Lick planning area ranges from 25 to 55 inches per year in the Little Applegate Watershed (USDI/USDA 1995:7) and from 26 to 52 inches in the Applegate River-McKee Bridge Watershed (USDI 1998:17). Precipitation predominately falls between the months of November and March and summer months are typically very dry. The rain 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.

Within the planning area, wet season precipitation generally falls as rain below 3,500 feet elevation and snow above 5,000 feet. Between 3,500 and 5,000 feet alternating warm and cold fronts drop a mix of snow and rain. Shallow snow packs often build in this elevation range, then are quickly melted by rain and warm winds (rain-on-snow event). This area is typically referred to as the Transient Snow Zone[1] (USDI 1998:17; USDI/USDA 1995:5).

2. Streamflow Regime

Within the Bald Lick planning area, moderate to high streamflows usually occur between mid-November and April, with runoff peaking in February and March. Significant flows can also be produced by local, high intensity summer storms, though these events are relatively rare and their effect is limited to the local area. The lowest streamflows generally occur in August and September. Many of the tributary streams in the planning area become dry in late summer. Flows in the Applegate River are regulated by the Applegate Dam upstream of the planning area, maintaining higher-than-historic summer flows, and decreasing winter peak flows. There are no flood control structures on the Little Applegate River. Summer low flows in the Little Applegate River are heavily impacted by irrigation diversions, including the McDonald Ditch diversion in the upper portion of the watershed and a number of smaller diversions lower down in the watershed. The McDonald Ditch is part of the Talent Irrigation District system; water from this diversion is transported out of the upper portion of the watershed and delivered to Wagner Creek in the Bear Creek Watershed to the north. Other diversions in the Little Applegate are primarily for irrigation of farmland within the Watershed, and most return flows are delivered back into the Little Applegate River. A project in the Little Applegate involving many landowners and agencies has been underway for several years to improve irrigation system efficiency, remove diversion dams, and replace water currently diverted at several dams in the Little Applegate with water stored in Applegate Reservoir; if completed, this project will improve summer low flows and aquatic connectivity considerably in the Little Applegate River. The project has been partially completed, but final implementation date is unknown due to apparent legal and budget issues. BLM has no involvement in ongoing issues relating to completion of this project.

Surface water in the proposed Bald Lick planning area includes streams, springs, wetlands, reservoirs, and ditches. *Perennial streams* are streams that in a year with average precipitation will have some water present throughout the year, although water in sections of some streams may be subsurface, especially late in the summer. *Long duration intermittent streams* are seasonal streams that typically have water present for at least 30 consecutive days each year, but generally go dry for at least part of the year. These

[1] The transient snow zone is not an exactly defined area; when the Little Applegate Watershed Analysis was completed in 1995, this zone was estimated to be between 4,000-5,000 feet (USDI/USDA 1995:5). Additional observation by hydrologists since that time has better defined this zone within the Planning Area as between 3,500-5,000 feet. This revised elevation band is identified in the more recent Star/Boaz Watershed Analysis (USDI 1998:17).

types of streams often have water present for long enough periods each year that they exhibit streamside riparian vegetation significantly different from the vegetation in surrounding uplands. *Short duration intermittent streams* are ephemeral, meaning they flow only in response to large precipitation events. Short duration streams generally flow for less than 30 consecutive days. This type of stream still has a defined channel and evidence of annual scour and deposition, but is dry most of the year, and often has vegetation very similar to the surrounding uplands. *Dry draws*, another type of ephemeral stream, are usually small valley features and swales that do not exhibit both a defined channel and evidence of annual scour and deposition. They may go many years with no visible surface flow, only flowing in larger flood events. Because they do not annually scour material out of a channel, they often have deep accumulations of soil, rock, duff, and other debris that fill the bottom of the draw. During storm events, water slowly flows through or is stored in these accumulations of "colluvium", being gradually released to the downstream system or utilized by on-site vegetation. Dry draws are often the initiation points for naturally-induced debris torrents during large flood events. In dry draws, ground disturbance such as roads can also be a concern. Roads have the potential to route storm flow into the dry draw, and subsurface flow through the colluvium 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).

Drainage	Table 3-H-2: Miles of Stream by Type, by Drainage								Total Stream Miles	
	Perennial		Long Duration Intermittent		Short Duration Intermittent		Dry Draw			
	BLM	All Lands	BLM	All Lands	BLM	All Lands	BLM	All Lands	BLM	All Lands
AU0218	2.0	6.3	4.7	8.3	0.7	0.9	15.4	35.2	22.8	50.7
AU0360	0.6	4.3	6.1	7.3	3.6	5.8	20.4	22.6	30.7	40.0
AU0363	0.9	3.9	2.8	6.6	2.1	3.5	8.3	13.8	14.1	27.8
LA0124	0.0	1.4	0.0	1.2	0.2	1.0	0.4	8.2	0.6	11.8
LA0127	1.2	4.8	0.9	3.7	0.5	0.6	4.1	12.2	6.7	21.3
LA0130	2.4	2.4	0.0	0.3	1.4	1.4	6.3	8.6	10.1	12.7
LA0133	0.0	0.4	0.0	0.8	0.0	0.0	0.0	0.5	0.0	1.7
LA0145	0.0	4.7	0.0	5.2	0.4	0.8	1.2	13.9	1.6	24.6
LA0203	0.4	2.8	0.3	1.9	0.6	1.0	1.2	4.0	2.5	9.7
LA0206	3.5	4.5	0.8	0.8	0.5	1.6	13.2	17.5	18.0	24.4
LA0209	2.5	3.1	1.3	1.9	1.5	2.1	9.5	10.4	14.8	17.5
LA0212	0.9	1.4	2.9	2.9	2.5	2.5	12.6	12.7	18.9	19.5
LA0215	1.5	4.2	3.3	3.8	3.6	3.9	16.1	19.1	24.5	31.0
LA0218	3.9	4.3	2.7	2.7	2.5	2.5	15.7	16.5	24.8	26.0
LA0221	1.6	4.5	1.0	1.2	1.7	2.4	6.1	8.8	10.4	16.9
LA0327	3.4	6.0	3.4	5.8	4.2	7.6	11.9	19.2	22.9	38.6
LA0330	1.0	3.2	2.2	2.7	3.2	4.4	12.8	15.7	19.2	26.0
LA0403	1.0	3.6	0.7	2.1	0.9	2.6	8.6	13.2	11.2	21.5
LA0406	3.7	4.1	2.2	2.2	1.6	1.6	19.5	19.6	27.0	27.5
LA0409	0.02	0.8	1.4	1.7	0.0	0.3	3.4	4.2	4.8	7.0
LA0439	0.0	1.6	0.0	0.0	0.5	1.9	2.3	6.5	2.8	10.0
LA0442	1.0	2.4	3.4	7.5	3.8	6.7	12.5	16.1	20.7	32.8

Drainage	Table 3-H-2: Miles of Stream by Type, by Drainage								Total Stream Miles	
	Perennial		Long Duration Intermittent		Short Duration Intermittent		Dry Draw			
LA0445	0.0	1.6	1.4	3.9	1.8	6.5	5.0	7.9	8.2	19.9
Totals	**31.5**	**76.3**	**41.5**	**74.5**	**37.8**	**61.6**	**206.5**	**306.4**	**317.3**	**518.8**

Bankfull flow refers to the flow during large storms that occur on an average of every one-two years. These flows typically determine the size of the channel on a stream, referred to here as the bankfull channel. The size of the bankfull channel is measured in riffles at several locations along each stream reach. Another channel measurement that indicates entrenchment is the flood prone area width, the width inundated with water in a fairly common flood, for example a flood size that occurs on average every 20 years or so. Bankfull and floodprone area widths are listed for streams in each drainage, to provide some context to the reader of the size of streams being discussed in the analysis.

Streams categorized as perennial or intermittent on federal lands are required to have Riparian Reserves (USDI 1995:26-27, USDI 1995: Appendix A B-11 to B-15). Dry draws do not meet requirements for streams needing Riparian Reserves because they lack the combination of a defined channel and annual scour and deposition (USDI 1995:27). Streams on private forest lands are managed according to the Oregon Forest Practices Act. Stream types on federal lands were identified through site visits; non-federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent federal lands.

3. Ground water and Low Flow

Groundwater supplies in the Applegate-Star/Boaz Watershed Analysis portion of the planning area are limited and primarily found in valley bottom alluvium of the Applegate River corridor (USDI 1998:29). The situation is likely similar in the Little Applegate Watershed portions of the planning area, since ground water supplies in most areas of the Rogue basin are limited (USDI 1994:3-13). Well water quality problems are prevalent throughout the Rogue basin, arising from natural sources such as arsenic, boron, and fluoride. Surface contaminants such as nitrate and fecal matter may enter ground water through improperly constructed wells. Increasing demand from rural population density increases and years with below-normal precipitation have been identified as factors affecting ground water supplies in Jackson Country (USDI 1994:3-13). The RMP/EIS identified that an increase in rural population density has been accompanied by an increase in ground water diversion, and this trend is expected to continue (USDI 1994:3-13). None of the Bald Lick planning area has been identified as a critical groundwater area by the Oregon Water Resources Department (OWRD 1989).

Limited amounts of shallow groundwater are also stored in the accumulated colluvium in the smaller streams and draws of the planning area, and contribute the small amount of late summer flow present in some streams and the available groundwater at locations away from valley-bottom alluvium of the larger rivers. These natural “sponges” reach full capacity most winters, slowly releasing water to downstream areas throughout the summer or being fully utilized by vegetation growing on these deposits. While the vegetation utilizes much of the stored water within these stream bottom areas during the course of the summer, this vegetation is also critical to maintaining the stability of these deposits over the long term, and for helping increase the wintertime holding capacity of these areas.

Although data is not available on groundwater conditions in the project area, conditions that would affect stream low flows would be a concern, since most of the low flows in the smaller streams of the planning area are maintained from the shallow groundwater stored in the accumulated colluvium of draw bottoms.

Precipitation falling on an area where vegetation has been removed moves into the soil surface and may either drain into streams or become groundwater. Removal of forest vegetation considerably increases streamflow during the summer low flow period. Although absolute increases are small, relative increases are large (Harr 1976b). In one study, summer low flow increases were greatest in drainages where

clearcut logging occurred. The first year after a small study watershed was clearcut in the Coyote Creek Experimental Watersheds located in the western Cascade Range of southwestern Oregon, summer low flow was increased by 196 percent (Harr et al. 1979). In the same study area, no significant change in summer flow was detected for two small drainages that were 30 percent harvested by the shelterwood and patch-cut methods (Harr 1976). In the H.J. Andrews Experimental Forest of the western Cascade Range of Oregon, summer low flow increased by 159 percent following clearcut logging in a small drainage (Hicks et al. 1991). This increase lasted for eight years following the start of logging. Another small drainage in the H.J. Andrews study area had low flow increases of 59 percent after 25 percent was patch-cut logged and burned. Low flows from this area continued to be greater than predicted for 16 years following the start of logging (Hicks et al. 1991). For the Alsea study area in the Oregon Coast Ranges, a significant reduction in number of low-flow days was observed for 5 years after a small drainage was 82 percent clearcut and burned (Harr 1976).

Partial cutting would be expected to have a much reduced influence on the streamflow regime compared to clearcutting. It is doubtful if removal of 20 percent or less of the forest cover would result in a detectable change in streamflow (Rothacher 1971). Rapid expansion of root systems and crowns of trees left after partial cutting or thinning would be expected to quickly reduce any changes in streamflow that did result from this type of logging (Rothacher 1971).

The perception that "logging dries up streams" may be explained by the initial increased local air temperatures, enhanced early snowmelt, and superficial drying of the surface soil and duff caused by clearcutting (Adams and Ringer 1994). Studies also have shown some instances where past logging and road construction practices have led to stream channel sedimentation, which can cause more water to flow below the surface of the stream bed. In each of these examples, downstream water flow probably would be maintained or even increase, but locally there is the appearance of drier conditions and related perceptions of flow changes (Adams and Ringer 1994).

All of these studies suggest that vegetation treatments that involved removal of vegetation would have the effect of increasing available water during the summer, although the increases may be small and could return to background levels within a matter of years.

4. Springs, wetlands, and reservoirs

Springs, wetlands and reservoirs on BLM-administered lands within the planning area have been identified and mapped in GIS. Most of the features are less than one acre and are contained within Riparian Reserves. On BLM administered lands, locations of springs having some type of development for the purpose of diverting, storing, and/or transporting water were identified during stream survey. The Oregon Water Resources Department website[2] was queried to find out if there are valid water rights for either diversion or storage at any locations on BLM land within these drainages. BLM records were also checked[3] to determine any right-of-ways or other authorizations for diversion structures, water storage, or water transport facilities in this drainage. These are discussed on a drainage-by-drainage basis in Appendix A. Landowners who have obtained water rights from the State of Oregon for use of the water must also secure the required right-of-way from the BLM for installation and use of these facilities on public land. Landowners must initiate application for, and are usually granted, a right-of-way for water sources located on BLM lands if the landowner has a valid existing water right for the water source. Without a right-of-way for the transport facilities, the pipeline or ditch is in trespass, and the Bureau technically is not liable for damages that may occur to the facilities in the course of the Bureau's land management activities.[4] In addition to valid water rights, the Hydrology Report for the Little Applegate Watershed Analysis stated that "concern has been expressed by the ODFW and by the Oregon State Police that additional water is being illegally withdrawn throughout the entire Applegate River System including the Little Applegate Watershed; while these withdrawals may be individually minor, their

[2] http://egov.oregon.gov/OWRD/
[3] Joe Hoppe, BLM realty specialist, personal communication to BLM hydrologist David Squyres.
[4] Joe Hoppe, BLM realty specialist, personal communication to BLM hydrologist David Squyres.

cumulative effect exacerbates the impacts on instream flows from valid rights" (Zan 1995:6). The Hydrology Report further states that there should be "a cooperative effort, possibly coordinated by ODFW, to identify and eliminate illegal diversions from the Little Applegate and its tributaries" (Zan 1995:12). Such a coordinated effort has not been undertaken within the planning area. An effort has been made to identify all known water-related authorizations or developments on BLM land within the Bald Lick planning area boundary, to provide information that can assist in analyzing potential impacts and provide for the protection of authorizations and developments during the project.

5. Stream Morphology

The Medford BLM uses a stream classification system (Rosgen 1996) to categorize stream channels. These categories are based on stream gradients, stream sinuosity, valley form, entrenchment, and confinement. Most of the streams on BLM-administered lands in the planning area are located in the upper reaches of drainage areas and are classified as type Aa+, A or type B streams. Type Aa+ streams are uniquely associated with channels gradients greater than 10 percent. The A and B type channels are associated with gradients in the 4 to 10 percent range. The channels of these streams are typically confined to a narrow valley and are generally stable. However, debris and gravel materials do accumulate in the channel at lodge points that eventually fail and may cause a debris torrent. The recurrence cycle of these failures is dependent upon the size and availability of the wood material and the quantity of movement of the streambed material. Because AA+ and A type channels are typically located in steep, confined valleys, are deeply entrenched, often located on depositional slopes, landslide debris, and mixtures of noncohesive, colluvial and alluvial deposition, natural disturbance and active erosion of channels and banks is a common feature of these streams. Typical natural stream bank erosional processes are fluvial entrainment, bank collapse, dry ravel, freeze/thaw and lateral scour from debris flows. (Rosgen 1996:4-4 to 4-6, 5-44 to 5-83)

Another factor observed in a number of drainages in the planning area are in-channel deposits of tufa, a soft porous rock consisting of calcium carbonate deposited by springs and groundwater rich in lime. The calcium carbonate is deposited at a fairly rapid rate in some streams in the planning area; twigs or other objects placed into a stream early in the summer can be totally encased in calcium carbonate by fall[5]. Large wood falling into these streams in the distant past may have become encased in these deposits at some locations, becoming a nearly permanent form of submerged large woody debris[6]. These tufa deposits appear to provide some level of stability to channel bottoms and banks in some drainages despite a general lack of bedrock or other structural control. Some of the drainages have minimal bedrock exposure or parent material that could provide much boulder/cobble/gravel material in channel bottoms, including many of the drainages along the north side of the Little Applegate River. For example, Birch Creek is largely BLM-administered land with little past management, no recent catastrophic fires or other obvious major erosion sources, yet it has substrate composed of a large percentage of fines and many incised stream reaches with high vertical streambanks. It is possible that tufa deposits stabilize sediments in the channel for long periods of time leading to deep deposits of material; floods appear to occasionally downcut through this tufa layer creating fines, and channels appear unstable due to high vertical banks; however, these banks and channel bottoms are actually quite solid, but present the appearance of stability problems when in reality this may be a reflection of natural processes. No studies are known that address such processes in the planning area; the preceding interpretation is based solely on field observations and speculation by BLM personnel. Definitively understanding this process is not critical to analysis of this project, however, it may be worthy of future investigation.

6. Roads in Key Watersheds

Within the planning area, BLM lands draining to the Little Applegate River upstream of Glade Creek are

[5] Personal observation of streams in the Applegate by David Squyres, BLM hydrologist.
[6] As a stream channel in the Quartz Gulch drainage of the Little Applegate adjusted to changes in peakflows following the 2001 Quartz Fire, long-buried structures appearing to be logs encased in tufa deposits were exposed at several locations. Personal observation by David Squyres, BLM hydrologist.

within the Little Applegate River Tier 1 Key Watershed (USDI 1995:22-23; USDI 1995:Map 3). This includes the Little Applegate River below Greely Creek, down to (and including) Water Gulch (LA0124), Little Applegate River between Water Gulch and First Water Gulch (LA0127), First Water Gulch (LA0130), and Little Applegate River between First Water Gulch and Glade Creek (LA0133). This Key Watershed contributes directly to the conservation of at-risk anadromous salmonids and resident fish species. No portion of BLM lands within the Little Applegate River Key Watershed qualifies as roadless under the guidelines used to originally designate the areas under the second Forest Service Roadless Area Review and Evaluation (RARE II)(USDI 1995:Appendix A, page B-19), so the prohibition on constructing roads in roadless areas of the Key Watershed is not applicable to these BLM lands. Within the Key Watershed, management direction states "[t]he amount of existing system and nonsystem roads…should be reduced through decommissioning of roads. Road closures with gates or barriers do not qualify as decommissioning or a reduction in road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds. That is, for each mile of new road constructed, at least one mile of road should be decommissioned, and priority given to roads that pose the greatest risks to riparian and aquatic ecosystems" (USDI 1995:Appendix A, page B-19).

There are no BLM lands in the planning area located within the Yale Creek Key Watershed (USDI 1995:23; USDI 1995:Map 3).

E. VEGETATION

The present day landscape pattern of the vegetation in the Bald Lick planning area is a result of topography, fires, wind events, timber harvesting, and agricultural/residential land development. There is a natural diversity of vegetation condition classes within stands and between stands whose boundaries are generally dictated by slope, aspect and past disturbance. Aspect is an important determinant in vegetation changes. Ridges with westerly to southerly aspects and areas with shallow soils have severe growing conditions with shrubs and grasses dominating these sites. 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.

BLM lands within the planning area are presently composed of the following vegetation types: grassland, 2,268 acres; shrubland, 3,583 acres; hardwood/woodland, 4,053 acres; seedlings/saplings (0 to 4.9 inches DBH), 1,394 acres; small conifer timber (5 to 11 inches DBH), 750 acres; and large conifer (11 to 21 inches DBH); 7,149 acres; mature/old-growth, 1948 acres, and 21 acres unknown or other (water).

Some of the BLM-administered forest lands within the Bald Lick have been previously harvested; an estimated 6.6 percent is in early seral stage condition. Natural mortality has also created openings in the canopy layer. Natural mortality is a result of Douglas-fir dwarf mistletoe, bark beetles and windthrow. The understory of these stands consists of dense pockets of conifer regeneration and shrubs; conifer regeneration ranges from seedling to small pole-sized trees, with many of these trees being suppressed.

In the planning area, many of the commercial forest stands originated from fires between 1864 and 1940. Most of the forest stands became established within 10 years after a fire, although the harsher sites may have taken 30 to 40 years to become forested. Because the fire was forest-replacing in nature, individual timber stands now tend to be fine grained. This means that there are many trees of the same age class and almost equal in height, with few older trees scattered throughout. The majority of the trees in the planning area are between 32 and 146 years old. However, there are 160 to 230 year old trees in fewer numbers. The oldest trees found were 290 to 372 years old. The age classes greater than 170 are the least frequently found. These older stands or patches of older trees are in the understory reinitiation stage of forest development and vertical stand structure is diverse.

There are some young, healthy forest stands (45 to 100 years of age) scattered among the older, overstocked stands. Most pole stands are suppressed and diameter growth is less than 1 inch per decade. These stands are still in the stem exclusion stage. These stands are characterized by a closed canopy and

high stocking levels (sometimes more hardwoods than conifers) with many suppressed trees resulting in poor individual tree vigor. The average canopy closure for the Bald Lick planning area is 87 percent and ranges from 13 to 100 percent. Some forest stands have been selectively logged, underburned by fire, commercially thinned or have suffered mortality from natural disturbance. These stands tend to be more diverse in species composition and vertical structure as a result of disturbance.

There are three tree series in the Baldlick Planning area: Douglas-fir, ponderosa pine, and white oak. 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 (Atzet et.al., 1996).

At the highest elevations on the eastside of the planning area the PSME (Douglas-fir)-ABCO (white fir)/HODI (oceanspray) plant association is present. PSME-ABCO and PSME-ABCO-PIPO (ponderosa pine) plant associations are also present. When rainfall is abundant, or the aspect is more conducive to cooler temperatures, plant associations most often found include PSME-PIPO (ponderosa pine), and PSME/BENE (dwarf Oregongrape).

On the drier sites the PSME(Douglas-fir)/RHDI(poison oak) and PSME/RHDI-BEPI (Piper's Oregongrape) plant associations are most prevalent. Pine and white oak series forests are usually found on south and west aspects and the lowest elevations ((PIPO-QUKE (California black oak) and PIPO-PSME)).

Subtle changes in species composition and stand structure are occurring over the landscape. Many second growth trees and trees with old-growth characteristics are dying as a result of high tree stocking levels. Douglas-fir, referred to as the climax species, is replacing ponderosa pine, sugar pine and incense cedar because of its more shade-tolerant nature. Douglas-fir is encroaching upon the edges of the oak woodlands, and mortality of Douglas-fir along these edges has been noticeable during the last few years. Whiteleaf manzanita and ceanothus species are migrating into the oak woodlands and grasslands and replacing the oaks, pines, and native grass species. In the shrublands mountain mahogany and serviceberry are mature because of the lack of fire disturbance. In the mid-size vegetation condition class, suppressed shrubs and hardwood trees beneath the dominant tree canopy layer are dying. Pacific madrone and white and black oak have dropped out of conifer stands where light and water have become limiting. Dead whiteleaf manzanita may be found in the understory of some conifer stands and is indicative of a vegetation shift from shrubs to trees. This may also indicate that whiteleaf manzanita is the species that will pioneer the site following future disturbance. Other shrub species dying out of the conifer stands include deerbrush ceanothus, creambrush oceanspray, and serviceberry.

Currently, the stocking levels of stands throughout the project area are high. This is primarily due to the lack of natural disturbance and fire suppression. Merchantable trees per acre range from 122 to 910. The overall average for the Bald Lick project area is 360 merchantable trees per acre. Average radial growth for the last decade at the time of inventory is 0.48 inches. The average relative density for the area is 0.937 and indicates that physiologically the trees are at the point of suppression and mortality. Vegetation densities are also extremely high in the shrublands and woodlands and indicate an increased potential for fire. The average tree vigor index, as measured by leaf area index is 57 (when the trees were sampled in 1998 and 1999; vigor has probably declined with 2 years of drought). Trees with vigor indices below 30 will succumb to attack from bark beetles of relatively low intensity. Trees with vigor between 30-70 can withstand progressively higher attacks but are still in danger of mortality from the insect attacks. Trees with vigor between 70-100 can generally survive one or more years of relatively heavy attacks and trees with indices above 100 generally cannot be killed by bark beetles (Waring, 1980).

Bark beetle infestations are present in the planning area. Western pine beetles *(Dendroctonus brevicomis*) and pine engraver beetles (*Ips emarginatus*) are attacking the pines while flatheaded fir borers *(Melanophila drummondi*) and Douglas-fir beetles *(Dendroctonus pseudotsugae*) are killing Douglas-fir. Drought conditions and high tree stocking levels are severely stressing the trees physiologically, enabling the beetles to enter and kill the trees.

Forest pathogens are also changing the forest stand structure and forest development pattern. *Phellinus pini* (red ring rot) is affecting Douglas-fir and ponderosa pine. It appears to be more common on dry sites when trees are stressed. Some of the infected trees are beginning to die or are subject to stem breakage thus allowing light to reach the forest floor and the understory reinitiation stage to begin. *Phaelous schweinitzii* (brown cubical butt rot) is also present. Douglas-fir dwarf mistletoe is a pathogen throughout the planning area with approximately 80 acres infected to some degree.

In the planning area, the overall average amount of coarse woody material (CWM) is approximately 6.40 tons per acre (range; 0 to 28.1 tons/acre). The coarse woody material stem diameters were concentrated in the12 to 31 inch classes at the large end and averaged 698 feet per acre for all decay and diameter classes. Coarse woody material was most often found to be in a decomposition class 3 and 4. Mid sized class stands (11 to 21 inches DBH) have an average of 38 snags per acre, and mature stands (21 inches DBH and larger) have 12 snags per acre.

The following Table displays vegetation conditions for the Bald Lick Planning area.

Table 3-2. Vegeation Condition Classes on Public Lands in the Bald Lick Planning Area.

Vegetation Condition Class[7]	Acres of Public Lands in the Bald Lick Planning Area
unclassified vegetation	178
Forbes & Grass	2,268
Shrubs & Non-forest	3,583
Hardwood/Woodland	4,053
Seedlings & Saplings	1,394
Poles	750
Mid-Seral (11-	7,149
Late-Seral/Old Growth	1,948
Total Acres	21,323

F. FIRE & FUELS

1. Fire Disturbance History

Fire is recognized as a key natural disturbance process throughout southwest Oregon (Atzet and Wheeler 1982) (Agee 1993). The landscapes that comprise the planning area evolved with frequent fires affecting the vegetation and other key components of the ecosystem. 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. Fire has played an important role in influencing successional processes. Large fires were a common occurrence in the area based on fire scars and vegetative patterns and were of varying severities.

Historically, frequent, low intensity fires maintained Douglas-fir and pine forest types in more open conditions than exist today (Agee 1993) (Little Applegate Watershed Analysis p. 10). Frequent, low intensity fires served as a thinning mechanism, thereby, naturally regulating the density of the forests. However, there is evidence of stand replacement fires occurring between the 1860s through 1940 within

[7] Data derived from BLM Geographic Information Systems using vegetation condition class layer.

and surrounding the Bald Lick planning area (Chapter 3, section E, Vegetation; Little Applegate Watershed Analysis (Appendix-Vegetation Report p. 10; LaLande 1995 p. 36-39). The Little Applegate Watershed Analysis reported that historically, stand replacement fires were likely infrequent and of smaller size in comparison to fires experienced today (USDA/USDI 1995, Appendix-Vegetation Report p. 10).

A more open crown structure would have allowed fire to travel more rapidly across the site with intensities that were short lived. These sites evolved to encourage that sort of fire behavior through allowing light flashy surface fuels (grasses, brushes, and conifer/hardwood litter) to dominate the fire behavior attributes and effects on the sites. The frequency, with which the events would return the sites to a seedbed for these fuels, the repeated reduction of conifer reproduction underneath the overstory, and the repeated consumption of large fuels and duff build-up, would affect the types of fire effects found on these sites post fire historically. The qualities of the open crown structure would also provide better avenues for the heat intensity to vent out of the site without scorching the crowns to the lethal limit.

2. Fire Exclusion

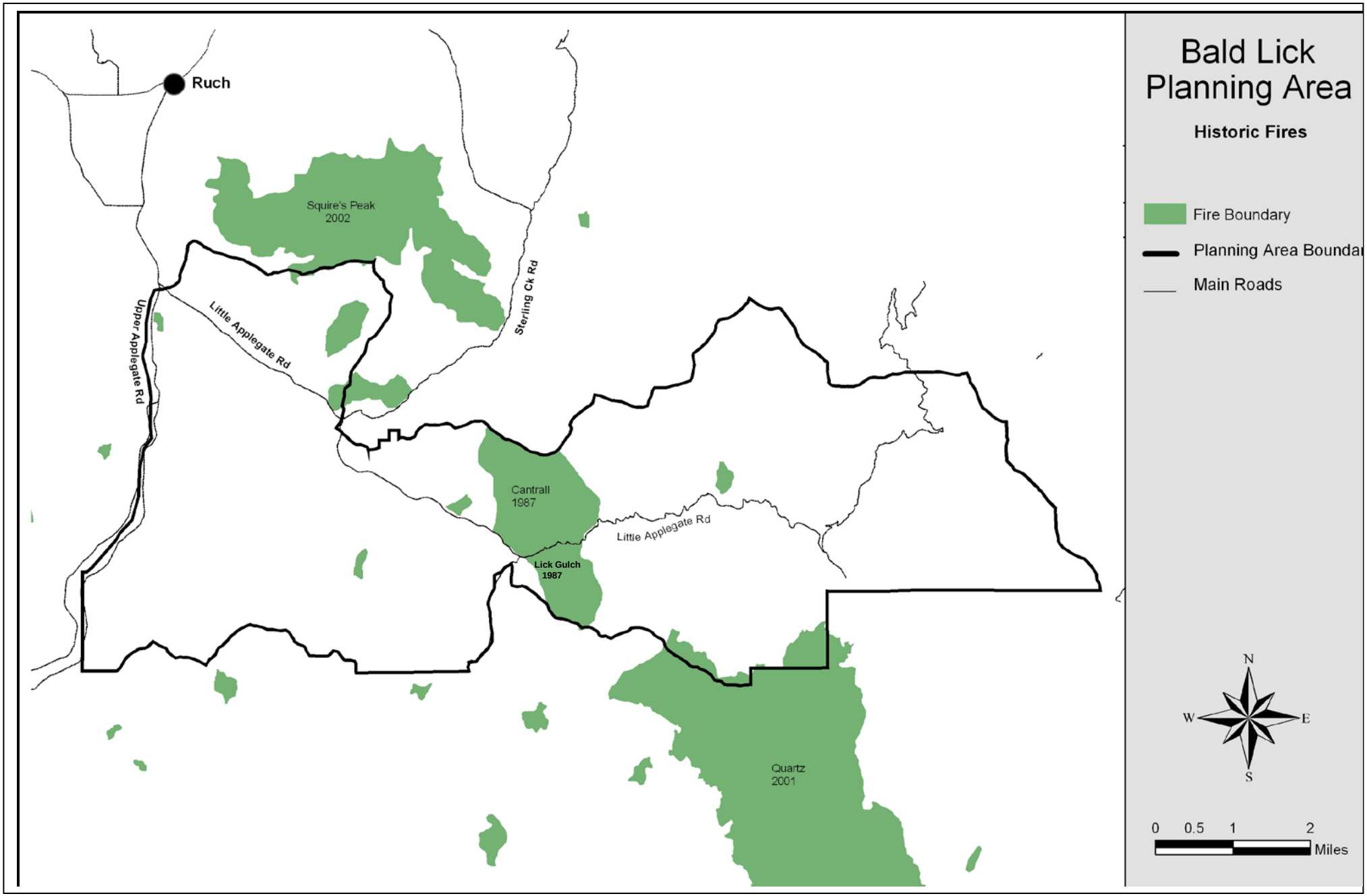
Since the establishment of Euro-settlement in this area, human relations and interactions with these landscapes have affected many of the processes that had previously played a large part in the evolution of the site. Of these interactions, one management decision that has affected one of the evolutionary processes has been that of fire exclusion. In the early 1900s, uncontrolled fires were considered to be detrimental to forests. Suppression of all fires became a major goal of land management agencies.

In ecosystems that historically burned frequently, such as many lower and mid elevation areas of much of the Medford District BLM (Sensenig 2002; Huff and Agee 2000;), the exclusion of fire combined with period of higher than normal precipitation (LAWA, veg appx, p. 10) has promoted an increases in fuel quantity and changes in fuel continuity and arrangement. Forest stand attributes have changed to a denser and more closed canopy situation with more surface fuels at any given time through the decomposition cycle. 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.

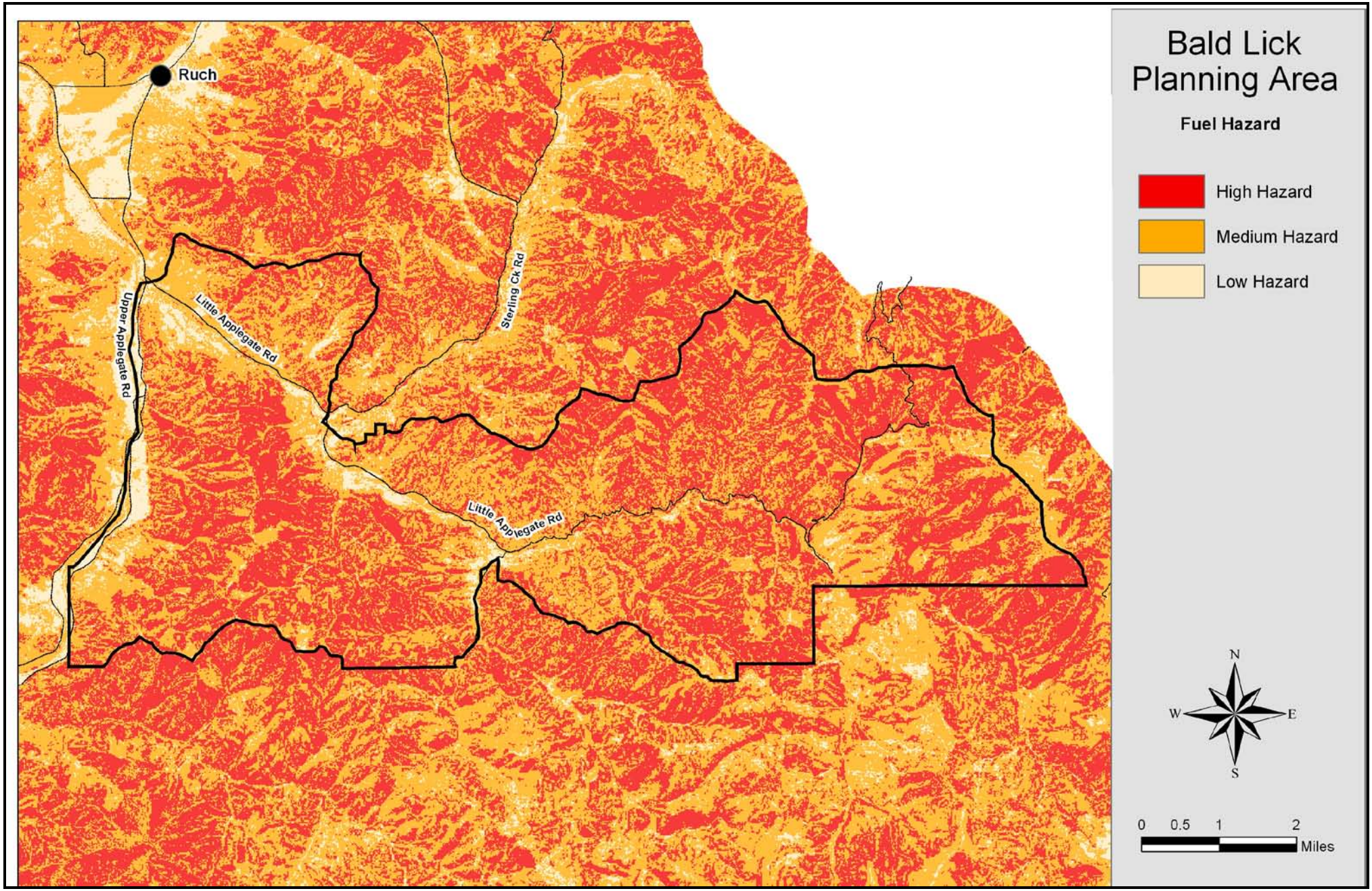
For sites that have a less frequent fire regime display much the same fuel quantity and arrangement increase and possibly may burn with similarity in patch-size and intensity to their historical pattern under some weather conditions and with more severe characteristics and larger patch size under severe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

Fire history recorded over the past 20 years in Southwest Oregon indicate a trend of more large fires which burn at higher intensities in vegetation types associated with low to mixed severity fire regimes. This trend is also seen throughout the western United States. Contributing factors are the increase of fuel loading attributed to the absence of fire, recent drought conditions, and past management practices

Large fires recorded in the past few decades either within, overlapping, or adjacent to the project planning area include: 1987 Cantrall Fire (1,850 acres); 1987 Lick Gulch Fire (300 acres); the 2001 Quartz Fire (6,160 acres), and the 2002 Squires Peak Fire (2,800 acres) (Map 3-1).



Map 3-1 Historic Fires



Map 3-2 Fuel Hazard

3. Fire Regimes

Climate and topography combine to create the fire regime found throughout the planning area. Fire regime refers the frequency, severity, and extent of fires occurring in an area (Agee 1991). The variable fire history, complex geology, land use history and steep environmental gradients of Douglas fir hardwood forests of southwest Oregon and Northern California Siskiyous prevents generalizations about fire and its ecological effects (Agee 1993 p. 283-284). However, plant associations groups are a credible link to historic ecological process, including fire regimes that occurred on sites in the past (Franklin-Agee 2003; Atzet in progress 2004). Historic fire regimes and the departure from them, correlate's to the change from historical to current vegetative structure (Schmidt et al 2001; Hann et all 2002). 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.

There are five national fire regimes (Schmidt et al. In press):

Fire Regime 1: 0-35 years, low severity
Fire Regime 2: 0-35 years, high severity
Fire Regime 3: 35-100+ years, mixed severity
Fire Regime 4: 35-100+ years, high severity
Fire Regime 5: 200+ years, high severity

Fire Regimes 3, 4, and 5 are subdivided based on vegetation and fire frequency. These fire regimes represent historic fire regimes, prior to the era of fire exclusion. Three of the five national historic fire regimes are represented within the planning area:

<u>Fire Regime 1. 0-35 years, Low Severity</u>

Typical climax plant communities include ponderosa pine, pine-oak woodlands, and oak woodlands. Large stand-replacing fire can occur under certain weather conditions, but are rare events (i.e. every 200 years). Approximately **28 percent** of the planning area is classified as ponderosa pine or Hardwood/Woodland sites.

<u>Fire Regime 2. 0-35 years, high severity</u>

Includes true grasslands and savannahs with typical return intervals of less than 10 years and ceanothus and Oregon chaparral with typical return intervals of 10-25 years. Fire severity is generally high to moderate. Approximately **33 percent** of the planning area is classified in these vegetation types.

<u>Fire Regime 3. < 50 years, mixed severity</u>

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. Approximately **39 percent** of the planning area is classified as dry westside Douglas-fir.

4. Condition Class

Condition class descriptions are used to describe the degree of departure from historical fire regimes and the resulting 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.

Plant communities proposed for treatment such as ponderosa pine and oak woodlands (fire regime 1) are in condition classes 2 and 3. The pine sites proposed for treatment have a dense understory of Douglas-fir and brush due to the absence of fire and the oak woodlands have a dense brush understory.

The dry westside Douglas-fir stands (fire regime 3) proposed for treatment are in condition class 2. There are small portions of these stands that are in condition class 1 and 3. Stand densities are extremely dense due to the absence of fire.

The shrublands (fire regime 2) are in condition classes 2 and 3.

5. Fire Risk and Fire Hazard Assessment

While some people to not support the theory that fire exclusion has changed vegetation densities and the amount and arrangement of hazardous fuels from historical conditions (see Appendix E, Public Involvement), the facts remains, hazardous fuels and the risk for wildfire ignition occur within the planning area. **Fire ignition sources for natural (lightning) and human-caused fires are present in the Bald Lick planning area, and the current fire hazard for much of the planning area is moderate to high (Map 3-2). The conditions exist that would allow for large-scale high intensity wildfires and the potential for initiation and sustained crown fires.** Additionally, it is important to remember that other purposes and needs were also identified for this project (Chapter 1, Purpose and Need), fire hazard reduction is only one of several needs identified for the Bald Lick Project proposal. The following describes the fire risk and hazard assessment completed for the Bald Lick planning area.

Fire Risk

Fire risk is a measure of the probability of fire to occur within a given area. Historical records show that lightning and human caused fires have occurred in the planning 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 planning area is from July through September.

Information from the Oregon Department of Forestry database from 1972 to 2002 show a total of 127 fires occurred throughout the planning area. Lightning accounted for 61 percent of the total fires and human caused fires accounted for 39%. Eighty Five percent of these fires started on BLM managed lands. Of these fires, 74% were started by lightning and the remaining fires were human caused. The following table is a break down of the fires within the planning area:

Table 3-3. Wildfires by Size Class Starting Within the Bald Lick Planning Area.

Total Number of Fires	Size Class	
106	**A**	<0.25 ac.
13	**B**	0.26-10 ac.
5	**C**	10.1-100 ac.
2	**D**	100.1-300 ac.
1	**F**	> 300 ac.

The class D and F fires were caused by lightning.

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 in need of fuels management treatment. Hazard ratings were developed for the planning area. In general the existing fuel profile within the planning 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.

Table 3-4. Fire Hazard Ratings for the Bald Lick Planning Area.

Fire Hazard Ratings for the Bald Lick Planning Area	
Fire Hazard Rating	**Percentage of Acres in each Category**
Low hazard	>1%
Moderate hazard	40%
High hazard	59%

Based on local knowledge of fire behavior of southwest Oregon the following factors were determined to be necessary in order to assign a fire hazard rating to an area:.

- Fuel Model
- Presence of Ladder Fuels
- Slope
- Aspect
- Elevation

Table 3-5. Fuel Models for the Bald Lick Planning Area

Factor	Assigned Points
1) Fuel Models	
Fuel Models 1, 2, 3, 8	0
Fuel Models 5, 6, 9	5
Fuel Models 10, 11	10
Fuel Models 4, 12, 13	15
2) Slope	
less than 20 percent	5
20 to 45 percent	10
greater than 45 percent	25
3) Aspect	
315 to 360 degrees & 0 to 68 degrees	5
68 to 135 degrees & 293 to 315 degrees	10
135 to 293 degrees	15
4) Elevation	-10
greater than 4,500 feet	
5) Presence of Ladder Fuels	10

Hazard ratings were based on the summation of total points assigned to these factors. The following fire hazard rating was utilized:

Table 3-6. Fire Hazard Ratings

Points	Hazard Rating
0-24	Low
25-50	Moderate
> 50	High

Field inventory and satellite data was used to establish fuel models and the presence of ladder fuels. This information was used to produce layers for fuel model and ladder fuels in GIS. These two layers along with layers on slope, aspect and elevation which already exited in GIS were used to give a hazard rating to all lands within the planning area.

Crown Fire Potential

The current science in determining the extent and severity of wildland fire is based on three environmental variables weather, topography, and fuels (Rothermel 1972, Albini 1976). 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 the atmospheric elements of temperature, relative humidity in relation to fuel moisture, and wind speed 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 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. This relationship is basic to the surface fire spread model which is also imbedded in the crown fire model currently in use. When there is little or no fuel loading available to burn, even during extreme weather conditions, there can be 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 temperatures, low relative humidity, windy unstable atmospheric conditions) fires often do not spread except under unusual wind conditions, due to the lack of continuous fuels.

Several analysis of fire behavior types on local projects have been completed, these studies have found there are an appreciable number of days in the average fire season where typical surface loadings and typical fuel moisture content within typical forested stands on the Medford District would contribute to

crown fire initiation and in some cases crown fire sustainability. When late afternoon winds are considered in late summer and fall conditions between 40-70% of the days in that time period would initiate crowning in the stands studied. Four of the six stands modeled transitioned from initiation to active crowning on at least 3 to 82% of the days within the time period. These are not extreme weather events, but a potential for severe fire activity in every average fire season due to the fuel structure and frequent environmental conditions (analysis file Bobar).

In another respect the historic fire regimen of these lower elevation areas was believed to have promoted a more open crown structure which allowed fire to travel rapidly across the site with intensities that were short lived. These sites evolved to encourage that sort of fire behavior through allowing light flashy surface fuels (grasses, brushes, and conifer/hardwood litter) to dominate the fire behavior attributes and effects on the sites. The frequency, with which the events would return the sites to a seedbed for these fuels, the repeated reduction of conifer reproduction underneath the overstory, and the repeated consumption of large fuels and duff build-up, would affect the types of fire effects found on these sites post fire, historically. The qualities of the open crown structure would also provide better avenues for the heat intensity to vent out of the site without scorching the crowns to the lethal limit. With the exclusion of these fire events stand attributes have changed to a more dense and closed canopy situation with more surface fuels at any given time through the decomposition cycle. The additional surface fuels provide for longer duration heat intensity (residence time) which in turn affects the severity with which the site burns, the increased canopy closure along with the lower canopy heights allow for more scorching in the canopy, and when environmental conditions are conducive, a transition to crown fire initiation and sustained crown fire runs.
Several analyses of fire behavior types (potential) on local projects have been completed, these studies have found there are an appreciable number of days in the average fire season where typical surface loadings and typical fuel moisture content within typical forested stands on the Medford District (and within the Bald Lick planning area) would contribute to crown fire initiation and in some cases crown fire sustainability. When late afternoon winds are considered in late summer and fall conditions, between 40 to 70 percent of the days in that time period would initiate crowning in the stands studied. Four of the six stands modeled transitioned from initiation to active crowning on at least 3 to 82 percent of the days within the time period. These are not extreme weather events, but a potential for severe fire activity in every average fire season due to the fuel structure and frequent environmental conditions ??? (analysis file Bobar).

G. BOTANY

Bureau Special Status Plants 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 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. Additionally, Bureau Assessment, Tracking, and District Watch species are included on the Special Status Plant list but special protection or management is discretionary.

The Bald Lick planning area is within the range of *Fritillaria gentneri*, a federally listed as endangered plant. *Fritillaria gentneri* occurs at nineteen sites within the planning area. Two of these sites are within or adjacent to treatment units and will be protected by a no treatment buffer. Protection of these sites results in no effect to *Fritillaria gentneri* populations. Table 3-7 lists the Special Status Plants found within the sale area.

There are 11 species of rare lichens and fungi on the Medford SSP list that were former Survey & Manage (S&M) list species. As Survey & Manage species, it was determined that field level surveys prior to habitat disturbing activities were impractical because these species were difficult to identify

and/or their occurrence was sporadic or unpredictable. Oregon State Office Information Bulletin No. OR-2004-145, Attachment 5, directs that field units will not be expected to conduct pre-project evaluations for these species. Bureau policy would be met by known site protection and large-scale inventory work performed in fiscal year 2004. Four of the species are known to occur on the Medford District. None are known to occur in the planning area. Species occurrence was not evaluated for the Bald Lick project. Table 3-8 lists the species for which surveys are not practical.

Table 3-7. Special Status Plants within the Bald Lick Timber Sale Area.

Scientific Name	Common Name	Status	TNC Rank
Carex serratodens	twotooth sedge	BAO	G5/S2
Cirsium ciliolatum	Ashland thistle	BSO	G2Q/S2
Cimicifuga elata	tall bugbane	BSO	G3/S3
Crumia latifolia	Wideleaf crumia moss	BAO	G3/S3
Cypripedium fasciculatum	Clustered lady's slipper	BSO	G4/S3
Cypripedium montanum	Mountain lady's slipper	BTO	G4G5/S3S4
Enemion stipitatum (Isopyrum s.)	Siskiyou false rue anemone	BTO	G4?/S3
Eucladium verticillatum	whorled eucladium moss	BAO	G4/S1
Eucephalus vialis (Aster v.)	wayside aster	STO	G3/S3
Fabronia pusilla	fabronia moss	BTO	G4/S1
Festuca elmeri	Elmer's fescue	BAO	G5/S1
Fritillaria gentneri	Gentner's fritillary	FE	G1/S1
Hedwigia stellata	moss	BTO	G4/S2
Lewisia cotyledon var. *howellii*	Howell's lewisia	BTO	G4T4Q/S3
Lithophragma heterophyllum	hillside woodland-star	BTO	G4/S3
Ribes inerme var. *klamathense*	Klamath gooseberry	BTO	G5T3?/SNR
Sedum oblanceolatum	oblongleaf stonecrop	BSO	G3/S3
Sedum spathulifolium ssp. *purdyi*	Purdy's stonecrop	BTO	G4G5T4/S3
Tripterocladium leucocladulum	tripterocladium moss	BAO	G3/S3

FE = federally endangered
BSO = Bureau Sensitive in Oregon
BAO = Bureau Assessment in Oregon
BTO = Bureau Tracking in Oregon
MW = Medford District Watch
G = Global Rank
S = State Rank
T = Trinomial (subspecies, variety, race) Rank
Q = Questionable taxonomy
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 = Imperilled 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 imperilled, 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.
NR = Not ranked.

Table 3-8. Former Survey & Manage Species, Surveys Not Practical.

Scientific Name	SSP Status	Documented/ Suspected	Former S&M	TNC Rank
Boletus pulcherrimus	BSO	D	B	G2G3/S2
Bryoria subcana	BAO	D	B	G2G4/S2
Dermocybe humboldtensis	BSO	S	B	G1G2/S1
Gastroboletus vividus	BSO	S	B	G2?/S1
Phaeocollybia californica	BSO	S	B	G2?/S2?
Phaeocollybia olivacea	BSO	D	F	G2/S2
Phaeocollybia oregonensis	BSO	S	B	G2?/S2
Ramaria spinulosa var. diminutiva	BSO	S	B	GUT2/S1?
Rhizopogon chamaleontinus	BSO	S	B	G1G2/S1S2
Rhizopogon ellipsosporus	BSO	D	B	G1G3/S1S3
Rhizopogon exiguus	BSO	S	B	G1G3/S1S2

Former S&M B = Rare species, pre-disturbance surveys not practical, manage all known sites, strategic surveys required
Former S&M F = Uncommon species, status undetermined, pre-disturbance surveys not required, strategic surveys required

1. Medford District Sensitive Plants (FE, STO, BSO)

Cimicifuga elata (BSO) is a native perennial that is found in low elevation moist woods and openings in woods. It is a candidate for listing by the State of Oregon. In the planning area, some populations occur in previously managed conifer stands. Currently, there is taxonomic evidence under review that Southern Oregon populations may be a separate variety. There are ten known sites in or adjacent to proposed treatment areas.

Cirsium ciliolatum (BSO) is a native perennial that is found in open areas and woodlands. This thistle is known from many sites in Jackson County, Oregon and only a few sites in Siskiyou County, California. Populations appear to do well despite heavy grazing pressure. There are two reported sites in or adjacent to proposed treatment areas. These sites, as all Ashland thistle sites west of Interstate 5, are suspected to be mis-identified. No sites west of Interstate 5 have been confirmed.

Eucephalus vialis (STO) is a native perennial that is found in open woods. BLM manages State listed plants for their conservation. State laws protecting these species apply to all BLM programs and actions to the extent that they are consistent with the Federal Land Policy and Management Act (43 U.S.C. 1701 et seq.) and other Federal laws. There are six known sites in or adjacent to proposed treatment areas.

Fritillaria gentneri (FE) is a native bulbiferous perennial that is found in oak woodlands, forest edges, and shrublands. By policy, the BLM conserves listed species and the ecosystems upon which they depend and shall use existing authority in furtherance of the purposes of the ESA. There are two known populations in or adjacent to proposed treatment areas. These populations are within Recovery Unit 1 of the US Fish & Wildlife Service Recovery plan for *Fritillaria gentneri* but are not part of any Fritillaria management area as described in the plan.

Sedum oblanceolatum (BSO) is a native perennial that is found only in Jackson County, Oregon and less than five sites in California. It is a candidate for listing by the State of Oregon. It is found on rock outcrops. There are eight known sites in or adjacent to proposed treatment areas.

2. Medford District Assessment and Tracking Plants (BAO, BTO)

Carex serratodens (BAO) is a native perennial that is found in moist meadows and rocky places near streams and seepages, foothill woodland, mixed evergreen, and yellow pine forests. There is one known sites in or adjacent to proposed treatment areas.

Crumia latifolia (BAO) is a moss native to western North America and Russia. Its substrate is wet rocks or soil, often on calcareous rock. In the planning area, it is usually in draws in conifer and white oak woodland communities. There are four known sites in or adjacent to proposed treatment areas..

Cypripedium fasciculatum (BSO) is a native long-lived perennial that is found in conifer forests with 60% and greater canopy cover throughout the western United States. There are 13 known sites in or adjacent to proposed treatment areas.

Cypripedium montanum (BTO) is a native perennial that is found in conifer forest with 60% to 80% canopy cover in western North America. There are two known sites in or adjacent to proposed treatment areas.

Enemion stipitatum (*Isopyrum s.*) (BTO) is a native perennial found in oak woodlands, shrublands, and mixed conifer forests in California and Oregon. There are seven known sites in or adjacent to proposed treatment areas.

Eucladium verticillatum (BAO) is a moss native to North America. Its substrate is wet rocks. In the planning area, it is usually in draws in forested communities. There is one known site in or adjacent to proposed treatment areas.

Fabronia pusilla (BTO) is a moss known from western North America, Europe, and North Africa. Its substrate is rock and bark in many types of plant communities. There are two known sites in or adjacent to proposed treatment areas.

Festuca elmeri (BAO) is a native perennial grass found in California and Oregon. It is found in partially shaded conifer forests and oak woodlands. There are five known sites in or adjacent to proposed treatment areas.

Hedwigia stellata (BTO) is a moss native to the Pacific states, British Columbia, and Europe. It grows over periodically dry, usually acidic rocks. There are two known sites in or adjacent to proposed treatment areas.

Lewisia cotyledon var. *howellii* (BTO) is a native perennial found in California and Oregon. It is found on rock outcrops and canyon walls, generally near oak woodlands. There are six known sites in or adjacent to proposed treatment areas.

Lithophragma heterophyllum (BTO) is a native perennial found in California and Oregon. It is found in shaded conifer forests. There are two known sites in or adjacent to proposed treatment areas.

Ribes inerme var. *klamathense* (BTO) is a native perennial shrub found in California and Oregon. It is found in conifer forest edges and riparian areas. There are two known sites in or adjacent to proposed treatment areas.

Sedum spathulifolium ssp. *purdyi* (BTO) is a native perennial found in California and Southern Oregon. It grows on rock often in the shade. There is one known site in or adjacent to proposed treatment areas.

Tripterocladium leucocladulum BAO) is a moss known from western North America. Its substrate is soil, rock, or trees in shaded conifer forests. There are 36 known sites in or adjacent to proposed treatment areas.

3. Former Survey & Manage Species, Surveys Not Practical

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 36 known sites. Four sites are on the Medford District in the vicinity of Hyatt Lake, two are on the Rogue River National Forest, and three border the Medford District on the Winema National Forest. Nearest site to the planning area is approximately 17.5 air miles on BLM. 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 4620' to 5640'. 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.

Bryoria subcana is a pale brown pendant, fruticose lichen. This lichen is known from south central Alaska to central California and northern Europe. In the range of the Northwest Forest Plan (NFP), there are 20 known sites. Three of these sites are on the Medford District in the vicinity of Merlin, approximately 32 miles from the planning area. NFP habitat data shows this species occurs on bark and wood of mainly western hemlock but also Douglas-fir, Pacific silver fir, and white fir. On two of Medford's sites the specimens occur on Douglas-fir, the other occurs on manzanita. The plant association for all Medford sites is Douglas-fir-Ponderosa Pine/Poison oak (PSME-PIPO/RHDI6).

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 64 air miles away. Habitat data for the Roseburg sites is incomplete; community type is listed as Ponderosa Pine-Douglas-fir for one site. Other NFP habitat community types are for coastal dune Redwood/Douglas-fir and Redwood/Sitka spruce.

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 four known sites; two sites occur in the Rogue River National Forest. Nearest site to the planning area is in the Applegate Ranger District and is approximately 6.6 air miles. Only one site (Rogue River National Forest, Prospect Ranger District) has habitat data, white fir mid-mature to mature forest. Other habitat data reports an association with various Pinaceae, particularly red fir and mountain hemlock.

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 30 known sites. The site nearest the planning area is approximately 29.5 air miles away in the vicinity of Takilma. 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 93 known sites in the NFP area and 98 total known sites. Four sites are on the Medford District in Josephine County with the site nearest the planning area being approximately 15 air miles away (near Williams). 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 3060'.

Phaeocollybia oregonensis is a gray-brown, glutinous, gilled mushroom with a long pseudorhiza. In the range of the NFP, it is known only from 11 sites in Oregon. The site nearest the planning area is approximately 81 air miles away on the BLM Coos Bay District. Habitat data reports an association with western hemlock and white fir. Elevation ranges from 550' to 4056'.

Ramaria spinulosa var. *diminutiva* is a brown coral fungus known from only three sites in the range of the NFP. It is also known from Europe. The single Oregon site is in the BLM Roseburg District in a late successional Douglas-fir forest at 1200' elevation. This site is approximately 61 air miles from the planning area. Other habitat data reports an association with Pinaceae.

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 mapped on Oregon Department of Forestry land near Galice. The site is approximately 38 air miles from the planning area. Habitat data for this site is Douglas-fir forest at 3300' elevation.

Rhizopogon ellipsosporus is a brown subglobose underground truffle fungus. It is known from only three sites, all in southern Oregon. One site is on BLM Medford District and two are on the Siskiyou National Forest. The nearest site is approximately 2.5 air miles from the planning area near Cantrall-Buckley Park. Habitat data lists an association with Douglas-fir and Sugar Pine. All sites are low elevation, foothill sites.

Rhizopogon exiguus is a white mottled globose underground truffle fungus. It is endemic to Washington and Oregon with only five sites known in the NFP area. The nearest site is approximately 27 miles away in the vicinity of Waters Creek on the Siskiyou National Forest. The elevation is 2800'. Habitat data lists an association with Douglas-fir and western hemlock.

4. Noxious Weeds and Introduced Plants

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 are found throughout the planning area and adjacent private lands. These weed sites are mostly associated with roads. Notably, in 1987 a small fire burned in the Cantrall Gulch area. Restoration seeding occurred subsequently with yellow starthistle infected grass seed. As a result, noxious weed populations of various size and density are located throughout the old fire area away from roads. All species of noxious weeds in the planning area are on the Oregon Department of Agriculture List B. "B" designated weeds are weeds of economic importance which are regionally abundant but may have limited distribution in some counties. Table 3-9 lists the noxious weeds and introduced plants within the planning area.

<u>Oregon Department of Agriculture List B Noxious Weeds</u>
Spotted knapweed (*Centaurea biebersteinii*) is a perennial with a stout tap root. The plant has a somewhat woolly appearance that overwinters in a rosette stage. The rosettes bolt in early summer producing 1-15 stems with pink to purple flowers. Each inflorescence can produce 9-37 seeds. Seed dispersal is mainly via gravity with longer distances by animals, humans, vehicles, and commercial crops. Seeds can remain viable in the soil seedbank for eight years. There are 70 sites reported for the Medford District and five for the planning area vicinity. This weed is a native of central Europe and has limited forage value, increases ranching costs, displaces native plants, and decreases plant diversity. Successful control methods include chemical, biological, cultural (including sheep grazing), and limited effectiveness with mowing.

Yellow star-thistle (*Centaurea solstitialis*) is an annual or biennial with a deep taproot. The yellow flower heads are spined producing 35-80+ seeds. Large plants can produce over 100,000 seeds. Seed dispersal is mainly via gravity with longer distances by birds, animals, humans, vehicles, and commercial crops. Seeds can remain viable in the soil seedbank for six to 10 years. Nonnative honeybees are the main pollinator of yellow star-thistle, accounting for 50% of seed set. There are 6229 sites reported for the Medford District and 332 for the planning area vicinity. This weed is a native of Eurasia and lowers forage value, increases farming and ranching costs, depletes soil moisture, displaces native plants, decreases plant diversity, is toxic to horses, and is an important source of honey. Successful control

methods include chemical, biological, cultural, and mechanical (including pulling and mowing).

Rush skeletonweed (*Chondrilla juncea*) is a perennial with a mass of wiry stems with small yellow flowers. A single plant can produce 20,000 seeds that are dispersed by wind, water, animals, and humans. It can also reproduce asexually through horizontal roots and root fragments. There are 54 sites reported for the Medford District and one for the planning area vicinity. This weed is a native of Eurasia and lowers forage value, and increases farming and ranching costs. Successful control methods include biological, and chemical (with repeated applications).

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 896 sites reported for the Medford District and three for the planning area vicinity. This weed is a native of Eurasia. Detrimental effects include displacement of native species, decrease of plant diversity, reduced forage, and 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.

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 and only 100 feet. 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. There are 1531 documented sites (incomplete records, data no longer tracked) reported for the Medford District and 260 for the planning area vicinity. This weed is a native of Eurasia. Detrimental effects include displacement of native species, decrease of plant diversity, and reduced forage. Active control methods are not usually employed. Bull thistle is eventually outcompeted by other vegetation for light, moisture, and nutrients.

Table 3-9. Noxious weeds and Introduced plants within the Bald Lick Planning Area.

Scientific Name	Common Name	ODA List*
Aira caryophylla	silver hairgrass	
Avena fatua	wild oat	
Bromus hordaceous	soft brome	
Bromus japonicus	Japanese brome	
Bromus rigidus	ripgut brome	
Bromus tectorum	cheatgrass	
Centaurea biebersteinii (C. maculosa)	spotted knapweed	B
Centaurea solstitialis	yellow star-thistle	B
Chondrilla juncea	rush skeletonweed	B
Cichorium intybus	chicory	
Cirsium arvense	Canada thistle	B
Cirsium vulgare	bull thistle	B
Convolvulus arvensis	field bindweed	
Cynosurus echinatus	bristly dogstail grass	
Dactylis glomerata	orchardgrass	
Erodium cicutarium	redstem stork's bill	
Holcus lanatus	common velvetgrass	
Hypericum perforatum	common St. Johnswort	
Hypochaerus radicata	hairy catsear	
Lactuca serriola	prickly lettuce	
Lepidium campestre	field pepperweed	
Lotus corniculatus	birdfoot deervetch	
Plantago lanceolata	narrowleaf plantain	
Poa bulbosa	bulbous bluegrass	
Poa pratensis	Kentucky bluegrass	
Rubus discolor	Himalayan blackberry	
Rumex acetosela	garden sorrel	
Taeniatherum caput-medusa	medusahead	
Torilis arvensis	spreading hedgeparsley	
Tragopogon dubius	yellow salsify	
Trifolium repens	white clover	
Verbascum blatteria	moth mullein	
Verbascum thapsis	common mullein	
Vicia sativa	garden vetch	
Vulpia myuros	rat-tail fescue	

H. WILDLIFE

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

Table 3-10. Vegetation Condition and Associated Wildlife Habitats

Vegetation Condition Class	Approximate Acres in Planning Area – Agency Administered Lands	Representative Species (from Brown 1985)
Grassland	2,268	gopher snake, California ground squirrel, western meadowlark
Brushland/Shrubland	3,583	western fence lizard, wrentit, dusky-footed woodrat
Hardwood/Woodland	4,053	acorn woodpecker, western gray squirrel, common garter snake
Seedling/Sapling	1,394	solitary vireo, deer mouse, black-tailed deer
Poles (small conifers)	750	Golden-crowned kinglet, porcupine,
Mid-Seral	7,149	Coopers hawk, Steller's jay, Douglas' squirrel
Mature/Large Conifer	1,948	northern spotted owl, northern flying squirrel, pileated woodpecker

1. Threatened/Endangered Species

The northern spotted owl (*Strix occidentalis caurina*) is a federally listed threatened species. There are six known spotted owl sites on BLM administered land within the proposed planning area. These sites have been monitored at various intensities during the last 10 years (1994-2003). Four sites are known to have been occupied within this 10-year period. Portions of the proposed planning area are also within the provincial home range radius (1.3 mile) of five other known northern spotted owl sites. As with the sites within the planning area, these sites have been monitored at various intensities during the last 10 years (1999-2003). Four of these sites are known to have been occupied within the10-year period.

There are approximately 6,000 acres of suitable spotted owl habitat and 3,070 acres of dispersal-only habitat on BLM administered land within the proposed planning area. Suitable habitat includes nesting/roosting and foraging habitat and generally has the following attributes: high degree of canopy closure (approximately 60 %+), multilayered canopy, large snags, and coarse woody debris. Dispersal-only habitat provides spotted owls some degree of protection and some foraging opportunity during dispersal and other activities, and generally has the following attributes: conifer stands with an average diameter of approximately 11 inches and 40-60 percent canopy closure.

Northern Spotted Owl Critical Habitat

Approximately 10,315 acres of the planning area are in designated critical habitat for the northern spotted owl – Critical Habitat Unit (CHU) OR-75. The constituent elements of northern spotted owl critical habitat are nesting, roosting, foraging, and dispersal habitat. Collectively, nesting/roosting/foraging habitat is "suitable habitat" as described above. There are approximately 3,165 acres of suitable habitat and 1,640 acres of dispersal-only habitat in CHU OR-75 within the proposed planning area.

OR-75 was designated to maintain an adequate distribution of nesting, roosting, and foraging habitat and to improve connectivity between CHUs in an area of high fragmentation (USDI 2003).

2. 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, or are BLM designated sensitive or assessment species. The table below lists the special status species that are known or are likely 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 an "accidental" in the planning area.

Table 3-11. Special Status Wildlife Species

BALD LICK SPECIAL STATUS SPECIES		
Common Name	Scientific Name	Status
Northern Spotted Owl	Strix occidentalis caurina	FT - Known
Northern Goshawk	Accipiter gentilis	BS - Suspected
Lewis' Woodpecker	Melanerpes lewis	BS - Suspected
Purple Martin	Progne subis	BS - Known
Northwestern Pond Turtle	Clemmys marmorata marmorata	BS - Known
Foothill Yellow-legged Frog	Rana boylii	BA - Suspected
Black Salamander	Aneides flavipunctatus	BA - Known
Siskiyou Mountains Salamander	Plethodon stormi	BS - Known
Fringed Myotis	Myotis thysanodes	BA - Suspected

FT = Federal threatened; BS = Bureau Sensitive; BA = Bureau Assessment

Generally, Bureau sensitive species have restricted ranges and have natural or human-caused threats to survival (USDI 1992). 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.

Bureau assessment species are species that are of concern and may need protection or mitigation in BLM activities. However, the level of concern for these species is generally less than for the sensitive species due to less threats to the species or they have larger ranges.

3. Survey and Manage Species

The Northwest Forest Plan provided extra protection for some species through Survey and Manage (S&M) standards and guidelines (S&Gs). The S&Gs generally required that surveys be conducted for certain species prior to ground-disturbing activities and that located sites be protected. In March 2004 the Northwest Forest Plan was amended, and the S&M Mitigation Standards and Guidelines were eliminated. Prior to this, the proposed project area was surveyed for the following former S&M species: Great gray owl, red tree vole, and terrestrial mollusks. Also, a portion of the proposed project area, known previously as the Bobar project, was surveyed for the Siskiyou Mountains salamander. The results of the surveys follow:

Great gray owl – There were several detections of great gray owls, but nesting owls were not found within the proposed project area.

Red tree vole – No red tree voles were located within the project area.

Mollusks: No S&M mollusk species were found in the proposed project area.

Siskiyou Mountains salamander: Numerous sites were found in the portion of the proposed project area previously known as the Bobar project area. Approximately 1,500 acres of occupied habitat are protected.

4. Deer Winter Range

Approximately 8,950 acres of the proposed project are in the Little Applegate Deer Winter Range as identified in the Medford District RMP. The winter range is characterized by a low density of roads and forage conditions that are deteriorating.

The inaccessibility of much of the winter range to vehicles provides seclusion for deer at a time when they are under physiological stress. This is a benefit because nutritional reserves are not depleted on avoidance behavior. However, forage conditions have deteriorated over time due to the lack of fire or other disturbance. Brush species which provide forage are becoming decadent and less productive. Oak woodlands, patches of oaks and individual large oak trees, all of which provide acorns, are becoming less productive, and in some cases oaks are being out-competed by brush and invading conifers.

Approximately 5,910 acres serve as primary foraging areas (grass, brush, woodland, and early seral vegetation condition classes), and approximately 1,780 acres serve as thermal cover (mid-seral and mature forest with a high degree of canopy closure). Generally, brushland/shrubland and mature conifer forest vegetation condition classes also provide hiding cover.

5. Important Bird Area

A portion of the proposed planning area has been designated as an Oregon Important Bird Area (IBA) by the Oregon Important Bird Area Technical Advisory Committee. This area was nominated as an IBA due to the presence of large areas of suitable habitat for several bird species that reach their northern breeding limits in southwest Oregon. The species specifically mentioned in the nomination include blue-gray gnatcatcher (*Polioptila caerulea*), California towhee (*Pipilo crillalis*) and oak titmouse (*Baeolophus inornatus*). These species are associated with the shrubland/oak-woodland habitat complex. There are approximately 7,625 acres of this habitat within the planning area.

IBAs have no particular legal status. Rather, the intent of the IBA program is to recognize important sites and encourage proper management or maintenance of these sites for avian values (Oregon IBA website).

I. FISH

1. Analysis Area

The analysis area includes the lower 12 miles of the Little Applegate River, tributaries to the Little Applegate River, and associated Riparian Reserves (Map Included). Streams in the Applegate River-Beaver Creek and Applegate River-Star Gulch HUC 6s (Applegate River-McKee Bridge HUC 5) on the east side of Applegate Road have either never had or have lost their surface connection to the Applegate River and were not considered part of the analysis area. There are three main reasons for this: 1) irrigation ditches intercepting flow 2) steep confined streams spreading out and going subsurface through the porous colluvium of the floodplains and terraces as they reach the valley bottoms along the Applegate River, and 3) floodplain development that has degraded, paved over, and otherwise destroyed the old channels. During summer months and most winters, these tributaries flow subsurface through the river terrace (now agricultural fields) before reaching the river. Fine sediments from these tributaries are also trapped on the terrace[8]. In large floods, these streams deposit debris flows, including wood, on the river terrace. It appears that the wood does not enter the Applegate River because the river has downcut through this reach and no longer accesses the adjacent terraces during floods[9].

Fish Distribution

The two major streams in the project area are the (upper) Applegate River and Little Applegate River. Significant tributaries include Boaz Gulch, Grouse Creek, Yale Creek, Lick Gulch, and Rush Creek.

[8] Dave Squyres, Ashland R.A. hydrologist, professional judgment.
[9] Dave Squyres, Ashland R.A. hydrologist, professional judgment.

Several native fish spawn and rear in the mainstem Applegate: coho salmon (*Oncorhynchus kisutch)*, steelhead (*O. mykiss*), chinook salmon (*O. tshawychta*), Pacific lamprey (*Lampetra tridentata*), sculpin (*Cottus spp*.), and Klamath smallscale suckers (*Catostomus rimiculus*) (USDI 1995b). Non-native warmwater fishes (e.g. golden shiners, smallmouth bass) are also present, especially in side channels and backwaters.

In the Little Applegate River steelhead and Pacific lamprey negotiate a natural bedrock falls at river mile 1.4. This falls is believed to be the upstream limit to coho migration in most years (ODFW 2002). Lamprey ammocetes have been found in the middle reaches of the Little Applegate River.[10] Resident rainbow and cutthroat trout reside in several Little Applegate River tributaries, especially in the upper reaches on USFS land[11].

Boaz Gulch is a fishless tributary to the Applegate River. The mouth is very steep, and the lower ½ mile often flows subsurface through deep alluvial deposits (now pasture).
Grouse Creek is the most downstream tributary to the Little Applegate River within the Bald Lick planning area and supports populations of steelhead and rainbow trout in the lower ½ mile. Yale Creek, a tributary to the Little Applegate supports populations of steelhead, rainbow and cutthroat trout however upstream migration is challenged by two diversion dams that have less-than-optimal fish ladders. Lick Gulch and Rush Creek are fishless tributaries to the Little Applegate. A three foot falls at the mouth of Rush Creek is a barrier in most conditions and an irrigation ditch captures much of the flow at river mile 1.0.

The following table describes miles of stream type within the project area, on BLM land, by HUC-7 drainages. In some cases, the entire HUC-7 is not represented because part of the drainage area is outside the project area. There are only 2.9 few fish-bearing perennial stream miles within the project area.

Table 3-12: Stream miles on *BLM land* within the Bald Lick Project analysis area. Fish-bearing miles are approximate, based upon the best information available. All miles are calculated from current BLM Geographic Information System layers (May 2003), which are updated with verified fish data from ARWC surveys, ODFW surveys, BLM on-the-ground surveys, and similar sources.

HUC 7 Drainage (and Drainage Number)	Fish-bearing	Non-fish bearing			Total All Streams
	All stream types	Perennial	Intermittent	Total	
Applegate River and Tributaries					
AU0218	0.4	1.9	5.5	7.4	7.8
AU0360	--	1.4	9.6	11.0	11.0
AU0363	--	0.9	4.9	5.8	5.8
Little Applegate River and Tributaries					
LA0124	--	--	0.2	0.2	0.2
LA0127	--	1.2	1.4	2.6	2.6
LA0130	--	2.4	1.3	3.7	3.7
LA0133	--	--	--	--	--
LA0145	--	--	0.4	0.4	0.4

[10] BLM Ashland F.O. lamprey sampling surveys, Little Applegate River, 2000 – 2003.
[11] BLM Ashland F.O. fish presence/absence surveys, Little Applegate tributaries, 1997 – 2002; USFS fish survey data, Little Applegate River tributaries; Little Applegate River WA (1995).

HUC 7 Drainage	Fish-bearing	Non-fish bearing			Total All
LA0203	--	0.4	0.9	1.3	1.3
LA0206	--	3.5	1.3	4.7	4.7
LA0209	1.2	1.4	2.9	4.3	5.5
LA0212	--	1.0	5.4	6.4	6.4
LA0215	0.6	0.9	7.0	7.9	8.5
LA0218	--	3.8	5.0	8.8	8.8
LA0221	0.1	1.6	2.6	4.2	4.2
LA0330	--	1.0	5.3	6.2	6.3
LA0403	--	1.0	1.6	3.5	3.5
LA0406	0.7	3.1	3.7	6.8	7.5
LA0409	--	--	1.4	1.4	1.4
LA0439	--	--	1.1	1.1	1.1
LA0442	--	1.0	6.7	7.8	7.8
LA0445	--	--	3.6	3.6	3.6
Totals	2.9	26.4	97.7	124.1	127.0

Fish Habitat within a Watershed Context

The Bald Lick Project is situated in the upper third of the Applegate River valley. In terms of organizing watersheds, the Applegate Valley is divided into five 5th field watersheds: Lower, and Middle Applegate River, Applegate/McKee Bridge, Upper Applegate River and the Little Applegate River. The confluence with the Little Applegate River is the start of the Applegate/McKee Bridge watershed; the Upper Applegate is above the Applegate Dam.

To reach the Upper and Little Applegate Rivers, coho must first pass through the lower and middle reaches of the Applegate River. The Lower and Middle Applegate watersheds are very developed. The river is paralleled by roads and irrigation ditches on both sides. Towns and 150 years of agricultural development have channelized the river and the major streams and isolated them from their floodplains. Population density is increasing as farms subdivide and more people choose to locate in the rural setting. Major tributaries were hydro-mined and/or dredged for gold up until the 1930's, and dredging still continues in the larger streams. Watersheds were logged, roaded, and protected from wildfire. Water withdrawals, dam construction and beaver trapping altered the hydrologic regime. Through the lower reaches, the Applegate River is 303(d) listed for both temperature and sediment[12].

More detailed information can be found in the Applegate Aquatic Health Assessment (USDI BLM and USDA FS 1995), Middle Applegate Watershed Analysis (USDI BLM 1995), the Star/Boaz Watershed Analysis (USDI BLM 1998?), and the Little Applegate Watershed Analysis (USDA FS and USDI BLM 1995).

Applegate River (Critical Habitat)

Little habitat data exists for the Applegate River because the river is too large for the ODFW stream survey protocol to be relevant, and because the land along almost the entire river is privately-owned, and

[12] ODEQ: http://www.deq.state.or.us/wq/standards/WQStdsTemp.htm.

therefore not part of the Hydrology Stream Survey protocol. The information below comes from the personal observations of professional fish biologists, geologists, hydrologists, and silviculturists who contributed to the watershed analyses cited above.

The Applegate/McKee Bridge River watershed begins (downstream) at the confluence with the Little Applegate River. It runs through a much narrower canyon than the wider, formerly floodplain-dominated lower reaches. Consequently the river channel is probably more or less in its historic channel. However, the river is deeply incised[13]. Most tributary mouths are perched; a fish ladder built into the bedrock at the mouth of Star Gulch allows anadromous fish to reach this tributary. It is probable that gold mining at the turn of the century contributed to this incision. The incision also appears to be exacerbated by the Applegate Dam, which stores sediment from the more erosive (e.g. granite) headwaters[14]. Although lower reaches still appear to have large sediment (e.g. gravels and cobbles) deposits, the upper reaches appear to be sediment starved. Bedrock shelves are common. Regardless of cause, the consequent adverse effects to fish habitat are fewer spawning beds, simplified (though deep) pools, little refugia from floods or predators, and decreased food supply.

As explained earlier in this document, the Bald Lick planning area only includes streams on the east side of the Applegate River. These steep, west-facing slopes are dry and hot. Vegetation is complex, comprising many different plant communities depending on slight variations in soil depth and moisture. Riparian areas are narrow, but contain a wide variety of more mesic trees and plants; upland slopes vary from white oak or live oak woodlands to pine and Doug-fir stands[15].

Boaz Gulch (Not Critical Habitat)

Boaz Gulch is a tributary to the Applegate River in HUC#0218. It is not part of Critical Habitat because coho cannot access the stream. The mouth is very steep, and the lower ½ mile often flows subsurface through deep alluvial deposits (now pasture). Boaz Gulch is steep and fishless.

The mainstem of Boaz Gulch has three major problems: eroding banks, little to no wood of any size, and a poorly-designed road that contributes fine sediments to the stream and is impassable through much of the year[16]. Boaz Gulch has more boulder substrate than would be expected for a stream of this size. These may have been exposed by channel scouring during the 1997 flood or be remnants of an old debris flow. Regardless, they constitute the only way for the stream to store and route sediment. This will be important, because 1998 BLM stream surveys found that short-duration tributaries were storing large amounts of fine sediment – as much as 90% of a tributary's substrate.

Little Applegate River (Critical Habitat)

Like the Applegate River, the Little Applegate River has been settled, mined, logged, roaded, and grazed. Current problems for anadromous fish include summer water withdrawals, migration barriers, and channelization[17]. Habitat quality varies. Lower reaches are in poor condition, while middle reaches (private and BLM) and upper reaches (mostly USFS) are in better condition. BLM-managed reaches (some of the middle reaches) were rated as 60% Properly Functioning (PFC) and 20% Functioning-At-Risk-with-an-Upward-trend (FAR-U)[18].

The 1997 New Year's Flood hit the Little Applegate watershed very hard. The storm cell settled over the upper reaches, and the flood event in the Little Applegate River is estimated to have been the size of a 90-

[13] Star/Boaz Watershed Analysis (USDI BLM 1998?).
[14] Star/Boaz Watershed Analysis (USDI BLM 1998?).
[15] Star/Boaz Watershed Analysis (USDI BLM 1998?).
[16] BLM, Ashland F.O., Hydrology stream surveys, Boaz Gulch and tributaries, October 1998.
[17] Little Applegate River WA (1995).
[18] Ashland F.O. Hydrology stream surveys, Little Applegate River, November 1998, June 1999, October 1999, and November 1999. NOTE that the definition of "properly functioning" is the "minimum condition for sustaining ecological function" (emphasis added) (USDI BLM 2001).

year return interval flood[19]. ODFW fish habitat stream surveys were conducted in 1993 and portions of the river were re-surveyed in 1998[20]. The re-surveyed reach data (from the middle and upper reaches of the Little Applegate River) indicate that some channel changes had positive effects on fish habitat, some negative, as would be expected. At a glance the data shows that in the middle and upper reaches:

- The channel deepened.
- "Key pieces"[21] of wood decreased—much of the larger key pieces appeared to have ended up scattered on agricultural fields (floodplains) downstream near the mouth of Yale Creek[22].
- Smaller wood increased downstream, but decreased upstream.
- Eroding banks increased.
- Cobbles increased downstream, but more of the channel was scoured to bedrock upstream, and overall amounts of gravel were less.
- Some reaches lost pool habitat; others gained.

Post-flood surveys on BLM-managed portions of the Little Applegate River confirmed that all six reaches were well below the Klamath-Siskiyou rating for properly functioning condition in the Matrix of Pathways and Indicators (Appendix D)[23]. Overall, the fish habitat in the middle reaches remains in moderate condition, and in the lower reaches remains poor (due to human impacts mentioned earlier)[24].

The geology of the Little Applegate watershed is famously variable, as it is throughout the Klamath-Siskiyou Mountain region[25]. Within the Bald Lick planning area, the soils are formed from Resistant Metavolcanics and Low Elevation Granitics[26]. Although these soils are both considered relatively stable, evidence of past slope failures (slumps) are evident along some streams, and certain hillslopes are unstable. This variability is reflected in stream condition. This is especially apparent in Rush Creek, which sports high amounts of fine sediments, but has a healthy riparian area and stable banks. Little Applegate River tributary descriptions follow.

Grouse Creek (Not Critical Habitat)

All-in-all, Grouse Creek is in pretty good shape. The riparian area is healthy. The channel does store fine sediment[27], probably exacerbated by a poor-condition road paralleling the stream. However, the substrate is a healthy mix of gravels, cobbles, and boulders; little bedrock is exposed in the channel. There is little to no bank erosion through the stream – even after the 1997 flood. Like many streams in the Applegate basin, Grouse Creek has insufficient amounts of wood. However, one mainstem reach (in an owl core) and one tributary do have moderate ("at risk") amounts of wood according to the Klamath-Siskiyou habitat indicator ratings for coho habitat (see Appendix D). BLM surveyors rated 72% of the reaches in this HUC-7 as PFC and 25% as FAR-U[28].

In Section 24 Grouse Creek has high sediment levels as a result of a road crossing and irrigation ditch. During high flow the ditch dumps water directly into Grouse Creek and it is reportedly very turbid (site visit 5/30/02).

Yale Creek (Critical Habitat) and tributaries (Not Critical Habitat)

Yale Creek is the next major Little Applegate tributary, upstream of Grouse Creek. Yale Creek is also the largest Little Applegate tributary; its drainage area is actually divided into two separate HUC-7s, only one

[19] D. Squyres, Ashland R.A. hydrologist, personal communication.
[20] ODFW fish habitat stream surveys, Little Applegate River, 1993 and 1998.
[21] "Key pieces" as defined by ODFW are those that are $\geq$0.6m dbh x $\geq$ 10m length.
[22] J. Rossa, D. Squyres, personal observation.
[23] Ashland F.O. Hydrology stream surveys, Little Applegate River, November 1998, June 1999, October 1999, and November 1999.
[24] J. Rossa, Ashland R.A. fish biologist, professional judgement based on survey data and field visits.
[25] Little Applegate River WA (1995).
[26] T. Haas, Bald Lick Soils Report, May 2004.
[27] BLM, Ashland F.O., Hydrology stream surveys, Grouse Creek and tributaries, October/November 1999.
[28] BLM, Ashland F.O., Hydrology stream surveys, Grouse Creek and tributaries, October/November 1999.

of which (the most downstream HUC-7, #0330) is mostly within the Bald Lick planning area.

Most of mainstem Yale Creek is sediment-starved. Even before the 1997 flood, mainstem Yale Creek had very low amounts of sand and little gravel (although high amounts, >10%, silt)[29]. Only the lower reach, downstream of the confluence with Waters Gulch, contained about 15-20% fines, and little gravel. Post-flood spawning surveys above the confluence with Waters Gulch (about 1/3 of the way upstream) confirm that there are few places with quality spawning beds within mainstem Yale Creek[30].

Conversely, the tributaries within the Bald Lick planning area (HUC#0330) are storing and/or releasing sediment downstream. Several have slumping problems or potential. Soils on the west side of Yale Creek appear to be thin and ravelly, supporting shrub savannah and oak woodlands, both indicators of shallower soils. Streams through these types of plant communities tend to contain and/or transport finer sediments than those in more forested areas[31]. There is also a road in bad condition which was partially decommissioned ten years ago. This road runs across the headwalls of the headwater tributaries of First Water Gulch (a west-flowing tributary of Yale Creek). Although soils appear to be naturally erosive, this road appears to be contributing to channel instability or fine sedimentation in short-duration intermittent sections downstream of road crossings.

Fortunately, several of Yale Creek's tributaries in HUC#0330 also have a fair amount of wood. Two reaches even have >25 key pieces of wood/mile, a tributary near the mouth of Yale Creek, and a tributary to First Water Gulch. Two additional reaches have moderate amounts of wood (10-25 key pieces/mile): the mainstem of and a tributary to First Water Gulch. In 1999, a BLM survey crew rated 43% of these tributary reaches (on BLM) as PFC, but 54% FAR-D[32].

1993 ODFW surveys in mainstem Yale Creek counted few wood pieces of any size in the first 3 ½ miles of Yale Creek[33]. Only the reach upstream of Kenney Meadows (section 10) contained moderate amounts of wood—many not "key" pieces, and many trapped in debris jams. Post-flood surveys counted very few "key" pieces of wood $\geq$ 24" dbh in mainstem reaches on BLM land[34]. Consequently, pool and glide habitat is in short supply. 1993 surveys estimated 1-24%, by area, of surveyed reaches, below the Klamath-Siskiyou MPI benchmark for "not properly functioning[35] (Appendix D). Post-flood observations do not contradict this. Not surprisingly, where there are large debris jams, the pool habitat appears to be of excellent quality[36].

In August 2000, the Quartz Fire burned several Yale Creek tributaries, including the entire sub-drainage of Quartz Gulch. Sediment monitoring by BLM has not found the excessive sediment deposition in Yale Creek from Quartz Gulch, as feared.

Lick Gulch ((Not Critical Habitat)

Fishless Lick Gulch is the next major tributary, upstream of Yale Creek. Lick Gulch is severely incised, as are many nearby tributaries[37]. This deep downcutting may be a partly a gold-mining legacy. Clearcut logging (down to streambank) and road construction may have also contributed. It could also be related to natural geology. Some reaches are prone to slumping; travertine deposits are common. Lick Gulch

[29] ODFW Fish Habitat surveys, Yale Creek, 1993.
[30] BLM, Ashland F.O. spawning surveys, Yale Creek, 2000-2004.
[31] J. Rossa, Aquatic Ecologist, personal observation based on reviewing BLM hydrology stream survey data for Bald Lick project.
[32] BLM, Ashland F.O. Hydrology stream surveys, First Water Gulch (Yale) and Yale Creek tributaries, August 1999.
[33] ODFW Fish Habitat surveys, Yale Creek, 1993.
[34] BLM, Ashland F.O. Hydrology stream surveys, First Water Gulch (Yale) and Yale Creek tributaries, August 1999.
[35] ODFW Fish Habitat surveys, Yale Creek, 1993.
[36] Chris Volpe, Ashland F.O. fisheries technician, professional judgement based on spawning survey field work in Yale Creek, 2003 – 2004.
[37] BLM, Ashland F.O. Hydrology stream surveys, Lick Gulch and tributaries, June and July 1999.

also stores an excessive amount of fine sediment: 50-100% sand and silt; the remaining sediment is primarily gravel.

Despite logging, four reaches in Lick Gulch have high or moderate numbers of "key pieces" of wood [per Klamath-Siskiyou Matrix of Pathways and Indicators (Appendix D)]. Other reaches store large amounts of small wood[38]. In Lick Gulch and tributaries, the size of the wood is probably not as important since Lick Gulch itself is quite small (approximately 4' wetted summer width) and tributaries even smaller. Canopy closure on Lick Gulch is also generally excellent now that old clearcuts have grown up and the riparian area hardwoods responded to increased light[39].

BLM surveyors rated 70% of the streams in the Lick Gulch HUC-7 as Properly Functioning (PFC). Twenty percent were rated as Functioning-at-Risk-with-an-Upward trend (FARU). Only 10% were rated in a "poor" category: Functioning-at-Risk-with-a-Downward-trend (FARD). Note that "properly functioning" is defined as the minimum condition for stream processes to function[40].

Rush Creek (Not Critical Habitat)
Fishless Rush Creek, upstream of Lick Gulch, drains the south-facing, grassy slopes of Anderson Peak as well as forests that appear to be situated on ancient slump beds[41]. Rush Creek stores an excessive amount of fine sediment in the stream channel[42]. In fact, fines are so naturally prevalent, that some reaches of the stream have wide depositional riparian areas with healthy (on federal land) multi-storied vegetation and numerous springs and seeps. Other reaches are steep and stair-stepped with travertine deposits. Rush Creek also has had human disturbance that has undoubtedly exacerbated the amount of fine sediment in the stream channel. A road running along Rush Creek languished in jurisdictional limbo for years; consequently went unmaintained, routing fine sediment into Rush Creek. Additionally, extensive logging and road building throughout the drainage…especially problematic on private industrial timber land. An additional problem for Rush Creek and its tributaries is that the channels contain little large wood[43]. Rush Creek is also diverted into a pond on a private ranch at the mouth.

BLM survey crews rated only 28% of the stream channels in Rush Creek as PFC. The rest were either FAR-without-an-apparent trend (30%), FARD (26%), or Not Properly Functioning (16%)[44].

ESA Action Area
The action area as defined under ESA includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.2). This includes the lower 12 miles of the Little Applegate River, tributaries around which action occurs, and associated Riparian Reserves (Map Included).

In the Applegate River watershed, the only streams affected by the Bald Lick project are those on the east side of the river – all fishless, steep gradient streams which flow subsurface through the river terrace. Only very short, steep stretches at the mouth are above surface, but all have naturally difficult access from the river and are fishless and are not considered to be within the ESA Action Area.

Coho and Coho Critical Habitat
On June 18, 1997, [FR62(117):33030] the National Marine Fisheries Service (NMFS) listed Southern Oregon/Northern California Coasts (SONCC) coho salmon as "Threatened" under the Endangered species act [FR 62(17:33038]. On May 5, 1999, NMFS designated "Critical Habitat" for SONCC coho [FR64(86):24049]. Within the project area, coho only spawn and rear in the Applegate River and Little

[38] BLM, Ashland F.O. Hydrology stream surveys, Lick Gulch and tributaries, June and July 1999.
[39] BLM, Ashland F.O. Hydrology stream surveys, Lick Gulch and tributaries, June and July 1999.
[40] USDI BLM (2001).
[41] Dave Squyres, Ashland R.A. hydrologist, professional judgment.
[42] BLM, Ashland F.O. Hydrology stream surveys, Rush Creek and tributaries, October 1999.
[43] BLM, Ashland F.O. Hydrology stream surveys, Rush Creek and tributaries, October 1999.
[44] BLM, Ashland F.O. Hydrology stream surveys, Rush Creek and tributaries, October 1999.

Applegate River (up to river mile 1.4). Critical Habitat is roughly determined by the estimated historical distribution of SONC coho. Therefore, within the project area, the Applegate and lower Little Applegate provide occupied Critical Habitat while the Little Applegate above the bedrock falls and the lower 5.0 miles of Yale Creek are considered *unoccupied* Critical Habitat. In addition, the Applegate River, the Little Applegate, Yale Creek, Boaz Gulch, Grouse Creek, Yale Creek, Lick Gulch, and Rush Creek are considered Essential Fish Habitat for Klamath Mountains Province steelhead.

As explained above, the Applegate River, Little Applegate River, and Yale Creek are the only streams in the Bald Lick area with Critical Habitat and are discussed below. Coho are only present in the mainstem Applegate River and the mainstem Little Applegate River up to river mile 1.4[45]. In the Applegate River, Critical Habitat ends at the Applegate Dam, a human-made barrier listed in the SONC Critical Habitat Designation[46]. In the Little Applegate, occupied Critical Habitat ends at stream mile 1.4 but unoccupied Critical Habitat extends up to Glade Creek and up Yale Creek to river mile 5.0.

Applegate River (Critical Habitat)
Coho salmon migrate through the Applegate River to spawning tributaries. Their migration is blocked by the Applegate Dam, over 10 miles upstream of the confluence between the Applegate and Little Applegate Rivers. BLM and US Forest Service (USFS) spawning and snorkeling surveys have determined that coho spawn in Star Gulch, approximately the lower 2 ¼ miles of Palmer Creek, and approximately the lower two miles of Beaver Creek. All of these streams are on the opposite sides of the river from the Bald Lick project; their watersheds are not influenced by the activities in Bald Lick.

Little Applegate River (Critical Habitat)
Coho also migrate up the Little Applegate River and spawn (presumably) in the mainstem. The current upper limit of coho distribution appears to be at a natural bedrock falls at river mile 1.4. This barrier may or may not meet the criteria for determining the end of occupied Critical Habitat. There has been much discussion over the years about whether the bedrock obstruction formed as a result of instream mining (and therefore is not "natural") or was always present, and whether coho can pass this barrier during unusually (but occasionally) high fall flows. If coho can maneuver the bedrock falls it is expected they could spawn in the Little Applegate up to Glade Creek and also in the lower 5.0 miles of Yale Creek.

Yale Creek (Unoccupied Critical Habitat)
Coho have not been observed in Yale Creek in recent spawning or snorkel surveys however Yale Creek does offer suitable habitat, especially in the lower two miles. Diversion dams on Yale Creek are currently equipped with less-than-adequate ladders so upstream migrations would be limited.

J. SPECIAL AREAS, WILDERNESS, & UNROADED AREAS

A section of the Sterling Mine Ditch is within the project area and is designated by the Medford District RMP as a Special Area - Area of Critical Environmental Concern (ACEC) for the following values: historical mining ditch, hiking, and special status species (RMP p. 60). The Sterling Mine Ditch ACEC is an estimated 141 acres, a corridor 60 feet in width paralleling the ditch trail. This corridor is not available for timber harvesting. The ACEC is also closed to off-highway vehicle use.

The "Dakubetede" area was nominated in May 1991, by local Little Applegate residents, to study its potential as an Area of Critical Environmental Concern (ACEC). The area was included as a Potential Special Area - Area of Critical Environmental Concern in the Medford District's land use planning process, Alternative E, and the effects of designating or not designating various areas were analyzed (RMP/EIS p. 4-83 to 4-85). The Dakubetede area was not selected to be included in the Medford District Resource Management Plan, therefore is not managed as an ACEC (Draft RMP, Appendix 2-SA-2; RMP EIS, Table 2-12, p. 2-139). However, the Dakubetede Area continues to be recognized by local residents and visitors as a special area.

[45] ODFW Survey Data from 8/26/2002.
[46] Federal Register: FR64(86):24049-24062.

Some people have incorrectly referred to these areas as wilderness areas. Section 603 of the Federal Land Policy and Management Act (FLPMA) of 1976 (FLPMA) directed the Secretary of the Interior and the BLM to review all public land roadless areas 5,000 acres or more in size, or roadless islands with wilderness characteristics, to determine their suitability or nonsuitability for wilderness designation. The BLM submitted wilderness suitability recommendations to Congress pursuant to Section 603 of FLPMA by October 21, 1993. Only one area located on the Medford District BLM, the Soda Mountain Wilderness Study Area (now located within the Cascade-Siskiyou National Monument), was included in the Wilderness Study Report recommendations (USDI 1991, Wilderness Study Report p. 3) (RMP/EIS p.4-95) (RMP p. 71).

Section 603 has limited application to the revested Oregon and California lands (O&C lands). The O&C Act takes precedence where mandatory wilderness review of Section 603 would prevent commercial timber management of O&C lands (Memorandums from Office of the Solicitor, Washington DC, August 27, 1979 and September 5, 1978). The majority of BLM lands (21,000 acres) within the Bald Lick planning area are O&C lands; therefore, were and continue to be ineligible for Wilderness Study.

Furthermore, it is no longer agency policy to continue to make formal determinations regarding wilderness character, designate new Wilderness Study Areas through land use planning process, or manage any lands except those already designated as Wilderness Study Areas under Section 603 of FLPMA in accordance with non-impairment standards (BLM IM No. 2003-275-Change 1).

Areas were identified by local residents and visitors to the Little Applegate as important for their unroaded character (Table 3-13). This citizens group submitted an alternative to manage these areas as roadless in order to protect their wilderness characteristics and values (see Chapter 2 and Appendix E, Public Involvement). The actual size of the areas as analyzed using BLM's GIS system differs from the size estimated by citizens. As discussed above, existing laws and policy do not allow for these areas to be formally studied to determine their wilderness characteristics; however, under NEPA the effects of management on these areas, valued as special by local residents and some visitors should be analyzed. This section of this EA addresses only the human values placed on the maintenance of unroaded areas to be used for recreational enjoyment as places of solitude and naturalness. These areas, for the most part, are allocated to Matrix/Adaptive Management Area by the Medford District RMP. The Medford District RMP and Northwest Forest Plan (and associated EISs) have already addressed the need for providing for wildlife habitat maintenance and connectivity through the establishment of Riparian Reserves, Late Successional Reserves, green tree retention areas and maintenance of coarse woody material to provide refugia areas and connectivity across areas managed as matrix.

Table 3-13. Unroaded Area

	Size in Acres*	
Name	**BLM GIS Analysis**	**Size Estimated by Citizens Group**
Dakubetede	5,778	6,500
Buncom A	3,338	5,600
Buncom B	1,400	Assessed as one block above
Bald Mountain	1,131	1,600
River Canyon	871	1200
Eagle Canyon	1,465	1,500
Trillium Mtn.	1,375	1,700
Cinnabar-Boaz	3,108	2,200
Quartz Lick A	847	2,300
Quartz Lick B	1,096	Assessed as one block above

The areas listed above, or portions thereof, could be described as having more natural character undeveloped by roads. However, portions of the areas listed have been influenced to some degree by human interaction with the land. Past actions include mining (including sterling mine ditch area), logging, wildfire suppression, fire hazard reduction to protect adjacent residential as well as resource values. None of the areas are adjacent to areas identified as eligible for Wilderness Designation.

While all areas are likely used to some degree for dispersed recreation, including: OHV use, hunting, fishing, dispersed camping hiking, the area most heavily used for recreation (mainly hiking) is the sterling mine ditch trail. The Sterling Mine Ditch Trail is designated in the RMP as an Area of Critical Environmental Concern (RMP) and protected for its recreational, cultural and botanical values. The Birch Creek Arts and Ecology Center, which hosts a variety of educational workshops from their privately owned land, relies on the Sterling Mine Ditch ACEC and the surrounding areas described as the Dakubetede and Trillium Mountain roadless areas as an attraction for visitors to their summer workshops. Letters were received from visitors concerned for the protection of the Dakubetede and Trillium Mountain areas. Other local residents appreciate the value of these areas as well. General comments were received by many concerning the maintenance of unroaded/unmanaged areas.

K. CULTURAL RESOURCES

The entire project area was surveyed under contract for cultural resources in FY 99 and all known sites are flagged and are to be avoided with all ground disturbing activities; this includes any planned fire activities. If any other cultural resources are discovered during the project activities, all work in the discovery area will be stopped until the District archaeologist can be consulted.

Assuming all known cultural sites will be avoided, there are no negative impacts to cultural resources anticipated from this project.

L. VISUAL RESOURCE MANAGEMENT

"Visual Resources are the land, water, vegetation, structures, and cultural modifications that make up the scenery of BLM-administered land." Medford District BLM-administered lands have been classified under a Visual Resource Management (VRM) Inventory Class system established by the BLM. The criteria used to determine VRM classes were scenery quality ratings, public sensitivity ratings and distance zone-seen area mapping criteria. Approximately 60 percent of the viewsheds in the Medford District RMP planning area have fragmented land ownership patterns with private lands dominating the viewed landscape (RMP/EIS p. 3-70). The entire Bald Lick planning area is classified as either VRM Class III or IV (RMP Map 10).

> **VRM Class III:** The management objective for VRM Class III lands is to retain the existing character of the landscape. The level of change to the characteristic change should be moderate. Management activities may attract attention but should not dominate the view of the casual observer.
>
> **VRM Class IV:** The level of change to the characteristic landscape can be high and these activities may dominate the view and be the major focus of viewer attention.

M. RECREATION

Recreation in the sale area includes hiking, horseback riding, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering. A section of the Sterling Mine Ditch is within the planning area and it is designated as an area of critical environmental concern (see discussion of special areas above). The ditch is closed to motorized use.

N. RURAL INTERFACE AREAS

The Medford District RMP defines Rural Interface areas as BLM-administered lands within 1/4-mile from private lands zoned as 1 to 5-acre or 5 to 20-acre sized lots (RMP p. 88). Approximately 1986 acres of the Bald Lick planning area are identified by the Medford District RMP as Rural Interface Area. BLM-administered lands within the Bald Lick planning area interface with rural residential lands located primarily along or accessed from the Little Applegate Road (paralleling the Little Applegate River) and Eastside Road (paralleling the Applegate River). Rural residential areas also include lands in Eagle Canyon, Grouse Gulch, Sterling Creek, Cantrall Gulch, Yale Creek, First Water Gulch of Yale Creek, Waters Gulch, Lick Gulch, Wolf Gulch, Bear Gulch, Muddy Gulch, and Rush Creek. Rural Residential lands within the Bald Lick planning area have a variety of uses; lands are used for residential purposes only, farming (organic gardening, water cress, lavender, horses, cattle, vineyards, etc.), home-based businesses, and environmental education (the Birch Creek Arts and Ecology Center). Some people commute to and from Medford (and surrounding towns) on a daily basis for work. Other people work at home on their farms and ranches, and some people are retired in the area; these people likely commute to and from town less often.

People responding to BLMs public outreach have expressed they are drawn to living in these rural interface areas for the peace, tranquility, and quiet, living out away from the hustle and bustle of city life; clean air, the beautiful views of mountains and streams, and a place to raise children. Some have lived in the area for decades, while others are new to the area over the last few years.

The main routes providing access through the Bald Lick planning area include the Little Applegate Road, Eastside Road, Yale Creek/Waters Gulch Road, and Anderson Creek Road. The Little Applegate Road, maintained by Jackson County up to the U.S. Forest Service boundary near Rush Creek, provides the main access running east-west through the Bald Lick planning area. The Little Applegate Road is paved to the intersection of Yale Creek Road. The remainder of the Little Applegate road is aggregate surfaced. Eastside road, also maintained by Jackson County, provides paved access along the western edge of the planning area. Yale Creek to Waters Gulch Road runs north-south from Little Applegate Road to the south up Waters Gulch. Anderson Creek Road, a County maintained road, provides access running generally north-south from the Little Applegate Road over Section Line Gap into the Anderson Creek Drainage. Many other BLM-administered and some Forest Service-administered roads provide access from main routes up onto BLM administered lands for the purpose of timber and resource management including fire protection. See Chapter 2, Maps 2-1 and 2-2, and 2-3 to view existing roads in the planning area.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This chapter forms scientific and analytic basis for the comparison of alternatives. This chapter describes the environmental effects of implementing the proposed action and the alternatives. It also identifies and analyzes mitigation measures, which may be taken to avoid or reduce anticipated effects.

The impact analysis addresses direct, indirect, and cumulative effects on all identified affected resources of the physical, biological, and human environment. Chapter 3, Affected Environment, describes the existing conditions of the project planning area and associated analysis areas, and sets the environmental baseline for comparing the effects of all the alternatives (including the No-Action Alternative). 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 Bald Lick Landscape Project.

The terms **project area**, **planning area** and **analysis areas** are used throughout Chapters 3 and 4. 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 decommissioning or renovation, or proposed road construction.
>
> The term **planning area** is used to describe the overall area of consideration that was reviewed for the development of the Bald Lick 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.

1. Effects Assumptions

The current conditions on the lands affected by the proposed action result from a multitude of natural 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 on past action may be useful in two ways according to the CEQ guidance. One is for consideration of the proposed action's cumulative effects, and secondly as a basis for identifying the proposed action's direct and indirect effects.

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment

inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions."

A description of the current state of the environment inherently includes the effects of past actions and serves as a more accurate and useful starting point for a cumulative effects analysis, than attempting to establish such a starting point by "adding" up the described effects of individual 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.

Watershed analysis, a component of the Aquatic Conservation Strategy developed under the Northwest Forest Plan and incorporated into the Medford District RMP, is a useful analysis for gaining an understanding of ecological processes and how those processes are functioning within a given watershed. Watershed analysis characterizes the human, aquatic, riparian and terrestrial features, conditions, processes, and interactions within a watershed including the effects of past and ongoing actions. Knowledge gained through watershed analysis enhances the agency's ability to estimate direct, indirect, and cumulative effects of management activities (Guide to watershed analysis p. 1). The 1998 Star-Boaz and 1995 Little Applegate Watershed Analysis are the results of a coarse filter analysis generally using existing data and information, however, were useful in identifying issues of importance to analyze in greater detail during project specific analysis. Some issues identified during watershed analysis have been analyzed and addressed at broader scales in association with regional and land use plans, the link from this site specific project to these broader analyses have been noted where applicable in this Environmental Assessment.

Direct, indirect, and cumulative effects analyses completed for resources affected by the Bald Lick 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. For example:

- Road densities occurring within the planning area or various analysis areas and the attributes of the road system (surfaced or unsurfaced, location related to streams, slope position, general condition, etc.) are important for understanding the potential for cumulative effects of the proposed action. This information was obtained from the Districts GIS system, aerial photos, and field reconnaissance. To catalogue each road by year of construction and name of the project would be irrelevant detail for understanding the incremental impact of the Bald Lick project when added to other past, present, and reasonably foreseeable future actions.
- Knowing whether a plantation was created in 1975 or 1985 and with what project does not contribute to knowing how that plantation will influence fire behavior, as fuel specialists recognize plantations as a certain fuel type and they are addressed accordingly in the analysis of fuel hazard mapping.
- Silvicultural information is obtained for stands within a planning area providing information on species composition, stand age, growth, vigor, and presence of disease and insects needed to prescribe treatments to maintain productive forest stands. Having the exact stand history does not lead to better silvicultural prescriptions or decisions for selecting among alternatives; therefore, would be unnecessary detail.
- Information on vegetation structural components (tree size, canopy closures, snags and coarse woody material, etc.) and species composition can easily be obtained from aerial photography, silvicultural surveys, vegetation and habitat data layers contained in GIS, all combined with on-the-ground reconnaissance. This information is used by wildlife biologists to assess current conditions from past actions and determine the effects of a proposal on various wildlife habitats and species.

For the reasons described above, this document does not contain a detailed catalogue (or chronology) of past actions, to do so would provide irrelevant detail and would not contribute to a better understanding of conditions which are to be addressed through this analysis. Rather, the analysis of direct, indirect and cumulative effects contained in this EA focuses on cause and effect relationships deemed important for determining the impact on the environment which may result from the incremental impact of the Bald Lick Project when added to other past, present, and reasonably foreseeable future actions and whether or not there is potential for this proposal to contribute to significant cumulative effects beyond those addressed in programmatic land use plans.

The cataloguing and analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary, and has been described below. How, each resource analysis used the following information was dependent on the geographic scale of concern and attributes considered during the analysis. For instance, the hydrologic effects analysis considered this information by seventh field drainages, the soils analysis considered information relevant to the project area, and the wildlife effects analysis considered information at the 5th field watershed scale. The appropriate scale of analysis is presented by resource.

Table 4-1. Ongoing and Reasonably Foreseeable Actions Being Considered [1]

Project	Acres Comm. Harvest	Acres Non-Comm. Treatments	Miles New Road Construct.	Miles Rd. Renov.	Miles Rd. Decom.
Timber Sales					
Boaz Project (2003/05)	47	0	0	0	0.25
Bobar Stewardship (2003/05)	111	77[2]	0	0	0.25
Deadmans Palm Project (2005/08)	3,980	1,130	2.2	43.7	4.9
Little Applegate Stewardship (incorporates Little Applegate 2 project)	283	0	0	0	0
Wagner Gap Timber Sale	419	0	0	1.55	0
Timber Harvest on Private lands (ongoing)	1,074	NA	Existing	0	0
Fuels Reduction					

[1] A future landscape project appearing on timber sale schedules in various documents, including the AMA guide and the Applegate Community Wildfire Protection Plan, is the Prince Beaver (also called Prince Castor) Project. While this project has appeared as a potential project for various years in various planning documents, this future project has not yet been proposed for action. At this time, this project is anticipated to occur in 2010, with planning beginning about 2009. Although the future project can be associated with a general geographic area, and would be designed to implement forest health a timber resource management actions/objectives of the Medford District RMP, the exact proposal is not known at this time. Once a project proposal has been developed, scoping would be initiated along with an environmental analysis process in compliance of the National Environmental Policy Act (NEPA). The NEPA process would include a comprehensive cumulative effects analysis for resources identified to be affected by a project proposal once a project is developed. 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 Bald Lick landscape project. The resulting NEPA document would be subject to public and administrative review once completed.

Commenters requested the Bald Lime Project be considered in the Cumulative Effects Analysis, the Bald Lime Project is located entirely in a separate 5th field watershed, the Middle Applegate 5th field, and is beyond the scope of this analysis. Original locat

[2] Acres within commercial treatment units.

Project	Acres Comm. Harvest	Acres Non-Comm. Treatments	Miles New Road Construct.	Miles Rd. Renov.	Miles Rd. Decom.
Little Applegate Fuels Reduction (2005/07)	NA	990	0	0	0
Bobar Fuels Reduction (2003/05)	NA	2,164	0	0	0
Fuels Reduction on Private lands (ongoing)	NA	1,000[3]	0	0	0

B. MITIGATION MEASURES ANALYZED

The following mitigation measures were developed for application to either Alternatives 2 or 3 in order to address social and economic concerns. These mitigation measures are not required but may be selected by the Responsible Official at the time a decision is made concerning the implementation of this project.

1. No commercial thinning on the north side of the ridge referred to as "Trillium Mountain" (Units #B55, B56A, B56B, and the northern portion of B56C), and no regeneration harvest in a portion of Unit 38.

The function of this mitigation measure is primarily to address social concerns that timber harvesting would impact the aesthetic character of the hillsides as viewed from rural residential areas along the Little Applegate Road.

The unnamed peak located in section 26 of T. 39 S., R. 2 W., W.M., along with the dominant ridge running to the east into section 27, is referred to as "Trillium Mountain" by some local residents. These residents have expressed concerns that commercial tree thinning on the north side of the unnamed peak and ridgeline could have adverse impacts on aesthetics as viewed from their residences and from Little Applegate Road. They have also expressed concerns for harvesting trees on steep and potentially unstable slopes above their homes.

Little Applegate residents living near Unit 38 (T. 39 S., R. 2 W. Section 19), proposed for regeneration harvest under both action alternatives, expressed concerns for impacts to aesthetics as viewed from their homes and Little Applegate Road as a result of regeneration harvest activities. They requested the prescription be changed from regeneration harvest to the thinning.

Description of Mitigation Measure: If this mitigation measure is selected for implementation, no commercial thinning would occur in on the north side of the unnamed peak and ridge line referred to locally as "Trillium Mountain" (Units #B55, B56A, B56B, and the northern portion of B56C). This would reduce the acres of commercial thinning by 198 acres (4 acres moist Douglas fir; 164 acres dry Douglas-fir; 30 acres pine site thinning). The new road construction proposed to provide access to these units would also be eliminated. As applied to the Proposed Action Alternative, new road construction would be reduced by 1.0 mile overall; under Alternative 3, new road construction would be reduced by 0.10 mile. An estimated 93 acres, in a portion of Unit 38, would have the treatment changed from regeneration harvest to dry Douglas-fir thinning prescription.

2. No commercial thinning of economically challenged units

[3] This is an approximate estimate based on the assumption defensible space would continue around homes.

The function of this mitigation measure would be to improve the economic efficiency timber harvest costs associated with the Bald Lick proposal. Some areas proposed for commercial thinning have high costs associated with treatment due primarily to the lack of road access. Units included in this category are B1-B10, B13-B19, B29-B31, and B38-B39 and are located in sections 13-15 and 17-24 of T. 39 S., R. 2 W.; W.M.

Description of Mitigation Measure: If this mitigation is selected for implementation, no commercial thinning would occur in Units B1-B10, B13-B19, B29-B31, and B38-B39 reducing the amount of acres treated by 283 acres (82 acres of dry Douglas fir, 193 acres of pine site, and 8 acres of pole thinning). Units affected by this mitigation measure are located north of the Little Applegate River primarily between the confluence of Sterling creek and Muddy Gulch.

C. EFFECTS OF IMPLEMENTATION

Some issues identified as relevant to this project proposal were analyzed at a broader scale in association with the 1994 *Final Environmental Impact Statement for the Bureau of Land Management Medford District Proposed Resource Management Plan* and the 1994 *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 (as amended).*

This EA would focus on addressing those issues ripe for decision at this level of environmental review, and would incorporate by reference broader level NEPA analysis where appropriate.

1. AIR RESOURCES

The effects on Air Quality of implementing the Medford District BLM resource management programs are analyzed in the Medford District RMP/EIS and are summarized below. Air pollutants--called particulates--include dust, dirt, soot, and smoke and are emitted directly into the air. The major sources of air pollutants associated with BLM resource management activities and the Bald Lick Landscape Project include smoke from prescribed burning and dust from the use of roads, road maintenance and road construction (RMP/EIS p. 4-8).

<u>Dust</u>

Dust from new road construction, road maintenance, and use of unpaved roads normally settles within a short distance of the point of origin. Dust has negligible effects away from the construction or maintenance site or unpaved road. Localized effects may be felt by residents within the rural interface areas. The major adverse effect would be local and during summer months when dust is produced from both public and administrative use of unpaved roads. (RMP/EIS p. 4-8). Under Alternative 1 (No-Action), the Bald Lick project would not contribute to an increased of dust associated with road use in the project area as no activities would occur. Alternatives 2 and 3 would result in similar increase in dust along unpaved haul routes, as both alternatives would harvest the same volume of timber using the same haul routes. Alternative 4 would harvest about half of acres and volume proposed under Alternatives 2 and 3; therefore, would contribute half the dust along haul routes used in comparison to Alternatives 2 and 3. An analysis of the number of truckloads and number days anticipated from various areas of the project by alternative is included under Section 15, Effects on Rural Interface Areas. Dust abatement would be required on all BLM-administered roads during operations (see Chapter 2, Alternatives, Project Design Features, Roads). Dust abatement would reduce dust and would improve visibility concerns on roads for drivers as well. BLM maintained roads merge into roads maintained by Jackson County. The maintenance of County-administered roads is the responsibility of Jackson County. BLM has coordinated with Jackson County for the potential need for additional dust abatement on County roads during Bald Lick timber sale operations.

Smoke

Prescribed burning is the only resource management activity with the potential to have notable adverse effects on local and down wind air quality (RMP/EIS p. 4-8). 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 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. However, if properly managed, most negative effects of prescribed fire smoke can be minimized or eliminated.

The Oregon State Forester manages the operational guidance for the Oregon Smoke Management Program. The policy of the State Forester is to regulate prescribed burning operations on forestland, achieve strict compliance with the smoke management plan, and minimize emissions from prescribed burning. The Smoke Management Plan is designed, in part, to protect visibility in Crater Lake National Park and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes) during the visibility protection period (July 1 to September 15).

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.

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.

In 1987 the EPA promulgated annual and 24-hour standards for particulate matter, using a new indicator, PM-10. Particulate matter smaller than 10 micrometers (PM-10) is a term used to describe airborne solid and liquid particles. Because of its small size, PM-10 readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema. The fate of PM

emissions from prescribed burning is twofold. Most (usually more than 60%) of the emissions are 'lifted" by convection into the atmosphere where they are dissipated by horizontal and downward dispersion. The "unlifted" balance of the emissions (less than 40%) remain in intermittent contact with the ground. This impact is dissipated by dispersion, surface wind turbulence and particle deposition on vegetation and the ground. The risk of impact on the human environment differs between the two portions of smoke plume.

Smoke Aloft

Until recent decades, the impact of the lifted portion of smoke was ignored because it seemed to "just go away." These impacts are generally not realized until the mechanisms of dispersal bring the dispersed smoke back to ground level. Because the smoke has already dispersed over a broad area, the intensity of ground-level exposure is minimal. The duration of exposure may include the better part of a day, however, and the area of exposure may be large.

Ground Level Smoke

Unlike smoke aloft, the potential for ground level smoke to create a nuisance is immediate. This part of the smoke plume does not have enough heat to rise into the atmosphere. It stays in intermittent contact with the human environment and turbulent surface winds move it erratically. Also in comparison to smoke aloft, human exposure is more intense, relatively brief (a few hours) and limited to a smaller area. Smoke aloft is already dispersed before it returns to the human environment while ground level smoke must dissipate within that environment. Dissipation of ground level smoke is accomplished through dispersion and deposition of smoke particles on vegetation, soil and other objects.

Alternative 1 (No-Action)

Although no action would occur in association with the Bald Lick Landscape 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 significantly higher than from prescribed burning. 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.

Alternatives 2-4

Direct, indirect, and cumulative

All prescribed burns would be conducted within the limits of a Burn Plan which describes prescription parameters so that acceptable and desired effects are obtained. Under all action alternatives, prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan (OSMP) and the Visibility Protection Plan.

Prescribed burning under alternatives 2-4 are not expected to effect visibility within the Crater Lake National Park 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 escape wildfire.

Under Alternatives 2 and 3 the same number of acres are proposed for vegetation and fuels reduction treatments (Chapter 2, Table 2-1 and 2-2), both alternatives propose the use of prescribed fire, so consequently smoke related impacts would be similar for Alternatives 2 and 3. Alternative 4 would treat

3,259 fewer acres and would result in lower potential for smoke related impacts due to few acres treated with prescribed fire. Prescribed burning emissions, under these alternatives is not expected to adversely effect annual PM10 attainment within the Grants Pass, Klamath Falls, and Medford/Ashland non-attainment areas. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

The greatest potential for impacts from smoke intrusions is from underburning to localized drainages within and adjacent to the project area. Underburning requires a low intensity burn that would not have 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. Maintenance underburning would occur over a 1 to 5 year period under Alternatives 2 and 3; Alternative 4 which treats fewer acres over the same period would have lower smoke impacts than Alterantives 2 and 3. Post harvest evaluations are conducted to determine the actual acres in need of maintenance underburning, which is based on amount of fuels remaining or shrub response and need for further hazard reduction through maintenance burning.

Prescribed burning would be scheduled primarily during the period starting in January 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. Burning would occur during weather conditions that provide for adequate smoke dispersal; these conditions are easier to achieve during the winter and spring months.

Smoke emissions and their effects are further reduced through other measures, which include post-burn mop-up as soon as practical after the burn and covering hand piles to permit burning during the rainy season when there is a stronger possibility of atmospheric mixing and/or scrubbing, thus dispersing smoke. The use of aerial ignition (helicopters) is sometimes used in broadcast burn units which reduce the total emissions by accelerating the ignition period and reducing the total combustion process due to the reduction in the smoldering stage.

While avoidance strategies described above are designed to lift smoke emissions from the project site and be dispersed and diluted by transport winds, not all smoke would be lifted from the project site. Smoke retained on site could be transported into portions of the Rogue Valley nonattainment areas if it is not dispersed and diluted by anticipated weather conditions. Localized concentration of smoke in rural areas may occur during prescribed burning operations. This unavoidable adverse effect is within those effects disclosed in the Medford District RMP/EIS (RMP/EIS p. 4-11).

Prescribed burning operations would follow all requirements of the Oregon Smoke Management Plan and the Department of Environmental Quality Air Quality and Visibility Protection Program. Under the authority of the State Forester, prescribed burning throughout southwest Oregon is administered, coordinated, and in situations where air quality of the entire State or part thereof is, or would likely become adversely affected by smoke additional restrictions are applied to avoid cumulative effects of prescribed burning across multiple owernships.

2. SOILS

This section discloses potential impacts on soils and soil productivity resulting from ground disturbance associated with the Bald Lick proposal. While this section discloses disturbances resulting in the production of sediments, the “Water Resources” section discusses the fate of those sediments as they relate to water quality. The “Water Resources” section also discloses the effects of altered hydrological functions as a result of soil compaction and disturbance.

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 quality or quantity would be the 7th level hydrologic unit (see Hydrology). Short-term impacts (or affects) are those being ten years or less and long-term more than ten years.

Alternative 1 - No-Action

Direct, Indirect, and Cumulative Effects

Under the No-Action Alternative, the current conditions and trends related to soil resources would remain unchanged. Road construction/renovation, timber falling/yarding treatment of the logging slash and prescribed fuels treatments would not occur thus soil disturbance would be minimal. Erosion rates near natural levels would continue across the landscape with the exception of the Quartz Fire area, which is still recovering with erosion rates moderately above natural levels, and areas affected by unmaintained roads and road drainage facilities.

Soil erosion occurs infrequently in undisturbed forests because the soil surface is protected by both vegetation and organic matter. The abundant layer of organic debris (duff) on the soil surface and the decomposed organic matter incorporated into the soil profile (humus) protect soil from erosion by allowing the rate at which water moves into and through the soil profile to equal or exceed the rate of precipitation or snow melt. Organic matter reduces the likelihood of overland flow and subsequent soil erosion.

Many of the roads in the project area are in need of drainage facilities maintenance and surfacing. Under the No-Action Alternative the renovation of approximately 51 miles of road would not occur; erosion rates would continue to be slightly higher than what is expected on a well maintained road. Many of these roads are open for use all year long which increases the probability for continued road degradation. Road decommissioning would not occur thus road densities would remain at the current level and all roads currently opened would remain open to traffic. This would result in no reduction of sediment production and may increase the potential for sediment delivery over time as roads deteriorate.

Although no fuel reduction would occur under this alternative, approximately 1,000 acres of fuels treatments would occur in this project area under a separate project, the Little Applegate Fuels Reduction Project. Under the No-Action Alternative approximately 330 acres would not have the fuels reduction treatment. This slightly increases the potential for severe wildfires to occur in the project area. A severe fire of any appreciable size could detrimentally effect the soil resources over the long term by removing protective vegetation, large wood, duff and organic material resulting in increased erosion potential and decreased soil productivity. Adverse soil impacts from a large, high intensity wildfire would be much greater and effect much more of the watershed than under the proposed action which would reduce fuel loads and the effects of fire on soils.

In summary, the No-Action Alternative would have very minimal direct, short-term effects to the soil resource due to the lack of soil disturbance. However, the areas proposed for forest health and fuels reduction treatments would remain untreated and would retain a moderate to high fuel loading that would contribute to a higher potential for severe intensity wildfire than under the action alternatives. As was experienced during the Quartz Fire, erosion rates increase dramatically for the short-term and long-term soil productivity could also decreases to some extent. Existing roads would continue to have slight to moderately higher than normal erosion potential rates with the potential for degradation due to lack of maintenance. Over the long-term, cumulative effects for soil productivity would be minimal as no changes in vegetation composition and/or structure would occur and soil disturbance would be minimal. Compacted area would remain relatively low in the project area as a result of this alternative which is a positive cumulative effect.

Alternative 2 – Proposed Action

Direct and Indirect Effects
The analysis of impacts incorporates by reference the analysis and conclusions in the Medford District Record of Decision and Resource Management Plan (1995) regarding soils. Under Alternative 2, approximately 312 acres would be tractor logged, approximately 2,147 acres would be skyline-cable logged using partial suspension, and approximately 2,655 acres would be helicopter yarded. Approximately 12 miles of road construction is proposed while about 16 miles of existing roads would be decommissioned. This alternative proposes to treat approximately 334 acres in order to reduce the fuel loading with about 79 acres of mechanical treatment with the 'Slashbuster' and 255 of manual vegetation slashing/burning. Young stands would be thinned and the slash treated to reduce competition and stimulate tree growth on about 492 acres. In addition, slash created by the proposed management activities would be removed from the site, burned or shredded to reduce the total fuel loading on-site.

Soils in the areas proposed for treatment are generally stable and the landslide hazard is considered low to moderate. No areas with high landslide potential are being treated in the Bald Lick Project. Approximately 76 acres identified as highly unstable were withdrawn from treatment considerations.

Soil disturbance would be limited to localized areas within each treatment unit except for areas that are underburned. Prescribed underburning could result in over one-third to one-half of the soil surface area becoming bare and exposed to erosive forces such as rain drop splash and overland flow of water. Following the guidelines for the designated soil categories (RMP/ROD p.168) would minimize long-term detrimental affect to the soil as a result of prescribed fire.

Ground-base logging using tractors on designated skid trails would disturb around 15 percent of the area within logging units. Yarding trails (skid trails) would be pre-designated and occupy 12 percent or less of the unit. This would result in soil productivity losses as a result of compaction of about 6 percent or less in the tractor yarding units (18 acres being compacted). These areas would not be considered detrimentally compacted. The disturbed and compacted skid trails would exhibit a slight increase in erosion during the first few substantial rainfall events following logging. Soil particles moving off site as a result of erosion should be minimal in these units as tractors are only allowed on slopes of less than 35 percent and skid trails would be water-barred. Although erosion rates would increase, most soil particles would remain on-site and only a slight increase in off-site erosion is anticipated primarily as a result of riparian buffers along stream channels and local waterways. See Hydrology section for more information on sedimentation.

Cable and helicopter yarding would result in minimal soil disturbance. Cable yarding exposes up to seven (7) percent of the unit as deeply disturbed or compacted (Dyrness 1972). Helicopter yarding would subject about two (2) percent of the unit to severe disturbance (Clayton 1981). As most of the commercial timber harvesting involves thinning of the understory trees, soil surface disturbance would be within the parameters listed above.

Cable yarding would be accomplished using a skyline system that lifts the front end of the log off the ground. This prevents the log from gouging the soil surface as it is brought up to the landing. A system of cable yarding trails would be established up and down the slope and could be areas of increased localized erosion the first wet season after use. On fragile soils or areas where a high increase in erosion is anticipated as a result of the yarding trails, hand waterbars would be constructed to guide overland flows off the trails and onto the vegetated hillslopes.

Helicopter yarding would cause the least impact to the existing soil and would only slightly increase erosion rates in the small localize area of disturbance. Building helicopter landings would disturb less than one acre of soil per landing but these landings would be surfaced and/or seeded upon completion of the project. Soil erosion rates would increase moderately during the first wet season after the helicopter landing is built and would decrease to near natural levels within 3 to 5 years after use. The helicopter landings would be located near ridges and/or hill tops which would minimize sediments reaching stream channels, depending on post harvest weather conditions.

Effects of Road Management: If implemented, the proposed action would:

- build approximately 12 (11.8) miles of roads,
- decommission about 16 (16.2) miles of roads,
- surface all but 0.6 miles of the proposed new roads.
- renovate and improve 50 miles of existing road, including surfacing.

New Road Construction

Of the actions proposed, new road construction has the greatest potential for causing accelerated erosion. Roads increase surface erosion by baring soil and concentrating runoff. Road building would result in moderately high to high erosion rates locally as approximately four acres of land is disturbed for every mile of new road constructed. The increase in erosion would be most noticeable the first few substantial rainfall events after construction and would return to near pre-construction levels within the next three to five years as ground cover is re-established on disturbed cut and fill slopes.

Ridge top roads would increase the existing erosion rates in the localized area of construction. Most of the eroded soil particles would not enter stream channels but would re-settle on the hillslope. There would be a moderate short-term increase in soil movement along temporary spur roads, skid trails, and on cable yarding corridors the first few rain events after construction or use. However, locating temporary roads on or near ridges, water barring skid trails, and filtering by vegetation in Riparian Reserves would reduce or prevent sediments from reaching streams.

Approximately one mile of new road construction is proposed on soils formed from granitic parent material in the south edge of T. 39 S., R. 2 W., Section 31. The soil series in the area of the proposed construction was identified as Tallowbox but site specific inspection reveals soils similar to the Tallowbox series with a Vannoy inclusion and influence. The soil surface texture is loamy and appears to have more cohesiveness than the Tallowbox series around Tallowbox Mountain or the Jackson Creek area. This new construction is an extension of a previously built road also on this version of Tallowbox soils. Most of the proposed new road is near the ridgeline or on slopes less than 50 percent. Based on the condition of the existing road after over twenty years and the inherent stability of this landscape, it is anticipated that potential for excessive erosion due slope failures from this proposed road is low. Measures that mitigate surface erosion on newly constructed roads (i.e., dry season construction, rocking the road surface, seeding and mulching) should minimize the potential for off-site surface erosion.
New roads would have an impact on the soil productivity. Approximately four (4) acres of land is disturbed and taken out of vegetation production for every one mile of road proposed. The 12 miles of new construction would take out of production approximately 48 acres.

The affects of 12 miles of new road construction would be partially balanced by decommissioning 16 miles of existing unsurfaced roads. The road decommissioning would consist of 8 miles of mechanical decommissioning and 8 miles of natural decommissioning where existing culverts are removed, the natural drainage patterns reestablished and the road blocked. Mechanically decommissioning roads should decrease erosion rates to near natural levels within ten years. As mechanically decommissioning involves ripping the road surface and digging up existing culverts, there would be a moderate short-term

increase in soil erosion the first several rain events after road decommissioning is completed. A long-term decrease in sediment production associated with existing roads would result as erosion rates on decommissioned roads lower to near natural levels in five to ten years.

The decommissioning of 16 miles of existing roads would bring approximately 64 acres back into production, resulting in a net increase of 16 acres of productive land base over the long-term. Although short-term erosion rates would moderately increase, the proposed action would decrease erosion from roads long-term further reducing soil particles reaching the aquatic environment by reducing the total miles of road in the watershed and by bringing the entire road system up to current BLM standards. This would include:

Existing Roads:

- The surfacing of about 50 miles of existing unsurfaced or inadequately maintained roads;
- Ensure proper spacing and sizing of drainage structures on all BLM roads in the project area.
- Armor splash pads on culverts and outfalls on water dips.
- Grade road surfaces to provide for proper runoff of water.
- Harden road surfaces by placing surface rock and thereby stabilizing roads.
- Restrict hauling and construction to periods when soils and roads have proper moisture content (dry periods).
- Gate or barricade unsurfaced roads.
- Decommission unneeded roads.

New Roads:

- New construction would only occur during the dry season.
- Fill slopes would be seeded and mulched and slash windrowed along the toe of the fill to filter sediment. Any excess earth material on 'full-bench' roads (generally 60%+) would be end-hauled to a suitable waste area.
- It is anticipated that most of the new construction would be on or near ridges and there are only a few small areas were new construction would occur on slopes over fifty percent.
- New road construction on sideslopes would occur on stable ground.
- For roads constructed on slopes of fifty percent or greater, slope stability may be compromised, moderately increasing the risk of soil slumping or mass wasting the first few years after the project until road cut and fill slope settles and vegetation is re-established across the hillslope.

Fuels Reduction

Almost a century of fire exclusion has occurred in this area and, consequently, the existing conditions consist of high fuel loading across much of the landscape (see Chapter 1, Purpose and Need, Chapter 3, Fire & Fuels and Vegetation). With present fuel conditions, an uncontrolled burn could be of such intensity so as to severely increase erosion potential, volatilize existing nitrogen reserves and severely set back the community of microorganisms. Under natural conditions, sheet erosion occurs only when the duff, litter or plant cover has been significantly removed, exposing soils to the erosive forces of rainfall. The only natural disturbance process capable of removing extensive soil cover in the Little Applegate Watershed historically and prehistorically has been wildfire. But wildfire by itself would not result in excessive sheet erosion. Coupled with the loss of cover must be a significant rainfall event occurring within a year or two after the fire. This is because most exposed soils would become re-established with vegetation or covered with litterfall within that time period, thus protecting the soil from rainfall impact (Hungerford et al 1990, Amaranthus). When intense rainstorm events do occur shortly after a wildfire disturbance, there can be a significant amount of topsoil loss (Hungerford et al, 1990).

Under this alternative, site productivity would be protected by reducing the fuel loading and decreasing the potential for severe wildfires. Prescribed burning would cause a short-term increase in available nutrients released which would benefit remaining vegetation, both tree and browse species. There would be a short-term increase in available mineral nutrients such as calcium and magnesium, conversely, there would be a decrease in total site nitrogen, yet available nitrogen would increase temporarily. For this reason, proposed fuel treatments are considered to have a slight short-term positive affect on nutrient availability and a slight negative affect in the 3-5 year period after burning. There would be a net positive influence long-term on nutrient availability as the fuel loading would be reduced along with the potential for a high severity wildfire.

An array of tools would be used to reduce fuel loads, these include: burning hand-piled slash, broadcast underburn and shredding vegetation using the slashbuster machine. Broadcast underburns associated with the fuel treatments would have a moderate short-term affect on the soil. Burning increases the amount of mineral soil exposed by a varying amount, depending on the depth and consumption of the forest floor. Broadcast burning could expose up to forty percent of the burned area. A low-intensity burn would have minimal direct affect on soil properties. A light surface fire would generally char the litter, leaving most of the mineral soil partially covered. The desired result would be a mosaic of burn intensities, where unburned areas may lie adjacent to more intensively burned strips. The retention of duff is desired, where duff already exists. Underburning is prescribed to meet the goal of consuming the majority of litter (fine flashy fuels) while retaining as much duff as possible. It is acknowledged that there might be pockets where a majority of duff is consumed. This is acceptable as long as a mosaic of intensity is present allowing migration of soil organisms from adjacent areas to re-colonize more the negatively impacted sites.

Most soil movement would occur during the first rainy season after the slash is burned and would quickly diminish as vegetation cover reestablishes. Soil productivity would experience a slight negative decrease short-term but long-term positive effects would be realized from the proposed actions as the risk of severe fire is diminished.

Piled slash burns hotter than broadcast underburning, increasing consumption of organic matter and nutrient losses. High soil temperatures generated under burning piles (typically, about 3-5% of the harvested area) negatively affect soil properties by physically changing soil texture, structure and reducing nutrient content. Additionally, the intense heat resulting from burning of hand piles would negatively impact soil organisms for the short-term. Migration of soil organisms from adjacent areas would re-colonize these sites over time.

Approximately 79 acres of young trees and brush would be mechanically treated with the Slashbuster. This operation would be accomplished when soil moisture levels are below twenty percent so that displacement and compaction are minimized. Approximately 15 to 25 percent of the soil surface area would be disturbed by this track vehicle and much of the time the machinery would be operating on top of the shredded slash. Soil erosion would be minimal as the shredded material would provide a soil cover that would slow the flow of surface water. The positive affect that Slashbuster has on the soil is not having to burn the slash. The shredded slash provides a soil cover and decomposes slowly over time with a slow release of nutrient back into the soil profile. Overall, the shredding of slash across the proposed acreage would have a slight to moderate long-term negative affect on soil productivity in the areas where compaction occurs. A long-term positive affect to the soil resource would be realized as the potential risk of high severity fire is reduced.

Alternative 2

Cumulative effects

Concern about cumulative soils effects stems from potential future adverse effects on soil or site productivity combined with past or other ongoing activities. More intensive forestry practices involve more direct and far-reaching interventions in natural processes, and should be likelier to lead to cumulative effects on forest soils and vegetation than less intensive practices. The time required for recovery from effects should be roughly proportional to the magnitude of changes or effects. The potential for forestry practices to exert cumulative effects on soils depends on the intensity and scheduling of practices and the resiliency of soils combined with the tendency towards natural recovery.

The proposed silviculture practice is deemed as an extensive regime in which the practices carried out comprise of selective cutting and fire protection. Yields would be limited to periodic light cuttings, natural regeneration might be relied upon, and vegetative competition regulated through prescribed burning and maintenance of canopy cover. Comparing this regime to intensive management of the 1980's where large proportions of the overstory or the entire overstory was harvested in one operation, diseases or pests might be curtailed or eliminated as the seed- or planting-bed was cleared in site preparation, prompt regeneration was typically secured through planting or direct seeding, and competing vegetation might be curbed through chemical, mechanical or manual means. The effects of the proposed silviculture practice on the soil resource are substantially less than the intensive management practices of the past. As a result, it would take less time for the soil to recover from the proposed action.

From a soils perspective, effects may be localized on-site, potentially substantial to site condition but not necessarily having potential for transport of materials or pollutants off-site. One of these effects is soil compaction, which in terms of productivity, is localized as an on-site effect. However, from a hydrological perspective, compaction may also alter drainage and/or concentrate runoff, potentially accelerating erosion. Under the proposed action there would be a slight increase in the amount of area compacted. The total amount of BLM land compacted in this watershed would increase by approximately one percent as a result of this proposed action. Most of the compacted area would be in the form of designated skid trails that should be used again on the next harvest entry. This compaction is considered non-detrimental and is consistent with best management practices described in the Medford District Resource Management Plan (p.166).

The cumulative effects to the soil resource in the affected landscape area as a result of roads in this proposed alternative would be a moderate short-term increase in erosion rates which would last about three to five years. There would be about a 5 mile net decrease in the total amount of roads which, long-term, would be a slight positive effect. It would still take between 5 and 10 years for the decommissioned roads to stabilize with erosion rate potential becoming near normal levels. There would also be a slight positive, long-term cumulative effect from renovating approximately 50 miles of existing roads. Although this project reduces the current road density, the watershed(s) would continue to experience slight to moderate potential for erosion rates above natural levels long-term as a result of the high amount of existing roads.

There would be a moderate direct short-term increase in erosion rate potential in the areas of management activities (i.e., falling, yarding and hauling). Most of the erosion would be localized with a slight potential of substantial off-site erosion. The potential for substantial off-site erosion would occur in the areas where new roads are built and, possibly, in tractor units near roads and landings. The cable and helicopter units would have a very low potential for substantial off-site erosion to occur. This is the result of only a small amount of area being disturbed during yarding. This increase in erosion rates would last between three to five years. Cumulative effects as a result of the increase erosion rates would be slight as surface erosion depends primarily on extent and continuity of bare areas so most disturbed soil particles would remain on site. Additionally, the next harvest entry should not occur within ten years which would allow adequate time for the soil to recover from the proposed action.

Alternative 3

Direct, indirect, and cumulative
Alternative 3 is very similar to Alternative 2 except that approximately 7 miles of new roads would be constructed (versus 12 miles in Alternative 2) and approximately 17 miles of existing road would be decommissioned (versus 16 miles in Alternative 2). The same amount of acres would be treated as in Alternative 2 but there would be more helicopter logging instead of ground base logging.

The effects on the soil resource would be slightly less than those of Alternative 2. Differences would be:

- There would be less potential increase in erosion rates as a result of constructing about 5 miles of road less than prescribed in Alternative 2 and less ground disturbance during timber removal as more helicopter yarding would be incorporated under alternative 3. The proposed road construction (approx. 1 mile) on soils formed from granitic parent material would be eliminated in this alternative. This would be more in conformance with the RMP recommendation of "avoid fragile soils when planning road systems" (RMP, p.155). The short-term negative impacts to the soil resource would be about 25% less than those described in Alternative 2 due to less road building and more helicopter logging (less soil disturbance).

- Cumulative effects to the soil resource would be slightly less than those described for Alternative 2 as a result of harvesting timber activities as more helicopter yarding would be implemented. Overall, the erosion potential would remain slight to moderate long-term as a result of current road densities although the net decrease of 10 miles of road proposed in this alternative aids in reducing the long-term soil erosion potential. Also upgrading approximately 50 miles of existing road would help reduce long-term soil erosion potential.

Alternative 4

Direct, Indirect, and Cumulative Effects
Under Alternative 4, approximately 153 acres would be tractor logged, 820 skyline cable logged and 1,309 would be helicopter logged. Approximately 4 miles of road would be mechanically decommissioned, almost 3 miles of road naturally decommissioned while about 4 miles of new road would be constructed. About 13 miles of existing natural surface roads would have surfacing added and about 8 miles of rocked roads would be renovated improving the drainage facilities.

Table 4-2. Comparison of Alternatives – Effects to Soils

Alt	tractor (ac)	cable (ac)	helicopter (ac)	Slash-buster	New roads	Road Renovate	Road Decommission
2	300	2,200	2,603	79 ac.	12 mi.	50 mi.	16 mi.
4	153	820	1,309	79 ac.	4 mi.	21 mi.	7 mi.

Overall for the project area, comparing Alternative 4 to the proposed action (Alternative 2) shows about half the amount of acres tractor and helicopter logged and about one-third the amount would be cable logging. Only one-third of new road construction, about half the amount of road renovation and half the amount of decommissioning would occur under Alternative 4. The effects to the soil resource as a result of Alternative 4 would decrease proportionally from those of Alternative 2.

The effects would be the same as those described in Alternative 2 in some of the localized drainages such Rush Creek, First Waters Gulch, Second Waters Gulch, Boaz Gulch. Frontal drainages to the Applegate River (HUCs-360 and 363) and Little Applegate River (HUCs- 409, 442, and 445) would have the same

effects in Alternative 4 as Alternative 2. The remaining drainages would experience little or no effects from Alternative 4. The drainages not being treated in Alternative 4 would basically have the same effects as the "No Action" Alternative.
Overall for the project area, the direct and indirect effects to the soil resource would be about one-half the magnitude of those anticipated under Alternative 2. Cumulative effects short-term would be about one-half the magnitude as Alternative 2 but long-term cumulative effects may be slightly more negative than Alternative 2 as the opportunity to treat some fuel hazards would be missed along with the opportunity to decommission some roads particularly in the Lick Gulch drainage.

Analysis of Proposed Mitigation Measures

Mitigation measure #1 proposed no commercial thinning on the north side of the ridge referred to as "Trillium Mountain".
The hillslopes in the area of the proposed mitigation were examined and the highly unstable slopes were withdrawn from commercial thinning. The remaining hillslopes are relatively stable but a recommendation was made to thin this hillside lighter than normal (particularly on concave topography with slopes over sixty percent) due to the concerns of slope stability. If Alternative 3 is selected then only 0.1 mile of new road would be constructed and the majority of the harvest would be accomplished using helicopters. As stated previously, helicopter yarding would limit severe soil disturbance to about one percent of the area. This should minimize most concerns about slope stability.

Not thinning these units and not reducing the fueling loading in these units would leave the hillslope at the existing risk to catastrophic fire which would definitely destabilize the hillslope. If a high intensity wildfire occurred on that hillslope it could cause the unstable slope withdrawn from harvesting to further destabilize and mass slope failure could result.

No commercial thinning of economically challenged units.
This mitigation measure would drop approximately 280 acres most of which would be helicopter yarded. The short-term, long-term and cumulative affects of dropping these units would have a minimal difference from the proposed action as helicopter logging only disturbs about one percent of the unit area and the units are scattered across the northern portion of the watershed.

3. HYDROLOGY/WATER RESOURCES

For purposes of analyzing the affected environment and the proposed project for water resources/hydrology issues, the Planning Area is divided into drainage areas. Drainage areas are generally less than 10,000 acres in size, often consist of the watershed area of a single main tributary, with a state-designated beneficial use usually occurring by the time flow reaches the lower boundary of the drainage. Watershed areas larger than drainage areas (for example entire 5th field watersheds such as the Little Applegate River) can mask significant water resource effects simply by their shear size. The following hypothetical example demonstrates why analysis of effects for water resources is being conducted at the 7th field drainage size.

As a simple example, picture a hypothetical 100 square mile 5th field watershed called "Big River". The hypothetical "Big River" 5th field watershed is made up of 10 7th field drainage areas approximately 10 square miles each in size. One of these hypothetical 7th field drainages, we'll call it "Fish Creek", is part of the large "Big River" landscape project. A cumulative effects analysis of "Big River" 5th field watershed indicates that water resource concerns focus on road density, related to fisheries concerns which have identified 5 miles of road per square mile as a critical threshold of concern for "Big River". The analysis for "Big River" watershed indicates that there are 150 miles of roads, and the proposed "Big River" project would build 10 miles of new road, with no road decommissioning, renovation, or other improvements to watershed condition being proposed. Cumulatively for the watershed, the existing road density is 1.50

miles per square mile, with the project adding only 0.10 miles per square mile of new road density. The analysis at the 5th field watershed level concludes that, given a post project road density of only 1.60 miles per square mile, the effect is insignificant, because it is nowhere near the 5 miles/square mile threshold of concern. This analysis is flawed, however, because at the 7th field drainage level where our beneficial use is occurring (fisheries), 5 miles of the new road construction in the "Big River" project is occurring in our 10 square mile "Fish Creek" drainage area. 7th field drainage analysis indicates that our hypothetical drainage already has 49 miles of existing road, or 4.9 miles/square mile (much higher than the overall density for the larger "Big River" watershed). Combined with the new road construction, road density in the Fish Creek drainage would increase to 5.4 miles/square mile, over the 5 mile/square mile threshold of concern for fisheries, an incremental change in condition for Fish Creek. Although both levels of analysis analyzed the same project, the analysis results were far different. For analysis of water resource concerns, analyses of effects at large watershed scales invariably "average out" evidence of adverse effects from proposed projects, because the projects typically affect such a small percentage of the overall watershed. A meaningful analysis of "cumulative effects" for water resources therefore must take into account the combined effects of the many individual site-specific conditions resulting from past, present and reasonably foreseeable actions at a scale where such effects would be detectable. If effects are not detectable within 7th field drainages, they will not be detectable at larger analysis scales, either.

The water resources discussion primarily uses the drainage areas identified in Table 3-H-1 of Chapter 3. These drainage areas generally fit the watershed delineation guidelines for analysis as listed in the Medford District Resource Management Plan (RMP) (USDI 1995:153). This size of analysis watershed is large enough to assess the cumulative effect of actions that, taken individually (site scale) may not be significant, but when combined with effects from everything else going on in the drainage, may have a potential adverse impact ("cumulative effect"). This size of analysis watershed is 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 (Lindell and Brazier 1986:2,11).

The analysis process for assessing water resources-related issues for the Bald Lick Landscape Project began in the 1990's with on-the-ground surveys over several years by BLM stream survey personnel to identify, map and assess conditions on over 500 miles of streams and draws on BLM lands in the Applegate River-McKee Bridge and Little Applegate River watersheds where the Bald Lick Landscape Project is proposed. BLM hydrology specialists then spent many months mapping and interpreting hundreds of miles of additional streams on non-BLM lands through stereoscopic aerial photo interpretation. Data from these sources was compiled in the BLM's Geographic Information System (GIS) to produce the most accurate mapping of hydrologic features produced for this area to date. Several thousand pages of field data collected in the stream surveys were compiled into a large dataset (USDI 2004a) to provide analysis capabilities for the project. BLM and other partners also collected extensive stream temperature data at many locations throughout the two watersheds over a 10-year period prior to the project analysis (USDI 2004b), providing the first detailed look at water temperature conditions in this area.

Stream surveyors mapped and marked hydrologic features including every BLM section of stream on-the-ground, recording all of the features necessary to make Riparian Reserve determinations as outlined in the RMP (USDI 1995: Appendix A pp. B-12 to B-17). Specialists took the collected information, and using direction from the RMP (USDI 1995), information from watershed analysis (USDI/USDA 1995; USDI 1998), stream survey information on instability (USDI 2004a), information on site potential tree heights, and location of fish habitat, evaluated each individual stream and hydrologic feature to make determinations of Riparian Reserve widths on all BLM lands in the Planning Area. The Riparian Reserves were then mapped in GIS to provide the most accurate tool currently available for Riparian Reserve analysis and on-the-ground management in the Planning Area.

The analysis process relies on a large quantity of information in addition that listed above including: aerial photo interpretation work and extensive on-the-ground inventory to quantify resource conditions (such as vegetation conditions and fisheries surveys); professional judgment by specialists (some of whom have observed conditions in this area for many years); anecdotal information from long-time residents; and evaluation of the applicability of data available from many different sources.

Because of the volume of information in the 7th field drainage analyses, the data and analysis provided for each of these drainage areas is contained in Appendix A of this EA. Summaries of the information and effects analysis are provided here in Chapter 4 in enough detail to inform readers of important findings needed for comparing the effects among alternatives. Appendix A contains the detailed drainage-by-drainage background analysis and discussion that the Chapter 4 tables, data and effects discussion are drawn from.

a. Risk Factors

The method of analysis used is generally based on guidance provided in the RMP(USDI 1995:153-154), modified as necessary to address site-specific concerns in the Planning Area. The evaluation of risk factors occurred to assess current conditions, including those resulting from past actions, and potential for effects of the alternatives related to hydrology and cumulative watershed effects. Discussion of why each risk factor is important, how it is being assessed and potential limitations in the available data or analysis methods is provided below. Following the discussion of the risk factors, is a summary of key findings from Appendix A providing information on current condition resulting from past actions, the potential effects of the alternatives being proposed, the potential effects of other foreseeable future actions, and a summary of the cumulative effects considering all past, current, proposed, and reasonably foreseeable actions. For each alternative, a determination was made as to whether or not there would be potential for significant cumulative effects from implementation of any of the proposed alternatives. The analysis assumes that all Project Design Features (PDFs) identified in Chapter 2 would be implemented, and that all activities would incorporate the Best Management Practices (BMPs) described in the Resource Management Plan (USDI 1995:Appendix D). While a summary of information and key findings are presented here in Chapter 4, Appendix A provides important supporting analysis and information in greater detail.

Risk Factor: Is there Disturbance on Highly Erodible Soils?

Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Unstable soil areas are also considered during this assessment. Unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function.

To assess whether highly erodible soils are an issue in a given drainage, GIS data was collected on the amount of soil in each drainage formed from granite parent material. Granitic soils have a low clay particle size content and are highly erodible. Unstable areas were identified through field investigation or during stream surveys. Areas with slopes over 65 percent were field checked for signs of soil movement. If there was a high potential for slope failure the area was identified. A map was made identifying the highly erodible soil areas and the data queried for past management activities on public land. Where the map showed highly erodible soils on non-public land, an aerial photo interpretation was completed to determine if mechanical soil disturbance had occurred within the past 30 years. It is estimated that erosion rates on disturbed areas are back to near normal rates within 3 to 5 years but skid trails take much longer due to compaction so for this exercise disturbance a little further back was identified. An estimate of disturbed acres on non-public lands was made and compared with the data of past and proposed management activities on public lands in a particular HUC-7 drainage for an assessment of ground disturbing management activities on highly erodible soils.

Risk Factor: Has a Large Percentage of Forest Vegetation been Harvested?

Timber harvest activities that expose soil to surface erosion can result in accelerated rates of sediment production. Skid trails and yarding corridors can expose soil and also cause compaction. Increased large openings in the forest canopy from intensive harvest activity can result in more snow accumulation and may increase the amount of streamflow during rain-on-snow events (see *Transient Snow Zone* discussion). In general, tree crowns intercept precipitation and can reduce the effect of extreme storm events while the tree roots provide stability to the soil. Consequently, large open areas without vegetative surface cover may have a greater risk of increased sediment production.

This risk factor simply looks at how much recent (past 30 years) intensive timber harvest activity (clearcuts or other similar harvest types that reduce canopy below historic levels) has occurred in the drainage as an indicator of potential disturbances that could affect water resources. Related risk factors (such as the *Sedimentation Potential*, *Percent of Nonrecovered Openings in the Transient Snow Zone*, *Area of Compacted Soil* for example) take a closer look at the actual or potential impacts that may result from harvest activities.

Areas impacted by older harvests are constantly recovering. Because of this, the negative effects of the proposed project on this risk factor are actually overstated, because current condition is based on conditions at the time of the analysis, while implementation of the proposed project may not begin for 1 to 2 years and would occur over 2 to 3 year period. Because the intensity of timber harvests on federal lands has declined dramatically in the past decade or so, and current management dictates a substantially "lighter touch" than those done many years ago, in reality it is probable that between the time of this analysis and the time any projects ultimately authorized by this project are actually implemented, recovery of those old intensive timber harvests would have had a greater positive effect on this risk factor than any negative effects that could ultimately be generated by the project itself.

A factor of six acres of harvest per mile of new road construction is included in calculations to cover road and landing construction. These areas are assumed to be new intensive harvest (clearcut) for this analysis.

In the Planning Area, the Ecoregion Description (WPN 1999: Appendix A) lists historic canopy closure in the watersheds of the Planning Area as greater than 30 percent, with the exception of the oak woodland/ lowest elevations and areas on soils derived from serpentine geology, which historically had less than 30 percent canopy closure. Based on this description, canopy closure in most stands is far above historic percentages.

Risk Factor: Are there Large Areas of Compacted Soil?

Large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation.

Data on compacted ground is not available for the drainages in the Planning Area, and cannot be obtained at a reasonable cost. However, for purposes of assessing whether compaction may be an issue warranting further investigation in a given drainage, a rough "worst-case" estimate is made of current area compacted with ground-based equipment across all ownerships in the drainage. In one western Oregon study, Harr concluded that large peak flows appeared to be increased where at least 12 percent of the watershed was seriously compacted (Harr, 1976). While the study was not done in the Planning Area, it is perhaps the most applicable given the limited amount of information on the subject. In field observations by BLM specialists over the past several decades, there has been nothing to suggest that the findings are not reasonably applicable to southwest Oregon. Indications of possible compaction of greater than 12 percent

of the total HUC-7 drainage area could indicate the need for special management practices to mitigate water quality/quantity impacts.

The assumptions used to calculate this "worst-case" estimate include: 1.) acres in roads are assumed to be 100 percent permanently compacted area at the rate of 2.5 acres per mile of road (20 foot compacted width on all roads; 2.) acres of forest stands under approximately 30 years of age are assumed for this exercise to have been tractor logged with 12 percent (or 25 percent depending on photo interpretation) of the harvest acreage compacted on public lands and 25 percent of the harvest acreage compacted on non-public lands and; 3.) acres of mechanical vegetation treatments (i.e. "slashbuster") are assumed for this exercise to compact 15 percent of the area treated. For analysis of the alternatives, tractor logging proposed as part of the project would be assumed to compact 12 percent of the treated acreage due to the required use of designated skid roads (USDI 1995:166). Compaction from helicopter logging would be about 1 percent while compaction from skyline yarding would be about 4 percent of the unit (Clayton, 1981; Dyrness, 1967). Although some of the mechanical road decommissioning would somewhat decrease compaction, especially over the long-term, this improvement cannot be easily quantified with any degree of confidence for purposes of this "worst-case" analysis, and would therefore not be included.
Potential sources of error in this estimation include: 1) the potential reduction in compaction on some roads being mechanically decommissioned is not taken into account; 2) the compaction calculated as a result of acres of forest stands under 30 years of age is likely overestimated because this includes areas that may be young stands resulting from wildfire but that were not entered post-fire and, therefore, have not sustained any compaction, or because these young stands may include acreage that was logged with less-compacting methods such as helicopter or cable. Another reason for overestimation may be because on BLM lands for this exercise stands up to 11 inches in diameter were considered to be under 30 years old, even though the slow growth of conifers on many sites (low rainfall, south slopes) in this area means that trees 11 inches in diameter may be much older than 30 years, and these areas may not have existing compaction water quality related impacts; 3) compaction from slashbuster operations can only be inferred from similar tractor yarding on harvest operations, because no studies are known to have addressed slashbuster compaction impacts specifically. Since slashbuster operations are not limited to the use of designated skid roads, it is conceivable that area compacted during slashbuster operations could be closer to the 25 percent encountered in unrestricted tractor yarding. Proponents of slashbuster treatments point out, however, that because the slashbuster can treat vegetation up to 25' in all directions from location of the tracks, the area subject to compaction remains at or below 12 percent of the treated area.

Risk Factor: Is there a Large Percent of Nonrecovered Openings in the Transient Snow Zone?

In the Bald Lick Planning Area, the Transient Snow Zone is identified as the elevation range between 3,500 and 5,000 feet[4] where there is a higher probability of rain-on-snow precipitation events (USDI 1998:17; USDI/USDA 1995:5). This zone is of interest to land managers since greater snow accumulation can occur in clearings, producing the potential for higher peak flows during rain-on-snow events.

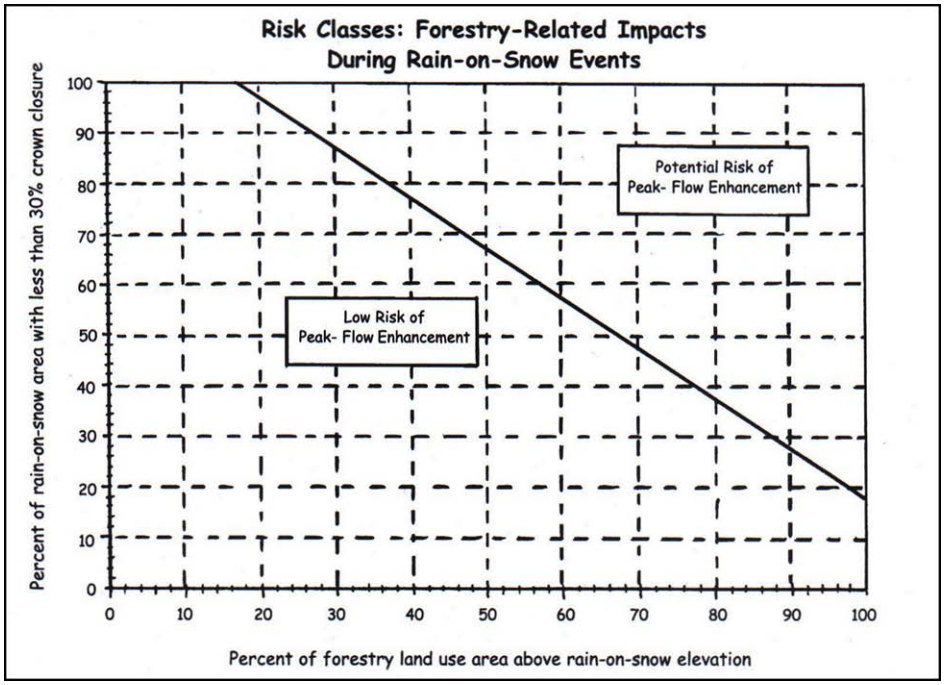
Drainage areas (Chapter 3 Table 3-H-1) in which the Bald Lick Planning Area is located range from 1,462 feet at the confluence of the Applegate and Little Applegate rivers to 5,624 feet at Bald Mountain at the top of First Water Gulch. The headwaters of the Applegate and Little Applegate rivers originate in the snow-dominated precipitation zone of the Siskiyou Mountains upstream of the Planning Area at elevations near 7,000 feet.

[4] The transient snow zone is not an exactly defined area; when the Little Applegate Watershed Analysis was completed in 1995, this zone was estimated to be between 4,000-5,000 feet (USDI/USDA 1995:5). Additional observation by hydrologists since that time has better defined this zone within the Planning Area as between 3,500-5,000 feet. This revised elevation band is identified in the more recent Star/Boaz Watershed Analysis (USDI 1998:17).

The Oregon Watershed Assessment Manual (OWAM) developed by Watershed Professionals Network (WPN 1999) for the Governor's Watershed Enhancement Board provides a method for assessing the potential risk for peak flow increases from runoff originating in the Transient Snow Zone. This risk assessment method compares the percent of transient snow zone area currently less than 30 percent crown closure to the percent of forestry land use area within the transient snow zone using the graph shown in Figure 4-H-1.[5]

It should be noted that for the Little Applegate and Applegate River-McKee Bridge watersheds, the Ecoregion Description (WPN 1999:Appendix A) lists historic canopy closure as greater than 30 percent, with the exception of the oak woodland/ lowest elevations and areas on soils derived from serpentine geology which historically had less than 30 percent canopy closure.

Figure 4-H-1: *Graph for estimation of the risk of peak-flow enhancement from forestry-related impacts during rain-on-snow events (WPN 1999:IV-11).*



Drainages with more than 25 percent of their area at or above the Transient Snow Zone elevation (3500 feet in the Planning Area) may be at risk for possible peak flow increases; drainages with 75 percent or more of their area in the rain zone (below 3500 feet) have a low potential risk of peak-flow enhancement (WPN 1999:IV-9). For this analysis, drainages with a low potential risk of peak-flow enhancement (drainages with 75 percent or more area in the Rainfall Zone) would not be evaluated further as part of the Transient Snow Zone analysis. The remaining drainages would be evaluated using the graph shown in Figure 4-H-1.

This technique is a screening process which only identifies the potential for increases to peak flows from impacts to forest crown closure; it does not identify the magnitude of potential impacts. If the screening process indicates an increased probability of flow impacts in the Planning Area, more definitive assessment techniques would be required to identify the magnitude of potential impacts.

[5] Regarding the graph shown in Figure 4-H-1, the Oregon Watershed Assessment Manual (WPN 1999:IV-11) states "[t]he graph…is adapted from the Washington State Department of Natural Resources Interim Rain-on-Snow Rules. Although the graph was derived for Washington State, it was developed using rules of thumb applicable to the Pacific Northwest. For the purpose of screening forested areas of hydrologic concern in Oregon, the risk classes used in the Washington graph were aggregated from three classes to two classes: low risk and potential risk. The boundary between the two classes was set at a lower threshold of concern, based on personal communication with the original author of the Washington graphs. The lines were also tested using the Washington State Forest Practices Board rain-on-snow model for a watershed in the Rogue Basin and a watershed on the western slope of the Cascades in northern Oregon. The line appears to roughly represent peak-flow increases of 8 to 10 percent, which represents the lower boundary of detectability; the accuracy of good streamflow measurements are within 10 percent of the true value."

Risk Factor: Do Stream Channels exhibit Poor-to-Fair Stability or Condition?

Streams may lack adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy, have degraded channel conditions (sinuosity, width/depth ratio, or gradient), and/or lack things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events.

Streams with a high percentage of streambanks composed of non-erodible material, boulders and cobbles, or stabilized by vegetation usually indicate a high level of bank stability and ability to withstand high flows. Streams naturally have some eroding banks resulting from the ongoing processes of scour and deposition. Most of the streams in the Planning Area are very steep, and many are located on depositional slopes, landslide debris, and mixtures of noncohesive, colluvial and alluvial deposition. Natural disturbance and active erosion of channels and banks are common features of these streams. Typical stream bank erosional processes are fluvial entrainment, bank collapse, dry ravel, freeze/thaw and lateral scour from debris flows (Rosgen 1996:4-4 to 4-6, 5-44 to 5-83). Tufa deposits also appear to be a factor in the condition of some of the stream channels in the Planning Area. (See further discussion under *Stream Morphology in Chapter 3*.)

For this analysis, there is no hard-and-fast condition threshold. The percentages of actively eroding streambanks observed during stream surveys are listed, along with any pertinent discussion and professional judgment as to the condition of this risk factor.

Risk Factor: Are Riparian Areas in Poor-to-Fair Condition?

Riparian areas need to be in a condition where adequate vegetation, landform, or woody debris is present to: dissipate stream energy during high flow events to reduce erosion and improve water quality; filter sediment, capture bedload, and aid in floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and to support greater biodiversity (USDI/USDA 1998). When adequate vegetation, landform, or woody debris is not present along a stream, proper functioning of the physical processes listed above is compromised.

Data collected using Proper Functioning Condition (PFC) assessment protocol (USDI/USDA 1998) is used for an indication of riparian condition, with the "functional-at-risk-downward" and "nonfunctional" categories being used to quantify conditions as "fair-to-poor". Also included is data collected during stream surveys indicating evidence of past riparian harvest, and GIS vegetation data indicating percentages of riparian areas in young stands and in old growth.

Riparian Reserves, a component of the Aquatic Conservation Strategy (ACS), have been determined using the direction in the RMP (USDI 1995:26-27). Hydrologic feature information necessary to make these determinations was collected for all streams during stream surveys conducted since 1998 (USDI 2004).

All PFC and stream/riparian survey data was collected on-the-ground, and is considered to be an accurate portrayal of conditions existing at the time collected. The GIS vegetation data is a combination of air photo interpretation and on-the-ground inventory and validation; the GIS data may include stand characteristics for an entire unit including the uplands adjacent to the Riparian Reserve, so although it represents the best available information, there is greater potential to not accurately reflect actual riparian conditions as compared to the on-the-ground stream/riparian surveys.

The RMP directs that silvicultural practices are to be applied to Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS and Riparian Reserve objectives (USDI 1995:27).

Risk Factor: Are there High Impacts from a Catastrophic Event?

High impacts can be present from events such as widespread intense fire, slides and debris torrents, or large flood events. The presence of recent catastrophic events within a drainage may indicate the need for closer examination of potential interrelated effects.

Wildfire is a natural process that is part of the forest maintenance and regeneration cycle. Fire exclusion management can result in increased fuel build-up with an increased risk of eventually experiencing a hotter, more devastating fire than would be experienced under a more natural fire regime. Severe fires can be more damaging to streams and water quality because they often expose more soil by burning the duff layer on the forest floor. The suppression effort associated with a fire can also be damaging. Dozer lines and hand constructed firelines need to be carefully rehabilitated to prevent serious resource damage. Also, since more large wood is consumed in a severe fire, a deficiency of stabilizing wood material can result in increased erosion processes. BLM's current fire management strategy is to mimic the effect of small, low intensity fires with a systematic fuel reduction program (See fire and fuels discussion).

For analysis of recent wildfire history in the Planning Area, data was used from the Oregon Department of Forestry (ODF, Southwest Oregon Office, Central Point, OR), and the Rogue River National Forest (RRNF, Supervisor's Office, Medford, OR). Because ODF handles fire suppression on all BLM lands in Southern Oregon, the data for fires on BLM lands should be fairly complete. The ODF dataset contains information on fires from 1967 to 2003 and the RRNF dataset contains information on fires from 1970 to 2003. The datasets are based on fire location point data with information on fire year, fire number, fire name, total acres burned, approximate location of the fire start, and cause of the fire. Using GIS, the ODF and RRNF datasets were intersected with GIS layers containing precipitation zones, 7th level drainage areas, and property ownership. The points represent fire location, but not exact points of origin—they are not based on GPS point data. ODF placed the point of origin in the center of a quarter-quarter section or, if the quarter-quarter section was not available, the point would be placed in the center of the quarter section. It is possible that some fires originating close to a drainage area boundary are mapped in the wrong drainage area due to the limited precision of the location data. Information as to how points were located is unknown for USFS points, and the location precision of these points is somewhat questionable[6]; however, it is the best data available. It is also possible ODF and RRNF have duplicate points of origin and fire acreage; however, where duplicate points and fire acreage were discovered they were removed. Some fires that occurred during the interval from 1967 to 2003 may have been missed due to the lack of data in the RRNF dataset from 1967 to 1969 and the potential that some fires might not have been documented by ODF or RRNF. Data for any fire starts since 2003 are not included, but it should be noted that there have been no major fires in either watershed between that time and this analysis in Spring 2005.

Only fires larger than five acres are individually discussed in this analysis. Smaller fires are discussed en masse for each drainage area. For larger fires that originated near drainage area boundaries on the perimeter of the Planning Area, aerial photographs were examined to determine whether or not they left the drainage area of origin or entered a drainage area related to the project from outside of the project boundary. While the point data helped to determine the location in which a fire originated, the acreage of larger fires could not be calculated by individual 7th level drainage areas. Polygon data from old BLM field reports and maps as well as collected GPS data was available for some larger fires. Acreage from this source was not determined for each individual 7th level drainage area. In some cases, the 7th level watershed acreage

[6] Ed Reilly, BLM, E-mail communication to BLM hydrologist David Squyres, January 5, 2005.

burned was estimated from aerial photos. Otherwise, the acreage was not included and a note was made that an undetermined area from a larger fire burned within the 7th level drainage area.

Other "catastrophic" events also occur as the result of natural processes. The natural recovery from such events can be affected by ongoing management activities, so analysis for proposed activities in areas where recent major events have occurred needs to consider this.

Risk Factor: Is Road Density High in the Drainage?

Roads alter the hydrologic network and may increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams (USDI 1998). Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119).

The *Klamath Siskiyou Matrix of Pathways and Indicators* (USDA/USDI 1996) identifies road densities greater than 3.0 miles per square mile as high. The Oregon Department of Environmental Quality references papers indicating that hydrology is altered when roads constitute more than 4 percent of the drainage area; this correlates to approximately 4 miles of road per square mile of area (ODEQ 2003b:61).

Roads can be a concern if they change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime. For example, a road might intercept storm flow and transport it into another drainage. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water.

Well-designed roads with a properly functioning drainage system would 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.

Road failures can adversely affect the aquatic system in several different ways. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems.

For this analysis, we started with all roads in the BLM GIS system, then added roads not shown on the GIS maps but visible on the most recent aerial photos, taken in 2001. Several field days were spent driving in the Planning Area to find additional roads including roads hidden by tree canopy, jeep and OHV trails, and recently constructed new private roads that might not be visible on the aerial photos. The BLM hydrologist has estimated that the percentage of undetected roads and trails in the Planning Area may be as much as 30 percent on private lands and 10 percent on federal lands; an error estimate using these percentages was added into the road density figures for each drainage to account for these undetected roads and trails.

Risk Factor: Is there High Sedimentation Potential?

The 2004 305(b) Report (ODEQ 2004b) identified thresholds for fine sediment (silt, clay, sand) based on reference sites throughout Oregon. Using the ODEQ thresholds, streams with substrate composed of less than 22 percent fine sediment are rated as "Good", those with 22-35 percent are rated as "Fair", and those with greater than 35 percent fine sediment are rated as "Poor" (ODEQ 2004b:19-20). Similar estimates of substrate composition were made by BLM stream survey crews at representative locations along streams

within the Planning Area (USDI 2004a), and BLM then applied the ODEQ "good-fair-poor" thresholds to the resulting information. The methodologies for collecting this data were probably somewhat different than those used by DEQ, so the confidence in the exact application of BLM data to DEQ's ratings is not high. However, it represents the best information available, and provides some idea of relative conditions between the drainages being analyzed. BLM perennial and long duration intermittent streams with continuous surface flow are looked at in each drainage for this rating; channels with interrupted surface flow (for example, portions subsurface) are not included in this rating, because these are often reaches with lots of instream structure or other channel characteristics that may show high sediment levels from natural functioning processes rather than from management-induced degradation.

The interaction of roads with streams is looked at as an indicator of potential for sediment impacts to be conveyed to the stream. The density of road/stream crossings as well as the presence of mining and irrigation ditches is considered.

Data from Proper Functioning Condition (PFC) surveys (USDI 2004a) is analyzed to determine the percentage of streams that do not have adequate riparian and channel conditions to store, sort, and transport sediment through the stream system at natural rates. Such riparian and channel conditions could negatively affect levels of fine sediments present in the stream.

The alternatives are analyzed as to the numbers of stream crossings that would be constructed or removed, how many existing stream crossings would be renovated to reduce interactions with the stream, and how many roads would be renovated to reduce existing erosion/water channelization problems.

Sedimentation rates from pile burning and maintenance underburning are not expected to be substantially different than what would be expected from natural fire in a low severity fire regime. Observation by BLM hydrology and fisheries staff of conditions during the rainy season following pile burns and underburns at various locations in the Applegate Subbasin have not indicated evidence of any surface flows or sediment movement from these types of burned areas into streams, even in observations made following major flood events and peakflow events. Because prescribed maintenance fire of this type is generally low severity, it stands to reason that the impacts to sedimentation would be similar to or less than what would be expected to occur under natural conditions. Based on this, no additional analysis is being done regarding the effects of pile burning and maintenance underburning on sedimentation.

Risk Factor: Is there Potential for Violation of the Clean Water Act?

This risk factor is a combination of three cumulative impacts criteria listed in the RMP, Appendix D (USDI 1995:153). The three criteria are: *potential for adverse impact on a beneficial use*; *monitoring data shows that water quality does not meet state water quality standards*; and *beneficial use impairment identified in DEQ's nonpoint source assessment and 305(b) reports*. These criteria contribute to the determination of whether or not there is a potential for violation of the Clean Water Act (CWA).

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters and to protect designated beneficial uses. Any adverse impact on a beneficial use would violate the CWA.

Under Section 303(d) of the CWA, the Environmental Protection Agency (EPA) or its state delegates are required to develop a list of the surface waters in each state that do not meet water quality criteria. In Oregon, these criteria are developed by DEQ to protect beneficial uses and are approved by EPA. The DEQ is responsible for designating waterbodies that do not meet established water quality criteria for one or more beneficial uses. These waterbodies are included on the state's 303(d) list of water quality limited waterbodies, which is revised every two years, and submitted to the EPA for approval. Monitoring data

showing that water quality does not meet state water quality standards would place the waterbody on the state's 303(d) list.

The RMP referenced the 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution and the 1992 Water Quality Status Assessment (305b) reports. The 1988 Nonpoint Source Assessment was a comprehensive survey of nonpoint source pollution prepared to comply with Section 319 of the CWA. DEQ has not repeated that survey; instead it produces annual nonpoint source program annual reports, most recently published for 2003 (ODEQ 2004a). Section 305(b) of the CWA requires the states to submit a report to EPA every two years describing the activities and accomplishments of the water quality program. The 305(b) report also discusses water quality problems that need to be addressed.

All three of these cumulative impact criteria from Appendix D of the RMP pertain to the CWA. For analysis in this environmental assessment they are combined into one risk factor.

Cold water aquatic life such as salmon and trout are the most sensitive beneficial uses occurring within the Planning Area (ODEQ 2003a:10). Other less sensitive beneficial uses include public domestic water supply, private domestic water supply, industrial water supply, irrigation, livestock watering, boating, aesthetic quality, commercial navigation and transportation (not occurring at present), anadromous fish passage, salmonid fish spawning, salmonid fish rearing, resident fish and aquatic life, wildlife and hunting, fishing, water contact recreation, and hydropower. In practice, water quality standards have been set at a level to protect the most sensitive beneficial uses (ODEQ 2003a:10); water quality sufficient to protect the most sensitive beneficial use would protect the other beneficial uses, as well.

One of the other beneficial uses BLM is required to protect is private domestic water supply. Oregon Department of Environmental Quality has indicated that this beneficial use is protected when such water can be "beneficially used with adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards" (ODEQ 2003e). Because water quality standards are set to protect the most sensitive beneficial use, the results of analysis of the effects of BLM actions on water quality standards would be applicable to less sensitive beneficial uses such as private domestic water supply, as well. Groundwater extracted through wells is used by many residents in the Applegate Subbasin as their private domestic water supply. BLM's management as analyzed for in the Medford District RMP/EIS would cause no measurable changes in ground water. This was the case for even the most management-intensive alternatives that were considered in the RMP/EIS. Because one of the more environmentally conservative alternatives (relating to water resources) in the RMP/EIS was ultimately selected (USDI 1995:4) and is being implemented (USDI 1995:6), concerns over potential impacts to ground water from BLM activities are negligible (USDI 1994:4-18).

The Oregon Department of Environmental Quality's 303(d) list (ODEQ 2002) has identified streams within the Planning Area that do not meet State Water Quality Standards (OAR 340-041, 2004). These include mainstem portions of the Applegate River, Little Applegate River, Sterling Creek, and Yale Creek for high summer stream temperatures, and Grouse Creek for dissolved oxygen. All streams within the Planning Area are identified as "core cold water habitat" (ODEQ 2003c), where the seven-day-average maximum summer stream temperature may not exceed 60.8° F. Streams within the Planning Area also provide cold water aquatic life, which requires a minimum dissolved oxygen concentration 8.0 mg/l to meet State Water Quality Standards (OAR 340-041-0016(2), 2004). The State of Oregon has not identified any additional water quality parameters for streams within the Planning Area that do not meet State Water Quality Standards.

No additional beneficial use impairment for the Applegate River or its tributaries (which includes the Bald Lick Planning Area in its entirety) is identified in DEQ's 2004 Nonpoint Source Assessment report (ODEQ 2004a) or DEQ's 2004 305(b) report (ODEQ 2004b). The 305(b) report includes an Oregon Water Quality

Index (OWQI) designed to monitor trends over long periods of time. This index utilizes temperature, dissolved oxygen for percent saturation and concentration, biochemical oxygen demand, pH, total solids, ammonia and nitrate nitrogens, total phosphorus, and fecal coliform data to measure cumulative impacts from point and non point sources in a variety of conditions (ODEQ 2004b:16). The 2004 305(b) report indicates that the overall OWQI for the entire Applegate River is good, with no significant change from 1993-2004 (ODEQ 2004b:17).

b. Project Components not Assessed in Detail for Hydrology/Water Resources

Below are project components not assessed in detail for Hydrology/Water Resources, along with rationale explaining why they were not assessed and are not critical to an assessment of project implications for water resources.

Differences in Commercial Harvest Prescriptions

This analysis does not go into great detail regarding differences in the different harvest prescriptions. Although different in objectives, the different harvest prescriptions proposed for this project do not vary significantly in terms of their hydrologic impacts. Yarding systems employed by the different harvest prescriptions have similar impacts (similar between prescriptions, not similar between yarding systems) regardless of which one of the prescriptions is employed, as they disturb roughly the same amount of area given the type of yarding being done. All of the prescriptions maintain canopy closures greater than 30 percent in every unit (Haupt 2004), in line with the historical canopy closure listed for this ecoregion (WPN 1999:Appendix A).

Drainage AU0206 – Beaver Creek below Petes Camp Creek, above Hanley Gulch

- This drainage is located outside of the Bald Lick Planning Area boundary.
- The only activity proposed in this drainage is the renovation of 0.88 miles of road under Alternatives 2 and 3.
- All renovation is near the ridge top, does not cross any streams or draws, and has no potential to deliver sediment to streams with implementation of the PDFs (Chapter 2) and BMPs (USDI 1995:Appendix D).
- The renovation has positive benefits from a hydrologic/sediment delivery standpoint, helping to control and prevent road-related runoff and sediment production. Upgrading roads is one of the most important components of a watershed restoration program under the Aquatic Conservation Strategy (USDI 1995:23). BLM's management direction under watershed restoration is to focus on removing and upgrading roads (USDI 1995:23). This is especially important in Beaver Creek, because Beaver Creek is a Tier 1 Key Watershed (USDI 1995:23), and is also on the State of Oregon 303(d) list (Water Quality Limited) for sediment. No other project activities are proposed for this drainage, so no further analysis will be done for this project.

Drainage AU0212 – Beaver Creek below Hanley Gulch, down to Armstrong Gulch

- This drainage is located outside of the Bald Lick Planning Area boundary.
- The only activities proposed in this drainage are the renovation of 0.46 miles of existing road, natural decommissioning of 0.25 miles of road, and mechanical decommissioning of 0.25 miles of road, under both Alternatives 2 and 3.
- All renovation and decommissioning is near the ridge top, does not cross any streams or draws, and has no potential to deliver sediment to streams with implementation of the PDFs (Chapter 2) and BMPs (USDI 1995:Appendix D).
- The road renovation and decommissioning has positive benefits from a hydrologic/sediment delivery standpoint, helping to control and prevent road-related runoff and sediment production. This is one of the most important components of a watershed restoration program under the Aquatic Conservation Strategy (USDI 1995:23). BLM's management direction under watershed restoration is to focus on

removing and upgrading roads (USDI 1995:23). This is especially important in Beaver Creek, because Beaver Creek is a Tier 1 Key Watershed (USDI 1995:23), and is also on the State of Oregon 303(d) list (Water Quality Limited) for sediment. No other project activities are proposed for this drainage, so no further analysis will be done for this project.

Drainage LA0124 –Little Applegate River below Greely Creek, down to (and including) Water Gulch

- Drainage area is 824 acres within the Little Applegate Tier 1 Key Watershed (USDI 1995:23), including 109 acres of BLM administered land.
- No project activities are proposed for this drainage, so no further drainage area analysis will be done for this project.

Drainage LA0133 –Little Applegate River between First Water Gulch and Glade Creek

- Drainage area is 221 acres within the Little Applegate Tier 1 Key Watershed (USDI 1995:23), with only 1 acre of BLM administered land.
- No project activities are proposed for this drainage, so no further drainage area analysis will be done for this project.

Drainage LA0321 – Quartz Gulch

- This drainage is located outside of the Bald Lick Planning Area boundary.
- The only activity proposed for this drainage is the natural decommissioning of 0.06 miles of road.
- All decommissioning is near the ridge top, does not cross streams or draws, and has no potential to deliver sediment to streams with implementation of the PDFs (Chapter 2) and BMPs (USDI 1995:Appendix D).
- This decommissioning has positive benefits from a hydrologic/sediment delivery standpoint, helping to control and prevent road-related runoff and sediment production. This is one of the most important components of a watershed restoration program under the Aquatic Conservation Strategy (USDI 1995:23). BLM's management direction under watershed restoration is to focus on removing and upgrading roads (USDI 1995:23). No other project activities are proposed for this drainage, so no further analysis will be done for this project.

Drainage LA0324 – Yale Creek below Quartz Gulch, above Waters Gulch

- This drainage is located outside of the Bald Lick Planning Area boundary.
- The only activity proposed for this drainage is the natural decommissioning of 1.17 miles of road.
- This decommissioning is near the ridge top, does not cross streams or draws, and has no potential to deliver sediment to streams with implementation of the PDFs (Chapter 2) and BMPs (USDI 1995:Appendix D).
- This decommissioning has positive benefits from a hydrologic/sediment delivery standpoint, helping to control and prevent road-related runoff and sediment production. This is one of the most important components of a watershed restoration program under the Aquatic Conservation Strategy (USDI 1995:23). BLM's management direction under watershed restoration is to focus on removing and upgrading roads (USDI 1995:23). No other project activities are proposed for this drainage, so no further analysis will be done for this project.

c. Summary of Effects Analysis for Hydrology/Water Resources

The *Conditions and Effects Analysis on Water Resources* (Appendix A) is summarized on the following pages. Appendix A contains the (7th level) drainage-by-drainage discussion of basic drainage information, a quick overview of what is proposed under the alternatives, followed by analysis of each of the risk factors for that drainage. This analysis takes a hard look at the effects of the proposed alternatives on water resources/hydrology issues by first quantifying the current conditions brought on by past actions, then combining the current conditions with each alternative to come up with the analysis of how conditions

would change. This is then combined with other foreseeable future actions to complete the assessment of the cumulative effects of the alternatives. The analysis process serves the purpose both of meeting requirements under NEPA (see Chapter 2) and with the objective to minimize detrimental impacts on water and soil resources resulting from the cumulative impact of land management activities within the watersheds encompassing the Bald Lick Planning Area (USDI 1995:153). Appendix A contains the detailed information that provides the basis for the summary information provided here for current condition.

Data from the Appendix A analysis is presented in tables for *Past Action/Current Condition* (Table 4-H-2), *Direct and Indirect Effects* for each of the alternatives (tables 4-H-4 through 4-H-7), *Foreseeable Future Actions* (Table 4-H-8), and the *Cumulative* (or in the case of Alternative 1, *Combined Current and Ongoing*) *Impacts* for each alternative (tables 4-H-9 through 4-H-12). Table 4-H-1 provides a simple reference to each of the tables by alternative.

Table 4-H-1: Table Reference for Water Resources Effects Analysis

	Past Action / Current Condition	**Direct and Indirect Effects**	**Foreseeable Future Actions**	**Cumulative or Combined Current and Ongoing Impacts**
Alternative 1	Table 4-H-2	Table 4-H-4	Table 4-H-8	Table 4-H-9
Alternative 2	Table 4-H-2	Table 4-H-5	Table 4-H-8	Table 4-H-10
Alternative 3	Table 4-H-2	Table 4-H-6	Table 4-H-8	Table 4-H-11
Alternative 4	Table 4-H-2	Table 4-H-7	Table 4-H-8	Table 4-H-12

As shown in Table 4-H-1, the data for *Past Action/Current Condition* (Table 4-H-2) and *Foreseeable Future Actions* (Table 4-H-8) is common to all alternatives. Tables 4-H-5 through 4-H-7 list the data for the changes resulting from implementation of each alternative (*Direct and Indirect Effects*). The *Cumulative or Combined Current and Ongoing Impacts* tables (4-H-9 through 4-H-12) combine the information contained in the *Past Action/Current Condition*, *Direct and Indirect Effects*, and *Foreseeable Future Actions* tables for each alternative. The difference between the *Combined Current and Ongoing Impacts* for Alternative 1 ("No Action" Table 4-H-9) and the *Cumulative Impacts* for each of the other alternatives (tables 4-H-10 through 4-H-12) represent the change in cumulative effects attributable to implementation of the given alternative.

Water Resources: Current Condition resulting from Past Actions

Table 4-H-2: Current Conditions resulting from Past Actions, by Drainage

Drainage (Chapter 3 Table 3-H-1)	**percent of Drainage with recent intensive timber harvest** (Table A2*)	**Acres of Disturbance on Highly Erodible or Unstable Soils** (Table A1*)	**percent Compacted Area** (Table A3*)	**percent Nonrecovered Transient Snow Zone Openings** (Table A4*)	**percent level of Concern for Nonrecovered Transient Snow Zone Openings** (Table A4*)	**Stream Channel Conditions on BLM** (Table A5*)	**Riparian Area Conditions on BLM** (Table A6*)	**Recent Catastrophic Events** (Table A7*)	**Road Density mile/mile^2** (Table A8*)	**Road Density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Stream Sedimentation Conditions on BLM** (Table A10*)	**Stream Sedimentation Potential** (Table A10*)	**Water Quality Problems other then sedimentation** (Table A11*)
AU0218	13	<1	3	0	0	Fair	Fair	0	6.9	6.0	Fair	High	Temperature
AU0360	9	<1	3	0	0	Good	Good	0	4.1	3.0	Fair	High	Temperature
AU0363	27	0	7	0	0	Good	Good	0	6.6	2.4	Fair	High	Temperature
LA0127	11	30	4	13	56	Good	Fair	0	4.0	7.5	Poor	High	Temperature
LA0130	27	0	7	31	45	Poor	Poor	0	4.7	3.7	Poor	High	None
LA0145	38	<1	11	43	42	Fair	Poor	Quartz Fire	10.4	0.0	Poor	High	Temperature
LA0203	24	17	5	0	0	Fair	Poor	Landslide	6.8	5.0	Poor	High	Temperature
LA0206	21	0	7	24	53	Poor	Poor	0	6.6	9.5	Poor	High	None
LA0209	16	0	2	0	0	Poor	Fair	0	5.1	5.7	Poor	High	Temperature
LA0212	1	0	<1	1	57	Fair	Fair	0	1.4	0.0	Poor	Low	None
LA0215	1	<1	1	0	0	Fair	Poor	0	2.8	3.5	Poor	High	Temperature
LA0218	17	0	2	0	0	Fair	Good	0	5.3	7.5	Poor	High	None
LA0221	10	0	2	0	0	Good	Good	0	5.7	2.3	Poor	High	Temperature
LA0327	44	103	14	0	0	Fair	Fair	0	9.7	10.5	Poor	High	Temperature
LA0330	11	<1	2	0	0	Fair	Poor	0	3.2	1.0	Poor	Low	Temperature
LA0403	13	0	3	0	0	Fair	Good	Debris Torrent	5.4	0.0	NA	High	Temperature
LA0406	23	<1	2	0	0	Good	Good	0	4.0	6.8	Fair	High	Temperature, DO
LA0409	9	0	2	0	0	Good	Good	0	4.1	0.0	Good	Low	Temperature
LA0439	9	0	4	0	0	NA	NA	0	10.1	2.6	NA	High	Temperature
LA0442	17	0	5	0	0	Good	Good	0	6.5	3.3	Poor	High	Temperature
LA0445	28	0	3	0	0	Good	Good	0	6.8	3.8	Poor	High	Temperature

*The referenced tables and supporting analysis are contained in Appendix A.

Groundwater supplies in the Applegate-Star/Boaz Watershed Analysis portion of the Planning Area are limited and primarily found in valley bottom alluvium of the Applegate River corridor (USDI 1998:29). The situation is likely similar in the Little Applegate Watershed portions of the Planning Area, since ground water supplies in most areas of the Rogue basin are limited (USDI 1994:3-13). None of the proposed vegetation management activities in the alternatives analyzed here would be located in the valley bottoms of either the Applegate or Little Applegate Rivers. Limited amounts of shallow groundwater are

also stored in the accumulated colluvium in the smaller streams and draws of the Planning Area, and contribute the small amount of late summer flow present in some streams and the available groundwater at locations away from valley-bottom alluvium of the larger rivers. These natural "sponges" reach full capacity most winters, slowly releasing water to downstream areas throughout the summer or being fully utilized by vegetation growing on these deposits. While the vegetation utilizes much of the stored water within these stream bottom areas during the course of the summer, this vegetation is also critical to maintaining the stability of these deposits over the long term, and for helping increase the wintertime holding capacity of these areas. Removal of this stabilizing stream bottom vegetation with the short-sighted purpose of increasing summer water yield could destabilize these colluvial deposits, allowing them to wash out to bedrock, effectively destroying the "sponge". Because these areas are protected as Riparian Reserves, and such colluvial deposits in the bottoms of streams are protected with no-treatment areas, actions proposed under the alternatives would have no negative effect on supplies of groundwater from this source. Combined with potentially less water use by thinned and periodically underburned upland vegetation, water could possibly be available for input into these colluvial deposits later into the spring each year, seeping down slopes to the stream bottoms rather than being utilized on-site by dense vegetation. This could keep these stream bottom areas saturated later into the dry season, making somewhat increased supplies of this shallow groundwater available. Restoration of upland vegetation conditions and larger vegetation and woody debris in stream bottoms are both ultimately critical in maintaining and enhancing low flows and groundwater availability within the Planning Area.

Increases in the magnitude and frequency of peak flows can lead to subsequent adverse effects on stream channel condition (USDI 1994:4-18), by more rapid delivery of flow to the channel, increased delivery of sediment to the channel via road drainage and other ground disturbance, and from erosion of the stream channels themselves as the channel adjusts to accommodate the increased volume of flow. High road densities, proximity of roads to streams, large areas of compacted soil, and large percentages of area in nonrecovered openings within the Transient Snow Zone are all factors that can lead to increased peak flows.

Road densities (Table 4-H-2 column 10) are high within all drainages except Muddy Gulch (LA0212) and Little Applegate River between Muddy Gulch and Lick Gulch (LA0215). Several drainages have extremely high road densities, including Glade Creek between Garvin Gulch and the confluence with the little Applegate River (LA0145) at 10.4 miles per square mile (partly due to post-Quartz Fire salvage logging on non-federal lands), 9.7 miles per square mile in Waters Gulch (LA0327), and 10.1 miles per square mile in Lower Sterling Creek (LA0439). On BLM lands, some of the drainages have very high road densities within Riparian Reserves (Table 4-H-2 column 11)(indicating that many roads are in close proximity to streams), including 7.5 miles per square mile of Riparian Reserves in the Little Applegate River between Water Gulch and First Water Gulch (LA0127), 10.5 miles per square mile in Waters Gulch (LA0327), 9.5 miles per square mile in Rush Creek (LA0206), 7.5 miles per square mile in Lick Gulch (LA0218), and 6.8 miles per square mile in Grouse Creek (LA0406). With high road densities and roads crossing streams at many locations (see the Appendix A *High Sedimentation Potential* risk factor discussion for each drainage), concentration of runoff by road drainage systems is likely contributing to more rapid delivery of storm runoff directly to streams, resulting in increased peak flows.

Compacted area due to harvest and roads (Table 4-H-2 column 4) is a concern in several drainages. Large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation. In Glade Creek between Garvin Gulch and the confluence with the little Applegate River (LA0145), 11% of the area is compacted (Table 4-H-2 column 4) due largely to roads and harvest associated with salvage logging on non-BLM

lands following the 2001 Quartz Fire (see the Appendix A discussion for drainage LA0145). While still below the 12% level at which compacted area may potentially begin to affect peak flows, it is an indication that disturbance levels are high enough that further impacts could have a potential adverse effect on peak flows. In Waters Gulch (LA0327), 14% of the drainage is in a compacted state (Table 4-H-2 column 4) due to harvest and roads related to private timber harvest, recent BLM tractor yarding, and large portions of the drainage treated using tracked vehicles (slashbuster) to clear overly dense vegetation on BLM (see the Appendix A *Compacted Area* risk factor discussion for drainage LA0327). It is probable that peak flows are already at increased levels within the Waters Gulch drainage.

The Transient Snow Zone is of interest to land managers since greater snow accumulation can occur in clearings, producing the potential for higher peak flows during rain-on-snow events. Five drainages have sufficient acreage located within the Transient Snow Zone to require analysis of the drainage for area in nonrecovered openings. Of these, only one is presently a concern: LA0145 Glade Creek between Garvin Gulch and the confluence with the Little Applegate River. Nonrecovered openings within this drainage slightly exceed the threshold of concern (compare Table 4-H-2 column 5 to column 6), such that there is an increased risk of increased peak flows. A large portion of this drainage (LA0145) burned in a stand-replacement fire in 2001 (Quartz Fire), and portions on private land were subsequently logged.

Stream channel conditions can also be an indicator of the adverse affects of peak flow increases, although degraded channel conditions can also arise from other impacts such as poor riparian vegetation condition and lack of sufficient instream structure such as woody debris. Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. Twelve drainage areas have fair-to-poor stream channel conditions on BLM lands (Table 4-H-2 column 7). These include all but two of the drainages discussed in the previous three paragraphs: LA0127 First Water Gulch has good channel conditions in spite of high riparian road density, and LA0439 Lower Sterling Creek has no streams on BLM lands within the planning area boundary).

Table 4-H-3: Water Quality Limited Streams in the Bald Lick Planning Area

Name	Stream Mile	Parameter(s)	Watershed	7th-field drainage(s)
Applegate River	0 to 46.8	Summer Temperature	Applegate River - McKee Bridge	AU0218 AU0360 AU0363
Little Applegate River	0 to 20.9	Summer Temperature	Little Applegate River	LA0127 LA0203 LA0209 LA0215 LA0221 LA0403 LA0409 LA0442 LA0445
Sterling Creek	0 to 2.5	Summer Temperature	Little Applegate River	LA0439
Grouse Creek	0 to 1.8	Dissolved Oxygen	Little Applegate River	LA0406
Yale Creek	0 to 1.3	Summer Temperature	Little Applegate River	LA0330

Fifteen of the 21 drainages analyzed for the project contain streams that are on the State of Oregon 303(d) list of water quality limited streams (Table 4-H-3)(ODEQ 2002). Listings are primarily related to high summer stream temperatures, with the exception of Grouse Creek (LA0406), which is listed for low dissolved oxygen levels. Data collected at 4 locations in Grouse Creek on BLM during July 2004 indicated dissolved oxygen concentrations ranging from 8.0-8.5 mg/l, meeting the ODEQ standard of 8.0 mg/l. Data ODEQ relied on for listing this stream appear to have been obtained at a downstream location on non-BLM land, below substantial return flows from an irrigation ditch. Other land management factors outside of BLM's control may have contributed to low measured dissolved oxygen values, as well. No streams within the analyzed drainages are on the 303(d) list for sediment issues (ODEQ 2002).

In addition to the streams that are on the State 303(d) list for high summer stream temperature, BLM data (USDI 2004b) indicates that high temperatures are a water quality problem in three additional project area drainages: LA0145 Glade Creek between Garvin Gulch and the confluence with the Little Applegate River, LA0327 Waters Gulch, and LA0406 Grouse Creek. Although many streams in southwestern Oregon have some degree of warming due to natural influences, areas of past intensive harvest in riparian areas along with degraded riparian and channel conditions at some locations contribute to elevated stream temperatures.

Most drainages had numerous streams on BLM lands where past timber harvest was noted in the riparian area immediately adjacent to the creek (USDI 2004a). This timber harvest activity was from prior to implementation of the current Resource Management Plan (USDI 1995). Twelve of twenty drainages containing streams on BLM land had stream channel conditions that were in the fair-to-poor range (Table 4-H-2 column 7), and 11 drainages had riparian conditions in the fair-to-poor range (Table 4-H-2 column 8). Removal of streamside vegetation, roads constructed with drainage systems that route flow directly to streams, ground-disturbing harvest operations without streamside buffers, and lack of project design features/best management practices appear to be the primary factors that have lead to the conditions adversely affecting stream temperature.

Although none of the streams in the Planning Area are on the 303(d) list for sediment (ODEQ 2002), sedimentation conditions were identified based on on-the-ground data as fair-poor in all but one of the drainages assessed (USDI 2004a)(Table 4-H-2 column 12). Analysis points to overall road densities, road interactions with streams, ground disturbance on highly erodible soils (particularly relating to intensive harvest on private lands in LA0327 Waters Gulch), and total compacted area (in one drainage – LA0327 Waters Gulch) as the culprits in the amount of adverse sediment conditions (see the Appendix A *High Sedimentation Potential* risk factor discussion for each drainage). The discussion under *Water Quantity: Peak Flow*, above, applies here as well. There is very little existing disturbance on highly erodible soils (Table 4-H-2, column 3), another potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. Unstable areas were identified in a number of dry draws in many of the drainages, as well as a large area on the north face of the ridge locally known as Trillium Mountain in drainage LA0215, Little Applegate River between Birch Creek and Lick Gulch. See the *Soils* discussion for more information on highly erodible soils and unstable areas.

Hydrology/Water Resources: Alternative 1 Direct and Indirect Effects

Table 4-H-4: Alternative 1 Changes in Risk Factors by Drainage resulting from "No Action"

Drainage (Chapter 3 Table 3-H-1)	**percent of drainage proposed for intensive timber harvest** (Table A2*)	**Acres proposed new disturbance on highly erodible/unstable soils** (Table A1*)	**percent proposed new compacted area** (Table A3*)	**percent proposed new transient snow zone openings** (Table A4*)	**Potential changes in stream channel conditions** (Table A5*)	**Potential changes in riparian area conditions** (Table A6*)	**Potential effects related to impacts from past catastrophic events** (Table A7*)	**Proposed change in road density miles/mile^2** (Table A8*)	**Proposed change in road density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Potential change in management-related stream sedimentation** (Table A10*)	**Potential effect on water quality problems other than sedimentation** (Table A11*)
AU0218	0	0	0	0	negative	negative	0	0	0	0	0
AU0360	0	0	0	0	negative	negative	0	0	0	0	0
AU0363	0	0	0	0	negative	negative	0	0	0	0	0
LA0127	0	0	0	0	negative	negative	0	0	0	0	0
LA0130	0	0	0	0	negative	negative	0	0	0	0	0
LA0145	0	0	0	0	0	0	0	0	0	0	0
LA0203	0	0	0	0	negative	negative	0	0	0	0	0
LA0206	0	0	0	0	negative	negative	0	0	0	0	0
LA0209	0	0	0	0	negative	negative	0	0	0	0	0
LA0212	0	0	0	0	negative	negative	0	0	0	0	0
LA0215	0	0	0	0	negative	negative	0	0	0	0	0
LA0218	0	0	0	0	negative	negative	0	0	0	0	0
LA0221	0	0	0	0	negative	negative	0	0	0	0	0
LA0327	0	0	0	0	negative	negative	0	0	0	0	0
LA0330	0	0	0	0	negative	0	0	0	0	0	0
LA0403	0	0	0	0	negative	0	0	0	0	0	0
LA0406	0	0	0	0	negative	negative	0	0	0	0	0
LA0409	0	0	0	0	negative	0	0	0	0	0	0

LA0439	0	0	0	0	0	0	0	0	0	0	0
LA0442	0	0	0	0	negative	negative	0	0	0	0	0
LA0445	0	0	0	0	negative	negative	0	0	0	0	0

* The referenced tables and supporting analysis are contained in Appendix A.

There would be no changes in road densities (Table 4-H-4 column 9), proximity of roads to streams (Table 4-H-4 column 10), areas of compacted soil (Table 4-H-4 column 4), or percentages of area in nonrecovered openings within the Transient Snow Zone (Table 4-H-4 column 5) with implementation of Alternative 1. There would therefore be no changes to the magnitude and frequency of peak flows.

With continued high road densities (Table 4-H-2 column 10) and roads crossing streams at many locations (see the Appendix A *High Sedimentation Potential* risk factor discussion for each drainage), concentration of runoff by road drainage systems would continue contributing to more rapid delivery of storm runoff directly to streams, resulting in continued increased peak flows. Roads alter the hydrologic network and may increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams. (USDI 1998). Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119). Roads can also be a concern if they change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime, causing adverse effects on the aquatic system. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads with a properly functioning drainage system would 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.

Stream channel conditions would also continue to be at an increased level of risk for adverse affects of increased peak flow (Table 4-H-4 column 6). Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. Increased peak flows could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel.

Under Alternative 1 (no action), riparian areas would continue to be protected per direction in the Aquatic Conservation Strategy (ACS) (USDI 1995:22-23). Riparian areas where previous harvest activities occurred would continue to gradually recover from past harvest impacts. There would be no road-related work in Riparian Reserves under this alternative, so watershed restoration direction regarding roads under the Aquatic Conservation Strategy might not be met. RMP direction that silvicultural practices are to be applied to Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS and Riparian Reserve objectives (USDI 1995:27) would not be implemented under this alternative, so the effect to riparian vegetation of taking “no action” would be negative in many drainages (Table 4-H-4 column 7). Riparian areas need to be in a condition where adequate vegetation, landform, or woody debris is present to: dissipate stream energy during high flow events to reduce erosion and improve water quality; filter sediment, capture bedload, and aid in floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the

habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and to support greater biodiversity (USDI/USDA 1998). When adequate vegetation, landform, or woody debris is not present along a stream, proper functioning of the physical processes listed above is compromised.

Streams would neither be added nor removed from the 303(d) list as result of implementation of Alternative 1 (Table 4-H-4 column 12). Implementation of Alternative 1 would not change current stream temperature conditions. Streams would continue to have some degree of warming due to a combination of natural influences, areas of past intensive harvest in riparian areas, and degraded riparian and channel conditions at some locations. There would be no action to correct problems associated with roads constructed with drainage systems that route flow directly to streams, so any temperature effects from channel conditions aggravated by roads would be expected to continue.

Implementation of Alternative 1 would not take any action to correct problems related to stream sedimentation. Sedimentation would be expected to remain a problem, and the risk of sediment inputs to streams would be expected to remain relatively constant (Table 4-H-4 column 11). There would be no action to decrease overall road densities (Table 4-H-4 column 9) or decrease road interactions with streams (Table 4-H-4 column 10; Appendix A *High Sedimentation Potential* discussion for Alternative 1 in each drainage). There would be no new disturbance on highly erodible soils (Table 4-H-4, column 3) or unstable areas, and area of compacted ground would not change (Table 4-H-4 column 4). Disturbance on highly erodible soils is a potential source of turbidity and sediment in streams (see Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage). Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. The discussion regarding peak flow, above, applies here as well.

Within the Little Applegate River Key Watershed, implementation of Alternative 1 (no action) would comply with management direction that "…there would be no increase in the amount of roads in Key Watersheds" (USDI 1995:Appendix A, page B-19), because there would be no change in the amount of existing roads in any portion of the Planning Area (Alternative 2 road construction and decommissioning in Appendix A *High Road Density* risk factor discussion for drainages LA0127 and LA0130), including the Key Watershed.

Hydrology/Water Resources: Alternative 2 Direct and Indirect Effects

Table 4-H-5: Alternative 2 Proposed Changes in Risk Factors by Drainage

Drainage (Chapter 3 Table 3-H-1)	**percent of drainage proposed for intensive timber harvest** (Table A2*)	**Acres proposed new disturbance on highly erodible/unstable soils** (Table A1*)	**percent proposed new compacted area** (Table A3*)	**percent proposed new transient snow zone openings** (Table A4*)	**Potential changes in stream channel conditions** (Table A5*)	**Potential changes in riparian area conditions** (Table A6*)	**Potential effects related to impacts from past catastrophic events** (Table A7*)	**Proposed change in road density miles/mile^2** (Table A8*)	**Proposed change in road density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Potential change in management-related stream sedimentation** (Table A10*)	**Potential effect on water quality problems other than sedimentation** (Table A11*)
AU0218	0	<1	<1	0	positive	positive	0	-0.2	-2.0	positive	0
AU0360	<1	1	<1	0	positive	positive	0	-0.2	-0.6	positive	0
AU0363	<1	0	<1	0	positive	positive	0	+<0.1	0	0	0
LA0127	0	0	<1	0	positive	positive	0	- 0.1	0	positive	0
LA0130	<1	0	1	<1	positive	positive	0	+0.2	-0.4	positive	0
LA0145	0	0	<1	0	0	0	negative	+0.1	+1.8	0	0
LA0203	<1	0	1	0	positive	positive	positive	+0.1	0	negative	0
LA0206	<1	0	1	<1	positive	positive	0	+0.3	-2.1	positive	0
LA0209	<1	0	2	0	positive	positive	0	-1.0	-3.1	positive	0
LA0212	0	0	<1	0	positive	positive	0	0	0	0	0
LA0215	<1	0	<1	0	positive	positive	0	+0.1	0	0	0
LA0218	<1	0	1	0	positive	positive	0	-1.1	-6.1	positive	0
LA0221	<1	0	1	0	positive	positive	0	+0.5	0	positive	0
LA0327	<1	3	<1	0	positive	positive	0	+0.2	0	positive	0
LA0330	<1	2	1	0	positive	positive	0	+1.1	+1.8	positive	0
LA0403	<1	0	1	0	positive	0	0	+0.2	0	positive	0
LA0406	<1	13	1	0	positive	positive	0	-0.5	-1.4	positive	0
LA0409	0	0	1	0	positive	0	0	-0.2	0	positive	0
LA0439	<1	0	<1	0	0	0	0	+0.1	0	0	0
LA0442	<1	0	<1	0	positive	positive	0	-0.1	0	positive	0
LA0445	<1	0	<1	0	positive	positive	0	+0.2	-1.5	positive	0

* The referenced tables and supporting analysis are contained in Appendix A.

Overall road density would decrease with implementation of Alternative 2 (Table 4-H-5 column 9). However, road density would increase in 12 drainages, decline in 8 drainages, and remain unchanged in one drainage (Table 4-H-5 column 9). With a few exceptions, roadwork under this alternative would better disconnect roads from the stream system by renovating existing roads, decommissioning roads, and relocating portions of the transportation system higher on ridges, away from streams. Road renovation would include fixing erosion and drainage problems, rocking roads, and installing larger cross drains or drainage dips where needed. Undersized stream and draw culverts would be replaced with crossings capable of passing the flow, bedload and debris expected in a 100-year flood event (size of storm with a 1 percent probability of occurring in any given year), and fixing other road drainage or erosion problems encountered. Many stream crossings that are currently natural surface (dirt) would be rocked, reducing surface erosion from that source. The road renovation and decommissioning would have positive benefits

from a hydrologic/sediment delivery standpoint, helping to control and prevent road-related runoff and sediment production. This is one of the most important components of a watershed restoration program under the Aquatic Conservation Strategy (USDI 1995:23). BLM's management direction under the watershed restoration portion of the Aquatic Conservation Strategy is to focus on removing and upgrading roads (USDI 1995:23) (Also see Chapter I, Purpose and Need).

Although road density would increase in some drainages, a better picture of the effects to the stream system is gained by looking at the changes to road density within the Riparian Reserves of each drainage (Table 4-H-5 column 10). Roads in the Riparian Reserves are located very close to the streams themselves, often crossing the stream, so changes in the amount and condition of roads within Reserves can make a major difference in the potential impacts. Under Alternative 2, road density in Riparian Reserves would be reduced in eight drainages (Table 4-H-5 column 10). The reductions would be dramatic in several drainages, including a reduction of two(2) miles per square mile of Riparian Reserve in the Applegate River between Beaver Creek and Star Gulch (AU0218), 2.1 miles per square mile reduction in Rush Creek (LA0206), 3.1 miles per square mile reduction in the Little Applegate River between Rush Creek and Birch Creek (LA0209), 6.1 miles per square mile reduction in Lick Gulch (LA0218), and 1.4 miles per square mile reduction in Grouse Creek (LA0406). Although there would be no reduction in Riparian Reserve road densities in some drainages such as the Little Applegate River between Water Gulch and First Water Gulch (LA0127), road densities would be reduced in the uplands (Table 4-H-5 column 9).

Drainages with high Riparian Reserves Road densities (Table 4-H-2 column 11) and no proposed reduction in road miles along the stream (Table 4-H-5 column 10)(for example Waters Gulch – LA0327) would still have road work to reduce the interaction of the road with the stream, including larger culverts and road renovation to reduce road drainage impacts (see Appendix A discussion for the *High Sedimentation Potential* and *High Road Density* risk factors for each drainage). The density of roads in BLM Riparian Reserves would increase in two drainages: Glade Creek between Garvin Gulch and confluence with the Little Applegate River (LA0145) and Yale Creek between Waters Gulch and the confluence with the Little Applegate River (LA0330)(Table 4-H-5 column 10). In lower Glade Creek (LA0145), the road density increase is deceiving due to the very small acreage of BLM lands in the drainage; only 0.1 mile of road would be constructed in Riparian Reserve, with another 0.3 miles in the uplands(Appendix A *High Road Density* risk factor discussion for drainage LA0145). There would be no new stream crossings in this lower Glade Creek drainage (LA0145)(Appendix A *High Sedimentation Potential* risk factor discussion for drainage LA0145). The new road construction would be at the top edge of the Riparian Reserve as shown on the map. There would be a slight risk that road construction could transport sediment downslope to the stream system. The risk would primarily be from severe summer thunderstorms if they occurred during the road construction phase, prior to completion of the road rocking and installation of the drainage features designed to prevent channelization of flow. Apart from this risk, a well-designed road and full implementation of the Chapter 2 Project Design Features would reduce the risk of stream sedimentation to very low levels. Any sediment that did make its way to the stream system in a severe storm would be transported only a short distance downslope. The same peakflow event that could trigger any sediment delivery to the stream would be so large that it would only be a short distance before the sediment would be deposited on streambanks or adjacent small floodplains in the first downstream depositional reaches which occur along Glade Creek, but which may also be present along Mule Gulch in the first mile downstream of the project. Any visible sedimentation impacts would occur within the first few hundred feet downslope of the road construction, prior to the point that the draw develops a defined channel. Any further downslope, there would no incremental increase in sediment transport over background levels, making any sediment input from the road indiscernible. There would be no change in sedimentation at the mouth of Glade Creek. In Yale Creek between Waters Gulch and the Little Applegate River (LA0330), road density both in the uplands and in Riparian Reserves would increase (Table 4-H-5, columns 9 and 10). A major portion of this increase is due to the reopening of a previously decommissioned road in First Water Gulch (Yale Creek tributary), indicated on project maps as an existing road being renovated. Although this road is

currently identified in the BLM GIS system as “decommissioned”, this road was merely closed with an inadequate barricade. No actual “putting the road to bed” work was done, such as removing fill at draw crossings or waterbarring the road. Consequently, vehicles resumed driving this road, and some erosion problems developed. Reopening and renovating this road would actually reduce potential sediment and flow-related impacts, as the road surface would be stabilized and existing drainage problems fixed.

With an overall reduction in road density (Table 4-H-5 column 9), reduction of Riparian Reserve road density in many drainages (Table 4-H-5 column 10), removal of numerous stream crossings and more disconnection of roads from the stream network (Appendix A discussion for the *High Sedimentation Potential* risk factor for each drainage), there would be less rapid delivery of storm runoff directly to streams from roads. Peak flows from roads would be reduced. These improvements to roads are important because roads alter the hydrologic network and may increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Roads can change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime, causing adverse effects on the aquatic system. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads with a properly functioning drainage system would 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. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams. (USDI 1998). Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119). Instream sedimentation conditions related to roads and harvest would improve or remain unchanged in most drainages (Table 4-H-5 column 11). An exception to this would be the Little Applegate River stream ford renovation and hauling on road 39-1-30.0 in drainage LA0203, between Glade Creek and Rush Creek, which would not benefit stream sedimentation conditions (Table 4-H-5 column 11). Following implementation of Alternative 2, sediment input at this stream ford would be less than pre-project levels, due to the rocking and drainage improvement of the currently natural surface road at the ford. However, the process of renovation and hauling across the stream ford under Alternative 2 could deliver approximately 3 cubic yards of fine sediment directly to the river during implementation of the project along with some minor channel modification associated with the stream ford renovation (Squyres and Smith 2005). Fine sediment input from this activity would contribute to maintenance of degraded habitat conditions in the River, but would probably not be sufficiently different from background fine sediment levels to trigger any changes in overall stability or condition (Appendix A *Stream Channel Condition* and *High Sedimentation Potential* risk factor discussions for Drainage LA0203).

Large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation. Compacted area due to harvest and roads would increase in both drainages where compaction was identified as a concern (Table 4-H-5 column 4). In Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (LA0145), construction of 0.4 miles of road would increase compacted area by about 1 acre for a total of about 1 acre compacted as a result of the project (Table 4-H-5 column 4). Combined with existing compacted area, overall compaction would minimally increase as the result of the proposed project and

remain at approximately 11 percent of the drainage. No mechanical road decommissioning is proposed. The potential impact to streams from this road construction was described in the preceding paragraphs. In Waters Gulch (LA0327), tractor yarding utilizing designated skid roads on about 2 acres would potentially increase compacted area by less than one-half acre, 24 acres of cable yarding would increase compacted area by 1 acre, and construction of 0.7 miles of road would increase compacted area by 2 acres, for a total of about 3 acres compacted as a result of the project (Table 4-H-5 column 4). Combined with existing compacted area, overall compaction on BLM lands would increase as the result of the proposed project and total compacted area in the drainage would remain at approximately 14 percent of the drainage. No mechanical road decommissioning is proposed. The area where the compaction would occur is located high on a ridge far from Riparian Reserves. Given the small amount of change and the location high on a ridge, additional flow or sediment would not reach streams from the area proposed for work.

There would be little new disturbance on highly erodible soils (Table 4-H-5, column 3) in any of the drainages under this alternative, and this disturbance would not impact streams (see Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage). Disturbance on highly erodible soils is another potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Potentially unstable areas were identified in a number of dry draws in many of the drainages, as well as a large area on the north face of the ridge locally known as Trillium Mountain in drainage LA0215, Little Applegate River between Birch Creek and Lick Gulch. These potentially unstable areas have been designated as Riparian Reserves, per the direction in the RMP (USDI 1995:27). Unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. See the *Soils* discussion for more information regarding highly erodible soils and unstable areas.

Conditions related to past catastrophic events would not be an issue in most drainages; however, there would be a slight decline in condition in Glade Creek between Garvin Gulch and the confluence with the Little Applegate River area (LA0145) burned in the 2001 Quartz Fire (Table 4-H-5 column 8). There would be 0.4 miles of new road construction high on the ridge above Mule Gulch in this drainage (Appendix A Alternative 2 *High Road Density* and *High Sedimentation Potential* discussions for Drainage LA0145). This construction would be within the burned area, at the top of dry draws that (pre-fire) were identified as having some instability (USDI 2004a) and were therefore identified as Riparian Reserve. Construction of a road at this location would increase the risk of a slope failure or failure of the colluvial deposits in the dry draws downslope of the road if any flow is channeled from the road into the draws; this risk would decrease over the next few years as vegetation continues to recover in the draws, providing more stability. An engineered design and implementation of the Project Design Features (Chapter 2) and BMPs (USDI 1995:Appendix D) would help prevent negative impacts; however, the risk of a slope failure would still be increased as compared to the “No Action” alternative. A slope failure along this proposed road would be unlikely to travel very far downslope due to the fairly gentle topography.

The amount of area in nonrecovered openings within the Transient Snow Zone was identified as a current condition concern in LA0145 Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (Table 4-H-2 columns 5 and 6). The Transient Snow Zone is of interest to land managers since greater snow accumulation can occur in clearings, producing the potential for higher peak flows during rain-on-snow events. Under Alternative 2, there would be no vegetation treatments proposed in this drainage (LA0145), so there would be no effect on transient snow zone openings from that source. The proposed road construction would also not create new openings, because the area of construction is already open due to the recent stand-replacement fire. However, construction of the road would convert that area into a permanent nonrecovered transient snow zone opening rather than one that would gradually recover over time (Table 4-H-5 column 5). Small areas of new Transient Snow Zone openings would be created as part of road construction activities in First Water Gulch (LA0130) and Rush Creek (LA0206); the total

amount of nonrecovered openings would remain far below the level of concern within these drainages (compare Table 4-H-5 column 5 to Table 4-H-2 columns 5 and 6), so there would be no changes to water quantity or quality due to transient snow zone issues.

Implementation of Alternative 2 would have a positive effect on stream channel conditions in most drainages; in the remaining drainages there would be no change in stream channel conditions (Table 4-H-5 column 6). Stream channels would be protected within Riparian Reserves (Chapter 2 Project Design Features). At various locations, decommissioning of stream crossings and streamside roads and road renovation at stream crossings, including drainage improvements and replacement of undersized culverts, would decrease the likelihood of incurring negative effects to stream channels from increased peak flows or sediment delivery (see Appendix A risk factor discussions for *High Sedimentation Potential*, *High Road Density*, and *Stream Channel Condition* for each drainage). Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel.

Under Alternative 2, riparian areas would continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS) (USDI 1995:22-23). As previously discussed, road renovation and road decommissioning in some Riparian Reserves would likely decrease some road-related impacts. To meet the RMP direction that silvicultural practices are to be applied to Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS and Riparian Reserve objectives (USDI 1995:27), Alternative 2 would implement vegetation treatments in some Riparian Reserves, allowing trees to gain late successional characteristics more quickly as well as increasing the chances that the riparian stands would be better adapted to occurrences of low intensity fire and other natural or prescribed disturbance. These treatments would generally be done within the Reserves that represent the least desirable current conditions (typically overstocked or very young stands). The treatments proposed under Alternative 2 are important because they would help promote desired conditions in the Reserves of many of the drainages (Table 4-H-5 column 7; Appendix A *Riparian Areas* Alternative 2 discussion for each of the drainages); riparian areas need to be in a condition where adequate vegetation, landform, or woody debris is present to: dissipate stream energy during high flow events to reduce erosion and improve water quality; filter sediment, capture bedload, and aid in floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and to support greater biodiversity (USDI/USDA 1998). When adequate vegetation, landform, or woody debris is not present along a stream, proper functioning of the physical processes listed above is compromised.

There is no activity proposed under this alternative that would result in anthropogenic-caused heating of streams (ODEQ 2003b:2) or cause other adverse effects to water quality (Table 4-H-5 column 12; Appendix A *Clean Water Act* risk factor discussion for each drainage), except for localized sediment/turbidity increases due to renovation and use of a stream ford in the Little Applegate River (Table 4-H-5 column 11)(see earlier sedimentation discussion regarding the ford in this *Alternative 2 Direct/Indirect Effects section*). This stream ford (on non-BLM lands, on a road not controlled by BLM) has been in place and has been used for many years, so the impacts identified for this project do not represent a long-term change from the current condition. Implementation of Best Management Practices (USDI 1995:Appendix D), other Project Design Features (Chapter 2), and protection of Riparian Reserves would enable the Project to avoid violation of the Clean Water Act. Under Alternative 2, riparian areas would continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS)

(USDI 1995:22-23). This alternative draws upon the passive and active restoration management actions recommended for achieving federal recovery goals as identified in the *Water Quality Restoration Plan for the Applegate Subbasin* (USDI/USDA 2005:45-47). Natural influences on water quality would continue. There would be no removal of streamside vegetation, roads would not be constructed with drainage systems that route flow directly to streams, existing road drainage problems would be fixed, and project design features/best management practices (including Riparian Reserves) would be implemented to minimize any adverse effects on water quality (USDI 1994:4-23).

There would be no net change in road mileage in the Little Applegate River Key Watershed (USDI 1995:87; USDI 1995:Appendix A, page B-19)(Compare Alternative 2 road construction and decommissioning in Appendix A *High Road Density* risk factor discussion for LA0127 and LA0130). No activity related to roads is proposed for the portions of the Key Watershed located on BLM lands in drainages LA0124 and LA0133 (see the discussion titled "*Project Components not Assessed in Detail for Hydrology/Water Resources"* earlier in the Hydrology/Water Resources section of this chapter). Approximately 0.8 miles of new road would be constructed in the First Water Gulch drainage (LA0130), while approximately 0.8 miles of road would be decommissioned in the First Water Gulch (LA0130) and Little Applegate River between Water Gulch and First Water Gulch (LA0127) drainages (Appendix A *High Road Density* and *High Sedimentation Potential* risk factor discussions for drainages LA0127 and LA0130) . All of the new road construction would be located further up the ridge, further away from any Riparian Reserves. The road decommissioning would eliminate a road within a Riparian Reserve, including a road crossing on a stream. The decommissioning would include measures to decrease the hydrologic impact of the road grade, such as ripping, removal of culverts and fill material out of stream channels, and installation of waterdips to eliminate channelization of flow and flow delivery to streams during storm events (Chapter 2 Project Design Features). Decommissioning would not be just a road closure with a gate or barricade (USDI 1995:Appendix A, page B-19), but rather, a permanent removal of the road, disconnecting the road drainage from the stream network. The project would meet the minimum Key Watershed requirement of equal amounts of road decommissioning for any new road construction (USDI 1995:Appendix A, page B-19).

Hydrology/Water Resources: Alternative 3 Direct and Indirect Effects

Table 4-H-6: Alternative 3 Proposed Changes in Risk Factors by Drainage

Drainage (Chapter 3 Table 3-H-1)	**percent of drainage proposed for intensive timber harvest** (Table A2*)	**Acres proposed new disturbance on highly erodible/unstable soils** (Table A1*)	**percent proposed new compacted area** (Table A3*)	**percent proposed new transient snow zone openings** (Table A4*)	**Potential changes in stream channel conditions** (Table A5*)	**Potential changes in riparian area conditions** (Table A6*)	**Potential effects related to impacts from past catastrophic events** (Table A7*)	**Proposed change in road density miles/mile^2** (Table A8*)	**Proposed change in road density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Potential change in management-related stream sedimentation** (Table A10*)	**Potential effect on water quality problems other than sedimentation** (Table A11*)
AU0218	0	<1	<1	0	positive	positive	0	-0.2	-2.0	positive	0
AU0360	<1	1	<1	0	positive	positive	0	-0.2	-0.6	positive	0
AU0363	<1	0	<1	0	positive	positive	0	+<0.1	0	0	0
LA0127	0	0	<1	0	positive	positive	0	- 0.1	0	positive	0
LA0130	<1	0	1	<1	positive	positive	0	- 0.1	-0.4	positive	0
LA0145	0	0	<1	0	0	0	negative	+0.1	+1.8	0	0
LA0203	<1	0	1	0	positive	positive	positive	+0.1	0	negative	0
LA0206	<1	0	1	<1	positive	positive	0	+0.3	-2.1	positive	0
LA0209	<1	0	2	0	positive	positive	0	-1.0	-3.1	positive	0
LA0212	0	0	<1	0	positive	positive	0	0	0	0	0
LA0215	0	0	<1	0	positive	positive	0	0	0	0	0
LA0218	<1	0	1	0	positive	positive	0	-1.7	-7.1	positive	0
LA0221	<1	0	1	0	positive	positive	0	+0.1	0	positive	0
LA0327	0	1	<1	0	positive	positive	0	0	0	positive	0
LA0330	<1	1	1	0	positive	positive	0	+1.0	+1.8	positive	0
LA0403	<1	0	1	0	positive	0	0	+0.1	0	positive	0
LA0406	<1	13	1	0	positive	positive	0	-0.5	-1.4	positive	0
LA0409	0	0	1	0	positive	0	0	-0.2	0	positive	0
LA0439	0	0	<1	0	0	0	0	0	0	0	0
LA0442	<1	0	<1	0	positive	positive	0	-0.1	0	positive	0
LA0445	<1	0	<1	0	positive	positive	0	+0.2	-1.5	positive	0

* The referenced tables and supporting analysis are contained in Appendix A.

Alternative 3 would have similar effects on water resources as Alternative 2 (compare Table 4-H-6 to Table 4-H-5); discussion of the differences between Alternative 3 and Alternative 2 follows. Overall road density would decrease even further with implementation of Alternative 3 (compare Table 4-H-6 column 9 to Table 4-H-5 column 9). However, this would make very little difference from a water resources standpoint, because road density within Riparian Reserves would remain identical to that proposed under Alternative 2, except in the LA0218 Lick Gulch drainage (compare Table 4-H-6 column 10 to Table 4-H-5 column 10).

In Lick Gulch, Riparian Reserve road density would be decreased by another 1 mile per square mile due to less new road construction and more decommissioning, for an overall reduction of 7.1 miles per square mile (Table 4-H-6 column 10). This would reduce road impacts on peak flows and sedimentation in Lick Gulch even beyond that already discussed under Alternative 2 (Appendix A *High Road Density* and *High Sedimentation Potential* risk factor discussions for Alternative 3 in drainage LA0218). This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel. Alternative 3 reductions in road construction in some of the other drainages would all occur outside of Riparian Reserves at locations that have very little chance of impacting streams in the first place. New road construction would be dropped completely in Lower Sterling Creek (LA0439), Waters Gulch (LA0327), and the Little Applegate River between Birch Creek and Lick Gulch (LA0215). Compared to the "No Action" alternative (Table 4-H-4 column 9), overall road density would increase in 8 drainages, decline in 9 drainages, and remain unchanged in 4 drainages (Table 4-H-6 column 9).

Compacted area due to road construction in Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (LA0145) would be identical to Alternative 2 (compare Table 4-H-6 column 4 to Table 4-H-5 column 4), but in Waters Gulch (LA0327), the new road construction would be dropped, and the tractor yarding and most of the cable yarding would be replaced with helicopter yarding, reducing the proposed new compaction to very low levels (Appendix A *Compacted Area* risk factor discussion for Alternative 3 in LA0327) and reducing the already-small amount of proposed disturbance on highly erodible soils even further (see additional discussion in following paragraph). This is important because large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation. There would probably be no real change in impacts to streams as compared to Alternative 2, because the area where the road and ground-based yarding would have occurred under Alternative 2 is located high on a ridge far from Riparian Reserves. Given the small amount of change and the location high on a ridge, changes in flow or sediment would not reach streams from the area proposed for work.

There would be little new disturbance on highly erodible soils (Table 4-H-6, column 3) in any of the drainages under this alternative, slightly less than under Alternative 2 (Table 4-H-5 column 3), and this disturbance would not impact streams (see Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage). Disturbance on highly erodible soils is another potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Potentially unstable areas were identified in a number of dry draws in many of the drainages, as well as a large area on the north face of the ridge locally known as Trillium Mountain in drainage LA0215, Little Applegate River between Birch Creek and Lick Gulch. These potentially unstable areas have been designated as Riparian Reserves, per the direction in the RMP (USDI 1995:27). Unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. See the *Soils* discussion for more information regarding highly erodible soils and unstable areas.

There would be a net decrease in road mileage in the Little Applegate River Key Watershed under Alternative 3 (USDI 1995:87; USDI 1995:Appendix A, page B-19)(Appendix A Alternative 3 High Road Density discussion for drainages LA0127 and LA0130). No activity related to roads is proposed for the portions of the Key Watershed located on BLM lands in drainages LA0124 or LA0133 (see the discussion titled "*Project Components not Assessed in Detail for Hydrology/Water Resources*" earlier in the Hydrology/Water Resources section of this chapter). Approximately 0.2 miles of new road would be

constructed in the First Water Gulch drainage (LA0130)(0.6 miles less than under Alternative 2), while approximately 0.8 miles of road would be decommissioned in the First Water Gulch (LA0130) and Little Applegate River between Water Gulch and First Water Gulch (LA0127) drainages (same amount as Alternative 2)(Appendix A *High Road Density* and *High Sedimentation Potential* risk factor discussions for drainages LA0127 and LA0130). The small amount of new road construction would be located further up the ridge, away from any Riparian Reserves. The road decommissioning would eliminate a road within a Riparian Reserve, including a road crossing on a stream. The decommissioning would include measures to decrease the hydrologic impact of the road grade, such as ripping, removal of culverts and fill material out of stream channels, and installation of waterdips to eliminate channelization of flow and flow delivery to streams during storm events (Chapter 2 Project Design Features). Decommissioning would not be just a road closure with a gate or barricade (USDI 1995:Appendix A, page B-19), but rather, a permanent removal of the road, disconnecting the road drainage from the stream network. The project would meet the Key Watershed direction to reduce road mileage through decommissioning (USDI 1995:Appendix A, page B-19); road mileage within the Key Watershed would decrease by 0.6 miles with implementation of Alternative 3 (Compare Alternative 3 road construction and decommissioning in Appendix A *High Road Density* risk factor discussion for LA0127 and LA0130).

Hydrology/Water Resources: Alternative 4 Direct and Indirect Effects

Table 4-H-7: Alternative 4 Proposed Changes in Risk Factors by Drainage

Drainage (Chapter 3 Table 3-H-1)	**percent of drainage proposed for intensive timber harvest** (Table A2*)	**Acres proposed new disturbance on highly erodible/unstable soils** (Table A1*)	**percent proposed new compacted area** (Table A3*)	**percent proposed new transient snow zone openings** (Table A4*)	**Potential changes in stream channel conditions** (Table A5*)	**Potential changes in riparian area conditions** (Table A6*)	**Potential effects related to impacts from past catastrophic events** (Table A7*)	**Proposed change in road density miles/mile^2** (Table A8*)	**Proposed change in road density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Potential change in management-related stream sedimentation** (Table A10*)	**Potential effect on water quality problems other than sedimentation** (Table A11*)
AU0218	0	<1	<1	0	positive	positive	0	-0.2	-2.0	positive	0
AU0360	<1	1	<1	0	positive	positive	0	-0.2	-0.6	positive	0
AU0363	<1	0	<1	0	positive	positive	0	+<0.1	0	0	0
LA0127	0	0	<1	0	positive	positive	0	- 0.1	0	positive	0
LA0130	<1	0	1	<1	positive	positive	0	+0.2	-0.4	positive	0
LA0145	0	0	0	0	0	0	0	0	0	0	0
LA0203	<1	0	<1	0	0	positive	positive	+0.1	0	negative	0
LA0206	<1	0	1	<1	positive	positive	0	+0.3	-2.1	positive	0
LA0209	0	0	<1	0	positive	positive	0	0	0	0	0
LA0212	0	0	<1	0	positive	negative	0	0	0	0	0
LA0215	0	0	0	0	negative	negative	0	0	0	0	0
LA0218	0	0	0	0	negative	negative	0	0	0	0	0

LA0221	0	0	0	0	negative	negative	0	0	0	0	0
LA0327	0	0	0	0	negative	negative	0	0	0	0	0
LA0330	0	0	0	0	negative	0	0	0	0	0	0
LA0403	0	0	<1	0	positive	0	0	+0.2	0	0	0
LA0406	<1	2	<1	0	negative	positive	0	-0.4	0	positive	0
LA0409	0	0	1	0	positive	0	0	-0.2	0	positive	0
LA0439	0	0	<1	0	0	0	0	0	0	0	0
LA0442	<1	0	<1	0	positive	positive	0	-0.1	0	positive	0
LA0445	<1	0	<1	0	positive	positive	0	+0.2	-1.5	positive	0

* The referenced tables and supporting analysis are contained in Appendix A.

Overall road density would decrease slightly with implementation of Alternative 4 (Table 4-H-7 column 9). Road density would increase in 6 drainages, decline in 6 drainages, and remain unchanged in 9 drainages (Table 4-H-7 column 9). With a few exceptions, roadwork under this alternative would better disconnect some roads from the stream system by renovating existing roads, decommissioning roads, and relocating portions of the transportation system higher on ridges, away from streams, although the extent of this work would be much more limited than under Alternative 2 or Alternative 3 (compare differences between alternatives in the Appendix A risk factor discussions for *High Sedimentation Potential* and *High Road Density* for each drainage). Road renovation would include fixing erosion and drainage problems, rocking roads, and installing more and larger cross drains or drainage dips where needed (Chapter 2 Project Design Features). Undersized stream and draw culverts would be replaced with crossings capable of passing the flow, bedload and debris expected in a 100-year flood event (size of storm with a 1 percent probability of occurring in any given year), and fixing other road drainage or erosion problems encountered. Many stream crossings that are currently natural surface (dirt) would be rocked, reducing surface erosion from that source (Appendix A *High Sedimentation Potential* risk factor discussion for each drainage). The road renovation and decommissioning would generally have positive benefits from a hydrologic/sediment delivery standpoint, helping to control and prevent road-related runoff and sediment production. This is one of the most important components of a watershed restoration program under the Aquatic Conservation Strategy (USDI 1995:23). BLM's management direction under the watershed restoration portion of the Aquatic Conservation Strategy is to focus on removing and upgrading roads (USDI 1995:23) (Also see Chapter I, Purpose and Need). There are a number of drainages where road improvements that would have reduced stream sedimentation potential under Alternatives 2 and 3 would not be done or would be much less extensive under Alternative 4 (compare Alternatives 2,3, and 4 in Appendix A *High Sedimentation Potential* and *High Road Density* risk factor discussions for each drainage); these include the Little Applegate River between Rush Creek and Birch Creek (LA0209), Lick Gulch (LA0218), Little Applegate River between Lick Gulch and Yale Creek (LA0221), Waters Gulch (LA0327), Yale Creek between Waters Gulch and the confluence with the Little Applegate River (LA0330), the Little Applegate River between Yale Creek and Grouse Creek (LA0403), and Grouse Creek (LA0406).

Although road density would increase in some drainages (Table 4-H-7 column 9), a better picture of the effects to the stream system is gained by looking at the changes to road density within the Riparian Reserves of each drainage (Table 4-H-7 column 10). Roads in the Riparian Reserves are located very close to the streams themselves, often crossing the stream, so changes in the amount and condition of roads within Reserves can make a major difference in the potential impacts. Under Alternative 4, there would be no increased road density in the Riparian Reserves of any drainage (Table 4-H-7 column 10). Road density in Riparian Reserves would be reduced in five drainages (Table 4-H-7 column 10). The reductions would be dramatic in several drainages, including a reduction of two (2) miles per square mile of Riparian Reserve in the Applegate River between Beaver Creek and Star Gulch (AU0218) and 2.1 miles per square mile reduction in Rush Creek (LA0206)(Table 4-H-7 column 10). Unlike Alternatives 2 or 3, there would be no reduction in Riparian Reserve road density in Lick Gulch (AU0218), in the Little Applegate River between Rush Creek and Birch Creek (LA0209), or in Grouse Creek (LA0406)(compare Table 4-H-7 column 10 to Table 4-H-5 column 10 and Table 4-H-6 column 10). As a result, benefits from reductions in road density would be substantially less under this alternative compared to Alternative 2 or Alternative 3.

Unlike Alternative 2 or Alternative 3, the density of roads in BLM Riparian Reserves would not increase in Glade Creek between Garvin Gulch and confluence with the Little Applegate River (LA0145) and Yale Creek between Waters Gulch and the confluence with the Little Applegate River (LA0330); in fact, no actions would occur in these drainages, as well as in another drainage where high Riparian Reserve road densities were a concern, Water Gulch (LA0327)(compare Table 4-H-7 column 10 to Table 4-H-5 column 10 and Table 4-H-6 column 10 for these drainages).

Like Alternatives 2 and 3, the Little Applegate River stream ford renovation and hauling on road 39-1-30.0 in drainage LA0203, between Glade Creek and Rush Creek would not benefit stream sedimentation conditions. Following implementation of Alternative 4, sediment input at this stream ford would be less than pre-project levels, due to the rocking and drainage improvement of the currently natural surface road at the ford. However, the process of renovation and hauling across the stream ford under Alternative 4 could deliver approximately 3 cubic yards of fine sediment directly to the river during implementation of the project along with some minor channel modification associated with the stream ford renovation (Squyres and Smith 2005). Fine sediment input from this activity would contribute to maintenance of degraded habitat conditions in the River, but would probably not be sufficiently different from background fine sediment levels to trigger any changes in overall stability or condition.

With an overall reduction in road density (Table 4-H-7 column 9), reduction of Riparian Reserve road density in some drainages (Table 4-H-7 column 10), removal of some stream crossings and more disconnection of roads from the stream network (Appendix A Alternative 4 discussion for the *High Sedimentation Potential* risk factor for each drainage), there would be less rapid delivery of storm runoff directly to streams from roads. Overall, peak flows from roads would be reduced, although the reduction would be substantially less than under Alternative 2. The condition of roads is very important hydrologically because roads alter the hydrologic network and may increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams. (USDI 1998). Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119). Roads can also be a concern if they change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime, causing adverse effects on the aquatic system. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads with a properly functioning drainage system would 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.

Under Alternative 4, there would be no increase in compacted area in either of the drainages where compaction was identified as a concern, Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (LA0145), and Waters Gulch (LA0327)(compare Table 4-H-7 column 4 to Table 4-H-2 column 4). This is important because large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of

compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation.

There would be very little new disturbance on highly erodible soils (Table 4-H-7, column 3) in any of the drainages under this alternative, less than either Alternative 2 or Alternative 3, and this disturbance would not impact streams (see Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage). Disturbance on highly erodible soils is another potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Potentially unstable areas were identified in a number of dry draws in many of the drainages, as well as a large area on the north face of the ridge locally known as Trillium Mountain in drainage LA0215, Little Applegate River between Birch Creek and Lick Gulch. These potentially unstable areas have been designated as Riparian Reserves, per the direction in the RMP (USDI 1995:27). Unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. See the *Soils* discussion for more information regarding highly erodible soils and unstable areas.

Conditions related to past catastrophic events would not be an issue under Alternative 4 (Table 4-H-7 column 8); a road of concern under Alternatives 2 and 3 proposed in Glade Creek between Garvin Gulch and the confluence with the Little Applegate River area (LA0145) that burned in the 2001 Quartz Fire would not be constructed under Alternative 4 (Appendix A *High Sedimentation Potential* and *High Road Density* risk factor discussion for LA0145).

The amount of area in nonrecovered openings within the Transient Snow Zone was identified as a current condition concern in LA0145 Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (Table 4-H-2 columns 5 and 6; Appendix A *Compacted Area* risk factor discussion for LA0145). The Transient Snow Zone is of interest to land managers since greater snow accumulation can occur in clearings, producing the potential for higher peak flows during rain-on-snow events. Under Alternative 4, there would be no activities proposed in this drainage (LA0145), so there would be no effect on transient snow zone openings (Table 4-H-7 column 5). Small areas of new Transient Snow Zone openings would be created as part of road construction activities in First Water Gulch (LA0130) and Rush Creek (LA0206); the total amount of nonrecovered openings would remain far below the level of concern within these drainages (compare Table 4-H-7 column 5 to Table 4-H-2 columns 5 and 6), so there would be no changes to water quantity or quality due to transient snow zone issues.

Implementation of Alternative 4 would have a positive effect on stream channel conditions in many drainages; however, the effect of “no action” being taken under Alternative 4 in a number of drainages would maintain current negative stream channel conditions in six drainages that would have seen improvement under Alternative 2: the Little Applegate River between Birch Creek and Lick Gulch (LA0215), Lick Gulch (LA0218), Little Applegate River between Lick Gulch and Yale Creek (LA0221), Waters Gulch (LA0327), Yale Creek between Waters Gulch and confluence with the Little Applegate River (LA0330), and Grouse Creek (LA0406)(Table 4-H-7 column 6). All stream channels on BLM administered lands would be protected within Riparian Reserves. At various locations, decommissioning of stream crossings and streamside roads and road renovation at stream crossings, including drainage improvements and replacement of undersized culverts, would decrease the likelihood of incurring negative effects to stream channels from increased peak flows or sediment delivery where such improvements are made (Appendix A *Stream Channel Conditions*, *High Sedimentation Potential* and *High Road Density* risk factor discussions). This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel.

Under Alternative 4, riparian areas would generally continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS) (USDI 1995:22-23). However, the effect of "no action" being taken under Alternative 4 in a number of drainages would maintain current declining riparian conditions in six drainages that would have seen improvement under Alternative 2: the Little Applegate River between Birch Creek and Lick Gulch (LA0215), Lick Gulch (LA0218), Little Applegate River between Lick Gulch and Yale Creek (LA0221), Waters Gulch (LA0327), Yale Creek between Waters Gulch and confluence with the Little Applegate River (LA0330), and Grouse Creek (LA0406)(Table 4-H-7 column 7). As previously discussed, road renovation and road decommissioning in some Riparian Reserves would likely decrease some road-related impacts (Appendix A *High Road Density* and *High Sedimentation Potential* risk factor discussions for each drainage). To meet the RMP direction that silvicultural practices are to be applied to Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS and Riparian Reserve objectives (USDI 1995:27), Alternative 4 would implement vegetation treatments in Riparian Reserves in some drainages helping lead to improving riparian conditions (Table 4-H-7 column 7), allowing trees to gain late successional characteristics more quickly as well as increasing the chances that the riparian stands would be better adapted to occurrences of low intensity fire and other natural or prescribed disturbance. These treatments would generally be done within the Reserves that represent the least desirable current conditions (typically overstocked or very young stands). The treatments proposed under Alternative 4 are important because they would help promote desired conditions in the Reserves of many of the drainages; riparian areas need to be in a condition where adequate vegetation, landform, or woody debris is present to: dissipate stream energy during high flow events to reduce erosion and improve water quality; filter sediment, capture bedload, and aid in floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and to support greater biodiversity (USDI/USDA 1998). When adequate vegetation, landform, or woody debris is not present along a stream, proper functioning of the physical processes listed above is compromised.

There is no activity proposed under this alternative that would result in anthropogenic-caused heating of streams in this drainage (ODEQ 2003b:2) or cause other adverse effects to water quality (Table 4-H-7 column 12) except for localized sediment/turbidity increases due to renovation and use of a stream ford in the Little Applegate River (Table 4-H-7 column 11)(see earlier sedimentation discussion regarding the ford in this *Alternative 4 Direct/Indirect Effects section*). This stream ford (on non-BLM lands, on a road not controlled by BLM) has been in place and has been used for many years, so the impacts identified for this project do not represent a long-term change from the current condition. Implementation of Best Management Practices (USDI 1995:Appendix D), other Project Design Features (Chapter 2), and protection of Riparian Reserves would enable the Project to avoid violation of the Clean Water Act. Under Alternative 4, riparian areas would continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS)(USDI 1995:22-23) at all locations where activity is taking place. This alternative draws upon the passive and active restoration management actions recommended for achieving federal recovery goals as identified in the *Water Quality Restoration Plan for the Applegate Subbasin* (USDI/USDA 2005:45-47). Natural influences on water quality would continue. There would be no removal of streamside vegetation, roads would not be constructed with drainage systems that route flow directly to streams, some of the existing road drainage problems would be fixed, and project design features/best management practices (including Riparian Reserves) would be implemented to minimize any adverse effects on water quality (USDI 1994:4-23).

There would be no net change in road mileage in the Little Applegate River Key Watershed (USDI 1995:87; USDI 1995:Appendix A, page B-19)(Appendix A High Road Density discussion for drainages LA0127 and LA0130). No activity related to roads is proposed for the portions of the Key Watershed located on BLM lands in drainages LA0124 and LA0133 (see "*Project Components not Assessed in Detail*

for Hydrology/Water Resources" earlier in the Hydrology/Water Resources section of this chapter). Approximately 0.8 miles of new road would be constructed in the First Water Gulch drainage (LA0130), while approximately 0.8 miles of road would be decommissioned in the First Water Gulch (LA0130) and Little Applegate River between Water Gulch and First Water Gulch (LA0127) drainages, the same as under Alternative 2. All of the new road construction would be located further up the ridge, further away from any Riparian Reserves. The road decommissioning would eliminate a road within a Riparian Reserve, including a road crossing on a stream. The decommissioning would include measures to decrease the hydrologic impact of the road grade, such as ripping, removal of culverts, cross drains and fill material out of stream channels, and installation of waterdips to eliminate channelization of flow and flow delivery to streams during storm events (Chapter 2 Project Design Features). Decommissioning would not be just a road closure with a gate or barricade (USDI 1995:Appendix A, page B-19), but rather, a permanent removal of the road, disconnecting the road drainage from the stream network. The project would meet the minimum Key Watershed requirement of equal amounts of road decommissioning for any new road construction (USDI 1995:Appendix A, page B-19).

Hydrology/Water Resources: Foreseeable Future Actions

Table 4-H-8: Changes in Risk Factors by Drainage due to Foreseeable Future Actions

Drainage (Chapter 3 Table 3-H-1)	**percent of Drainage potentially converted to new young stands by foreseeable harvest** (Table A2*)	**Acres of Foreseeable New Disturbance on Highly Erodible or Unstable Soils** (Table A1*)	**percent Foreseeable New Compacted Area** (Table A3*)	**percent Foreseeable New Transient Snow Zone Openings** (Table A4*)	**Effect on Stream Channel Conditions of foreseeable actions** (Table A5*)	**Effect on Riparian Area Conditions of foreseeable actions** (Table A6*)	**Effect of Foreseeable Future Actions related to past catastrophic events** (Table A7*)	**Foreseeable change in Road Density miles/mile^2** (Table A8*)	**Foreseeable change in Road Density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Foreseeable Change in Management-related Stream Sedimentation Potential** (Table A10*)	**Foreseeable Effect on Water Quality Problems other than sedimentation** (Table A11*)
AU0218	1	4	<1	0	0	positive	0	+0.008	0	0	0
AU0360	<1	0	<1	0	0	positive	0	+0.044	0	0	0
AU0363	3	0	1	0	0	positive	0	0	0	positive	0
LA0127	0	0	0	0	0	0	0	0	0	0	0
LA0130	<1	0	0	<1	0	0	0	0	0	0	0
LA0145	0	0	0	0	0	0	0	0	0	0	0
LA0203	11	0	2	0	0	0	0	0	0	negative	0
LA0206	1	0	<1	2	0	0	0	0	0	0	0
LA0209	2	0	1	0	0	0	0	0	0	0	0
LA0212	0	0	0	0	positive	0	0	0	0	positive	0
LA0215	4	0	1	0	positive	positive	0	0	0	positive	0
LA0218	2	0	1	0	0	positive	0	0	0	0	0
LA0221	<1	0	0	0	positive	positive	0	0	0	positive	0
LA0327	18	0	4	0	negative	negative	0	0	0	0	0
LA0330	6	0	2	0	negative	negative	0	0	0	0	0
LA0403	0	0	0	0	positive	positive	0	0	0	positive	0
LA0406	1	0	<1	0	0	positive	0	0	0	0	0
LA0409	4	0	1	0	0	positive	0	0	0	0	0
LA0439	14	0	3	0	positive	0	0	0	0	positive	0
LA0442	0	0	0	0	0	positive	0	0	0	0	0
LA0445	0	0	0	0	0	positive	0	0	0	0	0

* The referenced tables and supporting analysis are contained in Appendix A.

Road density could increase slightly in two drainages along the Applegate River, AU0218 and AU0360 (Table 4-H-8 column 9), due to possible construction of new road under the BLM Deadman's Palm Project (still in initial planning stages). The amount of new road construction is very small (Table 4-H-8 column 9), would not be located in any Riparian Reserves (Table 4-H-8 column 10), and would be done using Project Design Features incorporating Best Management Practices (USDI 1995:Appendix D) designed to prevent impact to the hydrology of the area. There is no other foreseeable road construction in the Planning Area; most areas that could be harvested on private lands are accessible by existing roads.

Future intensive timber harvests on non-BLM lands are possible in most drainages; available timber within each drainage ranges from a few acres up to many hundreds of acres (see the Appendix A *Large Percentage of Forest Vegetation Harvested* risk factor *Foreseeable Future Actions* discussion for each drainage). Potential large changes could occur in the Little Applegate River between Glade Creek and Rush Creek (LA0203) where an additional 11 percent of the drainage is potentially available for logging in the immediate future; Potential intensive harvest could also occur on 18 percent of lands in Waters Gulch (LA0327), 6 percent of lands in Yale Creek between Waters Gulch and the Little Applegate River (LA0330), and 14 percent of lands in lower Sterling Creek (LA0439)(Table 4-H-8 column 2). Compacted area could increase as a result of these activities, including as much as 2 percent of the drainage in LA0203, 4 percent in LA0327, 2 percent in LA0330, and 3 percent in LA0439 (Table 4-H-8 column 4). Timber harvest activities that expose soil to surface erosion can result in accelerated rates of sediment production. Skid trails and yarding corridors can expose soil and also cause compaction. Increased large openings in the forest canopy from intensive harvest activity can result in more snow accumulation and may increase the amount of streamflow during rain-on-snow events. In general, tree crowns intercept precipitation and can reduce the effect of extreme storm events while the tree roots provide stability to the soil. Consequently, large open areas without vegetative surface cover may have a greater risk of increased sediment production. Potential future harvests on non-BLM lands could periodically increase levels of fine sediments reaching streams, followed by gradual stabilization as areas recovered from harvest-related disturbance (Appendix A *High Sedimentation Potential* risk factor discussion for each drainage).

Hauling on road 39-1-30.0 at the Little Applegate River as part of non-BLM timber harvest that could occur during the next several years could deliver up to 12 cubic yards of fine sediment to the river during hauling activities (Squyres and Smith 2005). Fine sediment input from this activity would contribute to maintenance of degraded habitat conditions in the River, but would probably not be sufficiently different from background fine sediment levels to trigger any changes in overall stability or condition (Appendix A *Stream Channel Condition* and *High Sedimentation Potential* risk factor discussions for Drainage LA0203).

Thinning, fuel reduction, and future periodic maintenance underburning already authorized in many of the drainages under other federal projects could benefit adjacent riparian areas by helping restore a more natural vegetation structure/fire regime, potentially decreasing the magnitude of wildfires moving into riparian areas out of the uplands (see Appendix A *Riparian Areas* and *High Impacts from a Catastrophic Event* risk factor discussions for each drainage).

Stream channel and riparian conditions would likely decline in two drainages due to foreseeable future actions: Waters Gulch (LA0327) and Yale Creek between Waters Gulch and the Little Applegate River (LA0330)(Table 4-H-8 columns 6 and 7). Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel. Stream channels on private lands would continue to be protected by county ordinance and Oregon Forest Practices Rules; however, 402 acres in Waters Gulch and 106 acres in Yale Creek downstream of Waters Gulch of potential high-intensity logging on private lands (Appendix A *Large Percentage of Forest Vegetation Harvested* risk factor discussion for drainages LA0327 and LA0330) could further impact stream channels, because of the high overall levels of recent harvest activity (Table 4-H-2 column 2), area of compacted soils (Table 4-H-2 column 4), and the associated concerns for maintenance of increased in peak flows and sedimentation. High intensity harvest could impact stream channels if skid trails or roads were created that could route additional flow to streams, because peak flows in the mainstem of Yale Creek are probably already at increased levels in response to over 2,300 acres burned in the 2001 Quartz Fire along tributaries farther upstream. Intensive harvest activities on non-federal lands also have the potential to negatively impact riparian conditions on smaller intermittent/ephemeral streams by disturbing soils and vegetation because

there are generally few restrictions on private yarding operations on these types of streams under the Oregon Forest Practices Act; The Oregon Forest Practices Act would regulate activities on larger intermittent, perennial and fisheries streams on non-federal land, but those protections are substantially less than what is necessary to meet regulatory, Endangered Species Act, and Clean Water Act requirements addressed by Resource Management Plan implementation for similar streams on BLM-administered land. Sedimentation inputs to streams from non-BLM roads and harvest activities would be maintained relatively unchanged (Table 4-H-8 column 11; Appendix A *High Sedimentation Potential* risk factor discussion for each drainage) at current elevated levels due to continuing disturbance; channel and riparian conditions would continue on a downward trend at some locations (Table 4-H-8 columns 6 and 7) due to the accumulating impact resulting from this maintenance of the status quo.

Hydrology/Water Resources: Alternative 1 Combined Current and Ongoing Effects

Table 4-H-9: Alternative 1 (No Action) Combined Current and Ongoing Effects: Conditions and Trends in Risk Factors by Drainage (combining the Past Actions/Current Conditions [Table 4-H-2] and Foreseeable Future Actions [Table 4-H-8] with effects from implementation of the "No Action" Alternative [Table 4-H-4]). These are the current and ongoing conditions that will occur with selection of the "no action" alternative, and are the baseline conditions by which the cumulative impacts of the action alternatives (tables 4-H-10 through 4-H-12) can be compared to evaluate cumulative effects.

Drainage (Chapter 3 Table 3-H-1)	**Cumulative percent of Drainage converted to young stands by harvest** (Table A2*)	**Cumulative Acres of Disturbance on Highly Erodible or Unstable Soils** (Table A1*)	**Cumulative percent Compacted Area** (Table A3*)	**Cumulative percent Nonrecovered Transient Snow Zone Openings** (Table A4*)	**percent level of Concern for Nonrecovered Transient Snow Zone Openings** (Table A4*)	**Cumulative Trend in Stream Channel Conditions** (Table A5*)	**Cumulative Trend in Riparian Area Conditions** (Table A6*)	**Potential cumulative trend related to impacts from past catastrophic events** (Table A7*)	**Cumulative Road Density miles/mile^2** (Table A8*)	**Cumulative Road Density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Cumulative change in management-related stream sedimentation** (Table A10*)	**Cumulative Trend on Water Quality Problems other than sedimentation** (Table A11*)
AU0218	14	4	3	0	0	Declining	Improving	0	6.9	6.0	0	Improving
AU0360	9	<1	3	0	0	Declining	Improving	0	4.1	3.0	0	Improving
AU0363	30	0	8	0	0	Declining	Improving	0	6.6	2.4	Improving	Improving
LA0127	11	30	4	13	56	Declining	0	0	4.0	7.5	0	Improving
LA0130	28	0	7	31	45	Declining	Declining	0	4.7	3.7	0	Improving
LA0145	38	<1	11	43	42	Declining	Improving	negative	10.4	0.0	Improving	Improving
LA0203	35	17	7	0	0	Declining	Declining	negative	6.8	5.0	0	Improving
LA0206	22	0	7	26	53	Declining	Declining	0	6.6	9.5	0	Improving
LA0209	18	0	3	0	0	Declining	Declining	0	5.1	5.7	0	Improving
LA0212	1	0	<1	1	57	Declining	0	0	1.4	0.0	Improving	Improving
LA0215	5	<1	2	0	0	Declining	0	0	2.8	3.5	Improving	Improving
LA0218	19	0	3	0	0	Declining	0	0	5.3	7.5	0	Improving

LA0221	11	0	2	0	0	Declining	0	0	5.7	2.3	Improving	Improving
LA0327	62	103	18	0	0	Declining	Declining	0	9.7	10.5	0	Improving
LA0330	17	<1	4	0	0	Declining	Declining	0	3.2	1.0	0	Improving
LA0403	13	0	3	0	0	Declining	Improving	positive	5.4	0.0	Improving	Improving
LA0406	24	<1	2	0	0	Declining	Improving	0	4.0	6.8	0	Improving
LA0409	13	0	3	0	0	Declining	Improving	0	4.1	0.0	0	Improving
LA0439	23	0	7	0	0	0	Improving	0	10.1	2.6	Improving	Improving
LA0442	17	0	5	0	0	Declining	Improving	0	6.5	3.3	0	Improving
LA0445	28	0	3	0	0	Declining	Improving	0	6.8	3.8	0	Improving

* The referenced tables and supporting analysis are contained in Appendix A.

Compared to existing condition (Table 4-H-2), with implementation of the "No Action" alternative (Table 4-H-4) and effects of foreseeable future actions (Table 4-H-8), there would be slight increases in road densities in several drainages (compare Table 4-H-9 column 10 to Table 4-H-2 column 10), but these would be well designed roads far from streams. Areas of compacted soil would increase somewhat in many drainages (compare Table 4-H-9 column 4 to Table 4-H-2 column 4) due to foreseeable intensive timber harvest activities (Table 4-H-8 column 2), mostly on private lands. A small amount of new compaction would result from foreseeable future harvest and road building activities in several drainages on BLM lands (Appendix A Table A8 and Appendix A foreseeable future actions discussions for the *Forest Vegetation Harvested*, *Compacted Area*, and *High Road Density* risk factors). One drainage, Rush Creek (LA0206) could have potential increase in Transient Snow Zone nonrecovered openings due to harvest on non-BLM lands (compare Table 4-H-9 column 5 to Table 4-H-2 column 5) , but would still be less than half the amount (compare Table 4-H-9 column 6 to column 5) that would trigger concern for potential effects on peak flows. There would therefore be no cumulative changes to the magnitude and frequency of peak flows under Alternative 1.

With continued high road densities (Table 4-H-9 column 10) and roads crossing streams at many locations (see the Appendix A *High Sedimentation Potential* discussion for each drainage), concentration of runoff by road drainage systems would continue contributing to more rapid delivery of storm runoff directly to streams, resulting in continued increased peak flows. There would be no road-related work under this alternative, so watershed restoration direction regarding roads under the Aquatic Conservation Strategy might not be met. No restorative actions such as road decommissioning, removal of stream crossings, upgrading of culverts, or vegetation treatments to improve riparian condition would be implemented under Alternative 1, so maintenance or restoration of some riparian processes at some locations could be compromised that otherwise might have benefited from these actions (Appendix A *Riparian Area*, *High Sedimentation Potential*, and *High Road Density* risk factor discussions for each drainage). This is important because roads alter the hydrologic network and may increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams. (USDI 1998). Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119). Roads can also be a concern if they change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime, causing adverse effects on the aquatic system. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads with a properly functioning drainage system would 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.

Because there would be no new disturbance on highly erodible soils (Table 4-H-9, column 3) in any of the drainages under this alternative, implementation of this alternative would not cause any increase in cumulative impacts related to disturbance on highly erodible soils. Foreseeable future actions (Table 4-H-8, column 3) could cause slight increases in disturbance on highly erodible soils (see comparisons in Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage. Also compare Table 4-H-2, column 3 [Current Condition] to Table 4-H-9, column 3 [Alternative 1 Combined current and ongoing effects]). This increase in disturbance would only be a few acres, and would not result in changes in impacts to streams over current conditions. This is important because disturbance on highly erodible soils is a potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Because no activity is proposed in potentially unstable areas under this alternative, implementation of this alternative would not cause any increase in cumulative effects related to these areas. This is important because unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. See the *Soils* discussion for more information regarding highly erodible soils and unstable areas.

Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel. Stream channel conditions would continue to be at an increased level of risk from adverse affects of increased peak flow in virtually all drainages. With no changes in management, channel conditions would trend downward over time (Table 4-H-9 column 7), with drainages having the highest road densities (Table 4-H-9 columns 10 and 11) and other disturbances seeing the most rapid declines in condition. Currently elevated levels of stream sedimentation (Table 4-H-2 column 12) would be expected to continue relatively unchanged in most drainages (Table 4-H-9 column 12). It is anticipated that management activities would continue on private lands in much the same way and at similar rates as they have in the past. Sedimentation impacts from these lands would be expected to continue with little change, fluctuating in response to the level of harvest activity. Sedimentation from natural sources (for example erosional processes, bedload transport in streams) would continue, fluctuating in response to things such as variations in annual weather, climate cycles, and wildfire return intervals. Sedimentation levels could improve over the long term in some drainages, however (Table 4-H-9 column 12)(see Appendix A *High Sedimentation Potential* risk factor discussion for each drainage). Particularly, in Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (LA0145), due to the Quartz Fire, fine sediment levels may remain higher than average for the next 15 years or so as stabilizing roots of the dead large trees begin to rot and create localized areas of instability, and as peak flows remain at elevated levels (although still within their natural range of variability). Sediment levels would eventually decline as regrowth of vegetation becomes large enough to offset the instability created by the open stand conditions and decaying roots. In the Applegate River between Star Gulch and the Little Applegate River (AU0363), implementation of the foreseeable future Deadman's Palm Project could reduce sediment input to streams in that area and reduce the chance of stream crossing failures and associated stream degradation during high flow events on some streams on BLM lands on the west side of the Applegate River; although in the same drainage, this would not change conditions within the Bald Lick Planning Area boundary. Sedimentation conditions could also see slight improvements over time if foreseeable future improvements are made to correct drainage problems along the Sterling Mine Ditch in a number of drainages (see Appendix A *High Sedimentation Potential* risk factor discussion for drainages crossed by the Sterling Mine Ditch).

Over the short term, the contribution of up to 12 cubic yards of fine sediment from foreseeable future actions at the 39-1-30.0 stream ford in the Little Applegate River in Drainage LA0203 would lead to some

short term sedimentation immediately downstream of the stream ford, as well as some minor streambank and channel instability as the channel adjusts to the instream modifications in the first few years following work (Squyres and Smith 2005). Turbidity from the probable renovation work and instream hauling would exceed State water quality criteria during work; normally, permits would be required for such turbidity-producing activities in anadromous fish habitat, but such forest management-related activities by private operators appear to be exempt from State permits regulating this type of activity[7]. Turbidity increases during hauling activities would likely be detectable for several miles downstream, probably to the mouth of the Little Applegate River. Instream fine sedimentation would also increase downstream of the stream ford, and could be readily apparent in portions of the stream for the first 500 yards downstream of the crossing during the same low flow season that the work is done. Beyond 500 yards, there would be no incremental increase in sediment (Table 4-H-9 column 12 for Drainage LA0203); instream sedimentation levels would not be discernable over background levels of embeddedness present from the many other natural and anthropogenic-induced sediment inputs along the Little Applegate River. Sedimentation increases would not be visible in the Little Applegate River following the first major runoff events of the following winter. Although it would not be discernable against present background levels, most of the sediment delivered to the River would likely remain embedded within the stream substrate for many years, gradually being transported downstream during high flow events. Because downstream of this location both the Little Applegate and Applegate rivers have been straightened, channelized, and otherwise disconnected from their floodplains, and sediment inputs throughout the system are higher than sediment levels these systems evolved under, these rivers no longer retain their full capacity to adequately transport sediment through the system; fine sediment can easily be stored in the channel rather than stored on stream banks, floodplains, or transported through the system because of the non-functioning condition of large portions of these streams. Therefore, fine sediment contributed to these rivers is likely to remain in the active channel for many years, contributing to continued maintenance of degraded channel conditions and elevated channel instability. Future activity utilizing this stream ford would create additional disturbance from hauling, maintenance, and repairing the ford following floods, so the ford would likely remain a long-term source of sediment input to the River (Appendix A *Stream Channel Condition* and *High Sedimentation Potential* risk factor discussions for Drainage LA0203).

No vegetation treatments to improve riparian condition would be implemented under Alternative 1, so maintenance or restoration of some riparian processes at some locations could be compromised that otherwise might have benefited from these actions. Other future prescribed treatments (for example, low-intensity fire) that could be needed to meet ACS and Riparian Reserve objectives might not be possible to implement in some locations due to heavy fuel loading associated with overstocked young stands. In other areas, vegetation treatments already authorized under other projects could allow riparian conditions to improve over time. Ongoing protection of Riparian Reserves would allow those natural recovery processes that are functioning properly to result in a continued gradual improvement of riparian condition on BLM lands, with most areas eventually reaching Properly Functioning Condition barring a severe wildfire. However, implementation of Alternative 1 would not follow the RMP direction to apply silvicultural practices to Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS and Riparian Reserve objectives (USDI 1995:27). Some riparian stands would continue to grow slowly or be in poor health due to overstocked conditions, especially those areas that had been previously harvested or that have had fire excluded for long periods of time. Due to such conditions, some Reserves may be at greater risk of high intensity fire than under natural conditions or under the conditions that would result from implementation of the management direction provided in the RMP. Riparian protection on non-federal lands would continue to be governed by county ordinance and the Oregon Forest Practices Act. Riparian areas on lands under these jurisdictions would continue to have minimal riparian protection, especially on intermittent streams. Foreseeable future harvests on private lands could cause riparian degradation on those lands, but the impact would be

[7] John Samuelson, BLM Ashland Resource Area personal communication to BLM hydrologist David Squyres.

somewhat limited by implementation of the Oregon Forest Practices Act. Appendix A *Riparian Areas* risk factor discussions for each drainage provide information further the current riparian condition trends shown in Table 4-H-9 column 8.

Implementation of Alternative 1 would not change current stream temperature conditions, with long term conditions trending toward improvement (Table 4-H-9 column 13). Streams would continue to have some degree of warming due to a combination of natural influences, areas of past intensive harvest in riparian areas, and degraded riparian and channel conditions at some locations. There would be no action to correct problems associated with roads constructed with drainage systems that route flow directly to streams, so any temperature effects from channel conditions aggravated by roads would be expected to continue. Riparian areas on BLM lands would continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS) (USDI 1995:22-23), except for the lack of implementation of the RMP direction to utilize silvicultural practices to attain objectives. Riparian areas where previous harvest activities occurred would continue to gradually recover from past harvest impacts. There would be nothing under this alternative that would result in anthropogenic-caused heating of streams in this drainage (ODEQ 2003b:2). Activities on non-BLM lands are required to meet Clean Water Act requirements. No other impacts to water quality are anticipated.

Hydrology/Water Resources: Alternative 2 Cumulative Effects

Table 4-H-10: Alternative 2 Cumulative Impacts and Trends in Risk Factors by Drainage (combining the Past Actions/Current Conditions [Table 4-H-2], the Alternative 2 action proposed [Table 4-H-5], and Foreseeable Future Actions [Table 4-H-8]). Compare this table to the "No Action" impacts and trends in Table 4-H-9 to evaluate cumulative effects generated by implementation of Alternative 2.

Drainage (Chapter 3 Table 3-H-1)	**Cumulative percent of Drainage converted to young stands by harvest** (Table A2*)	**Cumulative Acres of Disturbance on Highly Erodible or Unstable Soils** (Table A1*)	**Cumulative percent Compacted Area** (Table A3*)	**Cumulative percent Nonrecovered Transient Snow Zone Openings** (Table A4*)	**percent level of Concern for Nonrecovered Transient Snow Zone Openings** (Table A4*)	**Cumulative Trend in Stream Channel Conditions** (Table A5*)	**Cumulative Trend in Riparian Area Conditions** (Table A6*)	**Potential cumulative effects related to impacts from past catastrophic events** (Table A7*)	**Cumulative Road Density mi/mi^2** (Table A8*)	**Cumulative Road Density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Cumulative change in management-related stream sedimentation** (Table A10*)	**Cumulative Effect on Water Quality Problems other than sedimentation** (Table A11*)
AU0218	14	5	3	0	0	Improving	Improving	0	6.7	4.0	Improving	Improving
AU0360	9	1	3	0	0	Improving	Improving	0	3.9	2.4	Improving	Improving
AU0363	30	0	8	0	0	Improving	Improving	0	6.6	2.4	Improving	Improving
LA0127	11	30	4	13	56	Improving	Improving	0	3.9	7.5	Improving	Improving

LA0130	28	0	8	32	45	Improving	Improving	0	4.9	3.3	Improving	Improving
LA0145	38	<1	11	43	42	Declining	Improving	negative	10.5	1.8	Improving	Improving
LA0203	35	17	8	0	0	Declining	Improving	positive	6.9	5.0	Declining	Improving
LA0206	22	0	8	26	53	Improving	Improving	0	6.9	7.4	Improving	Improving
LA0209	18	0	5	0	0	Improving	Improving	0	4.1	2.6	Improving	Improving
LA0212	1	0	<1	1	57	Improving	Improving	0	1.4	0.0	Improving	Improving
LA0215	5	<1	2	0	0	Improving	Improving	0	2.9	3.5	Improving	Improving
LA0218	20	0	4	0	0	Improving	Improving	0	4.2	1.4	Improving	Improving
LA0221	11	0	3	0	0	Improving	Improving	0	6.2	2.3	Improving	Improving
LA0327	62	106	18	0	0	Declining	0	0	9.9	10.5	Improving	Improving
LA0330	18	2	5	0	0	Declining	0	0	4.3	2.8	Improving	Improving
LA0403	13	0	4	0	0	Improving	Improving	positive	5.6	0.0	Improving	Improving
LA0406	24	13	3	0	0	Improving	Improving	0	3.5	5.4	Improving	Improving
LA0409	13	0	4	0	0	Improving	Improving	0	3.9	0.0	Improving	Improving
LA0439	23	0	7	0	0	0	Improving	0	10.2	2.6	Improving	Improving
LA0442	17	0	5	0	0	Improving	Improving	0	6.4	3.3	Improving	Improving
LA0445	29	0	3	0	0	Improving	Improving	0	7.0	2.3	Improving	Improving

* The referenced tables and supporting analysis are contained in Appendix A.

Compared to combined current and ongoing road density effects under the "No Action" alternative (Alternative 1)(Table 4-H-9 column 10), overall road density would decrease under Alternative 2 (Table 4-H-10 column 10). Road density would increase in some drainages and decrease in others (Table 4-H-5 column 9)(see the direct and indirect effects discussion for Alternative 2). A small amount of new road construction could also occur under foreseeable future projects on BLM (Table 4-H-8 column 9). The transportation system/drainage improvements proposed under Alternative 2 could result in an immediate improvement in sedimentation impacts during and after major storm events. Road relocation and drainage improvements within Riparian Reserves would have the greatest positive impact of the work proposed under this alternative, improving sedimentation and peak flow delivery conditions in a number of streams, with a subsequent positive effect on channel conditions at many locations (see Appendix A *High Sedimentation Potential*, *High Road Density*, and *Stream Channel Conditions* risk factor discussions for each drainage). Although improved conditions could be apparent at times at the mouth of individual 7th field drainages downstream of some of the improvements, the improvements would not make enough of a difference against background conditions to be discernable within the mainstem Little Applegate and Applegate Rivers. Over the long term, improving vegetation conditions on BLM lands in this drainage and throughout the watershed could reduce the frequency of stand-replacement wildfire and allow more low severity fires to burn, restoring a sediment regime that more closely mimics natural conditions. Gradual recovery of riparian areas (previously clearcut or subjected to other high intensity management that did not mimic more natural disturbance, but now managed as Riparian Reserves) would allow gradual improvement of riparian processes and corresponding improvements in sediment conditions over time (Table 4-H-10 columns 8 and 12). In spite of the improvements under this alternative, roads would still remain the largest unnatural contributor to negative sedimentation impacts in the drainage. With an overall reduction in road density (compare Table 4-H-10 column 10 to Table 4-H-9 column 10), reduction of Riparian Reserve road density in many drainages (compare Table 4-H-10 column 11 to Table 4-H-9 column 11), removal of numerous stream crossings (Appendix A *High Sedimentation Potential* risk factor discussion for each drainage), and more disconnection of roads from the stream network (Appendix A *High Sedimentation Potential* and *High Road Density* risk factor discussions for each drainage), there would be less rapid delivery of storm runoff directly to streams from roads. Peak flows from roads would be reduced; however, this reduction would not be discernable over background levels at or beyond the mouth of individual 7th field drainages (see the Appendix A *High Sedimentation Potential*, *High Road Density*, *Riparian Area Conditions*, and *Stream Channel Conditions* risk factor discussions for each drainage).

Road renovation and new road construction would be completed at the beginning of the project. Renovation work prior to the start of other activities at the beginning of the project would fix existing drainage and sediment transport issues on roads, and implementation of the Chapter 2 Project Design Features would help minimize potential risks, so the potential for road-related problems to be transmitted to

streams would be reduced. The net effect would be that, even though renovation would reduce routing of flow and sediment directly to streams at the beginning of the project, there would be slightly increased road densities during the actual project work, so risk levels related to roads during the project would be comparable to what existed prior to the start of the project. The improved conditions resulting from decommissioning (with the associated overall reduction in road density) would not begin to take effect until near the end of the project. Roads alter the hydrologic network and may increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams. (USDI 1998). Large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation. Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119). Roads can also be a concern if they change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime, causing adverse effects on the aquatic system. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads with a properly functioning drainage system would 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. Once harvest activities were completed, all roads would receive a final round of maintenance to fix “wear-and-tear” to surfacing and erosion control measures incurred during the project. Effects to hydrology, while potentially observable within a short distance of the work, would not be discernable over background levels at or beyond the mouth of individual 7th field drainages, with the exception of increased stream sedimentation associated with a stream ford in the mainstem Little Applegate River between Glade Creek and Rush Creek (LA0203). This ford has been in place and used periodically for many years, so while there would increased sediment delivery over levels seen in the last few years, this would represent part of the ongoing fluctuation in sediment levels resulting from periodic timber harvest activities and associated sediment input that has been occurring at this ford for many years. Sedimentation downstream of this ford would increase in the near future as the result of foreseeable timber hauling activities from private lands as well as from proposed renovation of and hauling across the ford under Alternative 2. Sedimentation downstream of this ford would increase in the near future as the result of foreseeable timber hauling activities from private lands as well as from proposed renovation of and hauling across the ford under Alternative 2. Because much of the downstream river system has been straightened and confined, the Little Applegate River no longer retains its full capacity to transport sediment through the system, and it is likely that sediment inputs in excess of long-term background levels will remain in the active channel for long periods of time, contributing to continued maintenance of or additional negative impact on already degraded sedimentation conditions downstream. While renovation of the ford proposed under Alternative 2 would ultimately leave the ford in a less-impacting condition after the project as compared to the current condition, sedimentation introduced by the Alternative 2 proposal itself would be slightly greater than what would occur under the no-action alternative (see Appendix A *High Sedimentation Potential* risk factor discussion for drainage LA0203) . Additionally, the location of the ford and approaches within the flood-prone area of the river ensure that improvements made to the ford at any given time are likely to be washed away in the next high water, requiring a continual cycle of maintenance and the associated disturbance to the channel, and preventing

any true long-term benefit from the limited stream ford improvements being proposed here (Appendix A *Stream Channel Condition* and *High Sedimentation Potential* risk factor discussions for Drainage LA0203).

Because the slight increase in disturbance on highly erodible soils under Alternative 2 (Table 4-H-5, column 3) would have no impact to streams (see *Alternative 2 Direct and Indirect Effects* discussion) under this alternative, implementation of this alternative would not cause any increase in cumulative effects related to disturbance on highly erodible soils (compare Table 4-H-10 column 3 to Table 4-H-9 column 3). Foreseeable future actions (Table 4-H-8, column 3) could cause slight increases in disturbance on highly erodible soils (see comparisons in Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage. Also compare Table 4-H-2, column 3 [Current Condition] to Table 4-H-10, column 3 [Alternative 2 Cumulative Effects]). This increase would be only a few acres, and would not result in changes in impacts to streams over current conditions. This is important because disturbance on highly erodible soils is a potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Because no activity is proposed in potentially unstable areas under this alternative, implementation of this alternative would not cause any increase in cumulative effects related to these areas. This is important because unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. See the *Soils* discussion for more information regarding highly erodible soils and unstable areas.

Under Alternative 2, stream channels would continue to have protection as Riparian Reserves, and treatments in Riparian Reserves would continue to utilize Project Design Features (Chapter 2) that would prevent impact to the channels. Stream channels of larger streams on private lands would continue to be protected by county ordinance and Oregon Forest Practices Rules. Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel. Forest management that does a better job at mimicking a low-severity natural fire regime could, over time, provide greater inputs of large, stable wood to channels and more stable peakflows and baseflows, resulting in improvements in channel stability and condition over the long term. Implementation of similar management across all ownerships could further improve the situation; without similar management on other ownerships, conditions of stream channels on private lands could remain static or even decline over time. Stream channel conditions on BLM lands would gradually improve (Table 4-H-5 column 6) with ongoing watershed restoration of riparian and upland areas.

Riparian areas would continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS) (USDI 1995:22-23). Riparian areas where previous harvest activities occurred would continue to gradually recover from past harvest impacts. Management of Riparian Reserves would follow the RMP general management guidelines for Riparian Reserves (USDI 1995:26-27) as well as the specific management direction for Riparian Reserves in the Applegate Adaptive Management Area (USDI 1995:38). No activity is proposed under this alternative that would result in anthropogenic-caused heating of streams in this drainage (ODEQ 2003b:2), and implementation of Best Management Practices, other Project Design Features (EA Chapter 2), and protection of Riparian Reserves would enable the Project to avoid violation of the Clean Water Act. This Project, other recent riparian vegetation treatments in the Planning Area, and foreseeable future management in the watersheds of the Planning Area, would allow gradual improvement in water quality over time (Table 4-H-10 column 13).

Other projects have already reduced the high density of vegetation on BLM lands in portions of the Planning Area; these previous treatments would allow for the future maintenance underburning of some

areas. In the event of a wildfire, this could result in reduced effects to water and soil resources, decreasing the likelihood that such a fire would have "catastrophic" effects (Appendix A *High Impacts from a Catastrophic Event* risk factor discussion for each drainage).

With future management of BLM lands continuing to avoid intensive timber harvest and focus on thinning-type prescriptions and use of maintenance underburning, new young stands might only be created as a result of future stand-replacement wildfire or stand-scale mortality caused by forest pathogens. Both stand replacement fire and stand-scale mortality could be reduced over the long-term compared to current conditions. This, along with the gradual recovery of riparian areas affected by past clear-cutting, would benefit riparian restoration and maintenance of late successional characteristics along streams (Table 4-H-10 column 8)(Appendix A *Riparian Area Conditions* risk factor discussion for each drainage).

Hydrology/Water Resources: Alternative 3 Cumulative Effects

Table 4-H-11: Alternative 3 Cumulative Impacts and Trends in Risk Factors by Drainage (combining the Past Actions/Current Conditions [Table 4-H-2], the Alternative 3 action proposed [Table 4-H-6], and Foreseeable Future Actions [Table 4-H-8]). Compare this table to the "No Action" impacts and trends in Table 4-H-9 to evaluate cumulative effects generated by implementation of Alternative 3.

Drainage (Chapter 3 Table 3-H-1)	**Cumulative percent of Drainage converted to young stands by harvest** (Table A2*)	**Cumulative Acres of Disturbance on Highly Erodible or Unstable Soils** (Table A1*)	**Cumulative percent Compacted Area** (Table A3*)	**Cumulative percent Nonrecovered Transient Snow Zone Openings** (Table A4*)	**percent level of Concern for Nonrecovered Transient Snow Zone Openings** (Table A4*)	**Cumulative Trend in Stream Channel Conditions** (Table A5*)	**Cumulative Trend in Riparian Area Conditions** (Table A6*)	**Potential cumulative effects related to impacts from past catastrophic events** (Table A7*)	**Cumulative Road Density miles/mile^2** (Table A8*)	**Cumulative Road Density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Cumulative change in management-related stream sedimentation** (Table A10*)	**Cumulative Effect on Water Quality Problems other than sedimentation** (Table A11*)
AU0218	14	5	3	0	0	Improving	Improving	0	6.7	4.0	Improving	Improving
AU0360	9	1	3	0	0	Improving	Improving	0	3.9	2.4	Improving	Improving
AU0363	30	0	8	0	0	Improving	Improving	0	6.6	2.4	Improving	Improving
LA0127	11	30	4	13	56	Improving	Improving	0	3.9	7.5	Improving	Improving
LA0130	28	0	8	32	45	Improving	Improving	0	4.6	3.3	Improving	Improving
LA0145	38	<1	11	43	42	Declining	Improving	negative	10.5	1.8	Improving	Improving
LA0203	35	17	8	0	0	Declining	Improving	positive	6.9	5.0	Declining	Improving
LA0206	22	0	8	26	53	Improving	Improving	0	6.9	7.4	Improving	Improving
LA0209	18	0	5	0	0	Improving	Improving	0	4.1	2.6	Improving	Improving
LA0212	1	0	<1	1	57	Improving	Improving	0	1.4	0.0	Improving	Improving
LA0215	5	<1	2	0	0	Improving	Improving	0	2.8	3.5	Improving	Improving

LA0218	19	0	4	0	0	Improving	Improving	0	3.6	0.4	Improving	Improving
LA0221	11	0	2	0	0	Improving	Improving	0	5.8	2.3	Improving	Improving
LA0327	62	104	18	0	0	Declining	0	0	9.7	10.5	Improving	Improving
LA0330	17	1	5	0	0	Declining	0	0	4.2	2.8	Improving	Improving
LA0403	13	0	4	0	0	Improving	Improving	positive	5.5	0.0	Improving	Improving
LA0406	24	13	3	0	0	Improving	Improving	0	3.5	5.4	Improving	Improving
LA0409	13	0	4	0	0	Improving	Improving	0	3.9	0.0	Improving	Improving
LA0439	23	0	7	0	0	0	Improving	0	10.1	2.6	Improving	Improving
LA0442	17	0	5	0	0	Improving	Improving	0	6.4	3.3	Improving	Improving
LA0445	29	0	3	0	0	Improving	Improving	0	7.0	2.3	Improving	Improving

* The referenced tables and supporting analysis are contained in Appendix A.

Alternative 3 cumulative effects (Table 4-H-11) would be nearly identical to Alternative 2 (Table 4-H-10), with the exception that overall road density would decrease even further with implementation of Alternative 3 (compare Table 4-H-11 column 10 with Table 4-H-10 column 10; also compare figures in the Appendix A *High Road Density* risk factor discussions for each drainage). This would have only a limited positive effect from a water resources standpoint, because road density within Riparian Reserves would remain identical to that proposed under Alternative 2, except in the LA0218 Lick Gulch drainage, where Riparian Reserve road density would be decreased (see previous discussion in the Alternative 3 Direct and Indirect Effects section)(compare Table 4-H-11 column 11 with Table 4-H-10 column 11), further reducing road impacts on peak flows and sedimentation in Lick Gulch even beyond that already discussed under Alternative 2. Alternative 3 reductions in road construction in some of the other drainages would all occur outside of Riparian Reserves at locations that have very little chance of impacting streams in the first place.

There would be minor reductions in the amount of new compacted area (compare Table 4-H-11 column 4 to Table 4-H-10 column 4) and acres of disturbance on highly erodible soils (compare Table 4-H-11 column 3 to Table 4-H-10 column 3) in Alternative 3 compared to Alternative 2, but the difference would not be enough to affect the impacts as discussed under Alternative 2.

Hydrology/Water Resources: Alternative 4 Cumulative Effects

Table 4-H-12: Alternative 4 Cumulative Impacts and Trends in Risk Factors by Drainage (combining the Past Actions/Current Conditions [Table 4-H-2], the Alternative 4 action proposed [Table 4-H-7], and Foreseeable Future Actions [Table 4-H-8]). Compare this table to the “No Action” impacts and trends in Table 4-H-9 to evaluate cumulative effects generated by implementation of Alternative 4.

Drainage (Chapter 3 Table 3-H-1)	**Cumulative percent of Drainage converted to young stands by harvest** (Table A2*)	**Cumulative Acres of Disturbance on Highly Erodible or Unstable Soils** (Table A1*)	**Cumulative percent Compacted Area** (Table A3*)	**Cumulative percent Nonrecovered Transient Snow Zone Openings** (Table A4*)	**percent level of Concern for Nonrecovered Transient Snow Zone Openings** (Table A4*)	**Cumulative Trend in Stream Channel Conditions** (Table A5*)	**Cumulative Trend in Riparian Area Conditions** (Table A6*)	**Potential cumulative effects related to impacts from past catastrophic events** (Table A7*)	**Cumulative Road Density miles/mile^2** (Table A8*)	**Cumulative Road Density BLM Riparian Reserves miles/mile^2** (Table A9*)	**Cumulative change in management-related stream sedimentation conditions** (Table A10*)	**Cumulative Effect on Water Quality Problems other than sedimentation** (Table A11*)
AU0218	14	5	3	0	0	Improving	Improving	0	6.7	4.0	Improving	Improving
AU0360	9	1	3	0	0	Improving	Improving	0	3.9	2.4	Improving	Improving
AU0363	30	0	8	0	0	Improving	Improving	0	6.6	2.4	Improving	Improving
LA0127	11	30	4	13	56	Improving	Improving	0	3.9	7.5	Improving	Improving
LA0130	28	0	8	32	45	Improving	Improving	0	4.9	3.3	Improving	Improving
LA0145	38	<1	11	43	42	Declining	Improving	negative	10.4	0.0	Improving	Improving
LA0203	35	17	8	0	0	Declining	Improving	positive	6.9	5.0	Declining	Improving
LA0206	22	0	8	26	53	Improving	Improving	0	6.9	7.4	Improving	Improving
LA0209	18	0	3	0	0	Improving	Improving	0	5.1	5.7	0	Improving
LA0212	1	0	<1	1	57	Improving	No change	0	1.4	0.0	Improving	Improving
LA0215	5	<1	2	0	0	Declining	No change	0	2.8	3.5	Improving	Improving
LA0218	19	0	3	0	0	Declining	No change	0	5.3	7.5	0	Improving
LA0221	11	0	2	0	0	Declining	No change	0	5.7	2.3	Improving	Improving
LA0327	62	103	18	0	0	Declining	Declining	0	9.7	10.5	0	Improving
LA0330	17	<1	4	0	0	Declining	Declining	0	3.2	1.0	0	Improving
LA0403	13	0	3	0	0	Improving	Improving	positive	5.6	0.0	Improving	Improving
LA0406	24	2	2	0	0	Improving	Improving	0	3.9	6.8	Improving	Improving
LA0409	13	0	4	0	0	Improving	Improving	0	3.9	0.0	Improving	Improving
LA0439	23	0	7	0	0	0	Improving	0	10.1	2.6	Improving	Improving
LA0442	17	0	5	0	0	Improving	Improving	0	6.4	3.3	Improving	Improving
LA0445	29	0	3	0	0	Improving	Improving	0	7.0	2.3	Improving	Improving

* The referenced tables and supporting analysis are contained in Appendix A.

Compared to combined current and ongoing effects under the "No Action" alternative (Alternative 1)(Table 4-H-9), cumulative road density would decrease slightly under Alternative 4 (compare Table 4-H-12 column 10 to Table 4-H-9 column 10). Road density would increase in some drainages and decrease in others (see the direct and indirect effects discussion for Alternative 4). A small amount of new road construction could also occur under foreseeable future projects on BLM (Table 4-H-8 column 9). The transportation system/drainage improvements proposed in several drainages under Alternative 4 could result in an immediate improvement in sedimentation impacts during and after major storm events. Improvements to the road system are important because roads alter the hydrologic network and may

increase the magnitude of peak flows and affect the time it takes runoff to reach the stream. Road cuts intercept subsurface water and road ditches convey it to streams. Road surfaces are in a permanently compacted state, promoting the collection and runoff of water during storm events; this water can be transported to streams (Wemple 1994). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams. (USDI 1998). Large areas of compacted soil, such as occur on roads, tractor yarding or slashbuster, 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. In riparian areas, large areas of compacted soil can indirectly affect stream conditions and water quality by contributing to reduced productivity of riparian vegetation. Roads are the primary source of sediment for streams in the analysis area (USDI 1998:119). Roads can also be a concern if they change the local drainage pattern and force the natural drainage system, which has developed over millennia, to adjust to a new regime, causing adverse effects on the aquatic system. A fill or cut slope failure produces soil material that could potentially increase the sediment input to a stream. Culvert failures can cause the water to be diverted from one drainage to another thereby affecting the channel stability of both systems. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads with a properly functioning drainage system would 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. Road relocation and drainage improvements within Riparian Reserves would have the greatest positive impact of the work proposed under this alternative, improving sedimentation and peak flow delivery conditions in a number of streams, with a subsequent positive effect on channel conditions at many locations (compare Table 4-H-12 columns 7 and 12 to Table 4-H-9 columns 7 and 12; also see Appendix A *High Sedimentation Potential*, *High Road Density*, and *Stream Channel Conditions* risk factor discussions for each drainage). Although improved conditions could be apparent at times at the mouth of individual 7th field drainages downstream of some of the improvements, the improvements would not make enough of a difference against background conditions to be discernable within the mainstem Little Applegate and Applegate Rivers. Over the long term, improving vegetation conditions on portions of BLM lands in drainages where project activities would occur and throughout the watershed could reduce the frequency of stand-replacement wildfire and allow more low severity fires to burn, restoring a sediment regime that more closely mimics natural conditions. Gradual recovery of riparian areas (previously clearcut or subjected to other high intensity management that did not mimic more natural disturbance, but now managed as Riparian Reserves) would allow gradual improvement of riparian processes and corresponding improvements in sediment conditions over time (Table 4-H-12 columns 8 and 12). In spite of the improvements under this alternative, roads would still remain the largest unnatural contributor to negative sedimentation impacts in the drainage. With an overall reduction in road density (compare Table 4-H-12 column 10 to Table 4-H-9 column 10), reduction of Riparian Reserve road density in some drainages (compare Table 4-H-12 column 11 to Table 4-H-9 column 11), removal of some stream crossings (Appendix A *High Sedimentation Potential* risk factor discussion for each drainage), and more disconnection of roads from the stream network (Appendix A *High Sedimentation Potential* and *High Road Density* risk factor discussions for each drainage), there would be less rapid delivery of storm runoff directly to streams from roads. Peak flows from roads would be reduced; however, this reduction would not be discernable over background levels at or beyond the mouth of individual 7th field drainages where such improvements took place (see the Appendix A *High Sedimentation Potential*, *High Road Density*, *Riparian Area Conditions*, and *Stream Channel Conditions* risk factor discussions for each drainage).

Road renovation and new road construction would be completed at the beginning of the project. Renovation work prior to the start of other activities at the beginning of the project would fix existing drainage and sediment transport issues on roads, and implementation of the Chapter 2 Project Design

Features would help minimize potential risks, so the potential for road-related problems to be transmitted to streams would be reduced. Road decommissioning would be completed at the end of the project, approximately 3 years following the initial roadwork. The net effect would be that, even though renovation would reduce routing of flow and sediment directly to streams at the beginning of the project, there would be slightly increased road densities during the actual project work, so risk levels related to roads during the project would be comparable to what existed prior to the start of the project. The improved conditions resulting from decommissioning would not begin to take effect until near the end of the project. Once harvest activities were completed, all roads would receive a final round of maintenance to fix "wear-and-tear" to surfacing and erosion control measures incurred during the project. Effects to hydrology, while potentially observable within a short distance of the work, would not be discernable over background levels at or beyond the mouth of individual 7th field drainages, with the exception of increased stream sedimentation compared to recent levels associated with a stream ford in the mainstem Little Applegate River between Glade Creek and Rush Creek (LA0203). This ford has been in place and used periodically for many years, so while there would increased sediment delivery over levels seen in the last few years, this would represent part of the ongoing fluctuation in sediment levels resulting from periodic timber harvest activities and associated sediment input that has been going occurring at this ford for many years. Sedimentation downstream of this ford would increase in the near future as the result of foreseeable timber hauling activities from private lands as well as from proposed renovation of and hauling across the ford under Alternative 4. Because much of the downstream river system has been straightened and confined, the Little Applegate River no longer retains its full capacity to transport sediment through the system, and it is likely that sediment inputs in excess of long-term background levels will remain in the active channel for long periods of time, contributing to continued maintenance of or additional negative impact on already degraded sedimentation conditions downstream. While renovation of the ford proposed under Alternative would ultimately leave the ford in a less-impacting condition after the project as compared to the current condition, sedimentation introduced by the Alternative 4 proposal itself would be greater than what would occur under the no-action alternative (see Appendix A *High Sedimentation Potential* risk factor discussion for drainage LA0203). Additionally, the location of the ford and approaches within the flood-prone area of the river ensure that improvements made to the ford at any given time are likely to be washed away in the next high water, requiring a continual cycle of maintenance and the associated disturbance to the channel, and preventing any true long-term benefit from the limited stream ford improvements being proposed here (Appendix A *Stream Channel Condition* and *High Sedimentation Potential* risk factor discussions for Drainage LA0203).

Because the very slight increase in disturbance on highly erodible soils under Alternative 4 (Table 4-H-7, column 3) would have no impact to streams (see *Alternative 4 Direct and Indirect Effects* discussion) under this alternative, implementation of this alternative would not cause any increase in cumulative effects related to disturbance on highly erodible soils. Foreseeable future actions (Table 4-H-8, column 3) could cause slight increases in disturbance on highly erodible soils (see comparisons in Appendix A Table A1 and the Appendix A discussion for the *Highly Erodible Soils* risk factor for each drainage. Also compare Table 4-H-2, column 3 [Current Condition] to Table 4-H-12, column 3 [Alternative 4 Cumulative Effects]). This increase would be only a few acres, and would not result in changes in impacts to streams over current conditions. This is important because disturbance on highly erodible soils is a potential source of turbidity and sediment in streams. Highly erodible soils can more easily be impacted from ground disturbance or channelization of water, increasing the chances that associated fine sediment could enter the downslope aquatic system. Because no activity is proposed in potentially unstable areas under this alternative, implementation of this alternative would not cause any increase in cumulative effects related to these areas. This is important because unstable areas are prone to mass wasting that could dramatically increase sediment yields and possibly affect stream function. See the *Soils* discussion for more information regarding highly erodible soils and unstable areas.

Under Alternative 4, stream channels would continue to have protection as Riparian Reserves, and treatments in Riparian Reserves would continue to utilize Project Design Features that would minimize impact to the channels (Chapter 2). Stream channels on private lands would continue to be protected by county ordinance and Oregon Forest Practices Rules. Streams need adequate stream channel structure (i.e. debris jams or other structures) to dissipate stream energy and prevent degradation of channel conditions (sinuosity, width/depth ratio, or gradient), and need things like rocks and woody debris sufficient to protect the channel from accelerated bank erosion and downcutting during flood events. This is important because increases in peak flows or sediment delivery could destabilize the stream channel, increasing bank erosion, reducing channel structure, and increasing sedimentation within the channel. Forest management that does a better job at mimicking a low-severity natural fire regime could, over time, provide greater inputs of large, stable wood to channels and more stable peakflows and baseflows, resulting in improvements in channel stability and condition over the long term. Implementation of similar management across all ownerships could further improve the situation; without similar management on other ownerships, conditions of stream channels on private lands could remain static or even decline over time. Stream channel conditions on BLM lands would gradually improve with ongoing watershed restoration of riparian and upland areas (Table 4-H-7 column 6).

Riparian areas would continue to be protected and managed per direction in the Aquatic Conservation Strategy (ACS) (USDI 1995:22-23). Riparian areas where previous harvest activities occurred would continue to gradually recover from past harvest impacts. Management of Riparian Reserves would follow the RMP general management guidelines for Riparian Reserves (USDI 1995:26-27) as well as the specific management direction for Riparian Reserves in the Applegate Adaptive Management Area (USDI 1995:38). No activity is proposed under this alternative that would result in anthropogenic-caused heating of streams in this drainage (ODEQ 2003b:2), and implementation of Best Management Practices, other Project Design Features (Chapter 2), and protection of Riparian Reserves would enable the Project to avoid violation of the Clean Water Act. This Project, other recent riparian vegetation treatments in the Planning Area, and foreseeable future management in the watersheds of the Planning Area, would allow gradual improvement in water quality over time in portions of the Planning Area (Table 4-H-12 column 13).

Other projects have already reduced the high density of vegetation on BLM lands in portions of the Planning Area; these previous treatments would allow for the future maintenance underburning of some areas. In the event of a wildfire, this could result in reduced effects to water and soil resources, decreasing the likelihood that such a fire would have “catastrophic” effects within the treated areas (Appendix A *High Impacts from a Catastrophic Event* risk factor discussion for each drainage).

With future management of BLM lands continuing to avoid intensive timber harvest and focus on thinning-type prescriptions and use of maintenance underburning, new young stands might only be created as a result of future stand-replacement wildfire or stand-scale mortality caused by forest pathogens. Both stand replacement fire and stand-scale mortality could be reduced over the long-term compared to current conditions. This, along with the gradual recovery of riparian areas affected by past clear-cutting, would benefit riparian restoration and maintenance of late successional characteristics along streams (Table 4-H-12 column 8)(Appendix A *Riparian Area Conditions* risk factor discussion for each drainage).

Hydrology/Water Resources: Changes in Effects Analysis due to implementation of Mitigating Measures

For the Alternative 2 analysis, implementation of Mitigating Measure 1 would slightly change the analysis numbers in four drainages. In the Little Applegate River between Rush Creek and Birch Creek (LA0209), 74 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. Approximately 0.1 mile less of new roads and landings would be constructed. In the Little Applegate River between Birch Creek and Lick Gulch (LA0215), 124 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future

underburning on those same acres. Approximately 0.3 miles less of new roads and landings would be constructed. In Lick Gulch (LA0218), 0.3 miles less new road would be constructed. In general, these changes are small and far from active streams, so there would be little potential for either adverse or beneficial effect to water resources. The reductions in road construction would slightly reduce negative effects related to compaction and road density, while the reductions in vegetation treatments and use of fire as a resource tool would have some negative effects on overall ecosystem function related to water resources. In the Little Applegate River between Yale Creek and Grouse Creek (LA0403), the harvest prescription would change on approximately 93 acres, but this change would not change the effects analysis for water resources. Mitigating Measure 1 would not significantly change the water resources effects analysis for Alternative 2.

For Alternative 3, implementation of Mitigating Measure 1 would slightly change the analysis numbers in three drainages. In the Little Applegate River between Rush Creek and Birch Creek (LA0209), 74 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. Approximately 0.1 mile less of new roads and landings would be constructed. In the Little Applegate River between Birch Creek and Lick Gulch (LA0215), 124 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. In general, these changes are small and far from active streams, so there would be little potential for either adverse or beneficial effect to water resources. The reduction in road construction could very slightly reduce the risk of negative effects related to compaction and road density, while the reductions in vegetation treatments and use of fire as a resource tool would have some negative effects on overall ecosystem function related to water resources. In the Little Applegate River between Yale Creek and Grouse Creek (LA0403), the harvest prescription would change on approximately 93 acres, but this change would not change the effects analysis for water resources. Mitigating Measure 1 would not significantly change the water resources effects analysis for Alternative 3.

For the Alternative 2 analysis, implementation of Mitigating Measure 2 would slightly change the analysis numbers in five drainages. In First Water Gulch (LA0127), 3 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. In Birch Creek (LA0212), 97 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. In the Little Applegate River between Birch Creek and Lick Gulch (LA0215), 96 acres of helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. In the Little Applegate River between Yale Creek and Grouse Creek (LA0403), 32 acres of tractor yarding and 39 acres helicopter yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. There would be 0.4 miles less new road and landing construction. In Sterling Creek between Hukill Hollow and the Little Applegate River (LA0439), 17 acres of tractor yarding would be dropped, along with the associated slash pile and burn, and future underburning on those same acres. There would be 0.2 miles less road and landing construction. In general, these changes are small and far from active streams, so there would be little potential for either adverse or beneficial effect to water resources. The reduction in road construction would very slightly reduce the risk of negative effects related to compaction and road density, while the reductions in vegetation treatments and use of fire as a resource tool could have some negative effects on overall ecosystem function related to water resources. Mitigating Measure 2 would not significantly change the water resources effects analysis for Alternative 2.

For the Alternative 3 analysis, implementation of Mitigating Measure 2 would be identical to the Alternative 2/Mitigating Measure 2 analysis discussed above, except that there would be no difference in road construction between this mitigating measure and what was already analyzed for Alternative 3, so the discussion regarding roads would not apply here. Implementation of Mitigating Measure 2 would not significantly change the water resources effects analysis for Alternative 3.

Hydrology/Water Resources: Summary of Key Findings

Some of the key findings from the Hydrology/Water Resources discussion above and in Appendix A are reprised below, to make it easier to highlight some of the differences between the Alternatives.

Current Condition

- Road density is high, with many roads in close proximity to streams.
- Concentration of runoff by road drainage systems is likely contributing to more rapid delivery of storm runoff directly to streams, resulting in increased peak flows.
- Compacted area due to past harvest and roads is a concern in the Waters Gulch drainage (LA0327); Waters Gulch probably has elevated peak flows due to the amount of compacted ground and area in roads.
- The area in nonrecovered transient snow zone openings is a concern in Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (Drainage LA0145); openings are due to high road density and large areas of salvage logging and open stand conditions following the 2001 Quartz Fire. There is a slightly increased risk for peak flow enhancement in this drainage. BLM-administered land in this drainage is only 152 acres (approximately 5 percent of the drainage).
- Groundwater storage within the Planning Area is generally limited to valley bottom alluvium along the larger rivers and in the accumulated colluvium in the valley bottoms of smaller streams and draws.
- Restoration of upland vegetation conditions and larger vegetation and woody debris in stream bottoms are both critical in maintaining and enhancing low flows and groundwater availability within the Planning Area.
- Stream channel conditions are fair-to-poor in many of the drainages in the Planning Area.
- Many streams within the Planning Area have stream temperatures that exceed State water quality standards. This is a combination of natural influence, past intensive harvest in riparian areas along with degraded riparian and channel conditions at some locations. On BLM lands, the primary factors that adversely affect stream temperatures include removal of streamside vegetation, roads constructed with drainage systems that route flow directly to streams, ground-disturbing operations without streamside buffers, and lack of project design features/best management practices being applied to management activities.
- Stream sedimentation conditions are fair-to-poor in many streams within the Planning Area, due to overall road densities, road interactions with streams, ground disturbance on highly erodible soils (in the Waters Gulch drainage, LA0327), and total compacted area (also in Waters Gulch).
- Naturally unstable areas were identified in a number of dry draws, as well as an area on the north face of the ridge locally known as Trillium Mountain.

Foreseeable Future Actions

- Very slight increases in road density could occur in two drainages along the Applegate River as part of the BLM's proposed Deadman's Palm project. Road construction would not be located in any Riparian Reserves, and would be done using Project Design Features incorporating Best Management Practices (USDI 1995: Appendix D).
- Future intensive timber harvests on non-BLM lands are possible in most drainages; large changes could occur in the Little Applegate River between Glade Creek and Rush Creek (Drainage LA0203), Waters Gulch (Drainage LA0327), Yale Creek between Waters Gulch and the confluence with the Little Applegate River (Drainage LA0330), and Lower Sterling Creek (Drainage LA0429). At some locations, these future intensive harvests and associated disturbance could increase compacted ground, create new areas of nonrecovered transient snow zone openings,

increase sediment production and sediment delivery to streams, increase the amount of streamflow during rain-on-snow events, and cause declines in stream channel and riparian conditions.

- Future periodic maintenance underburning already authorized in many of the drainages under other federal projects could benefit adjacent riparian areas, potentially decreasing the magnitude of wildfires moving into riparian areas out of the uplands.

Alternative 1 (Current and Ongoing effects)

- There would be no changes in the magnitude or frequency of peak flows, because changes in road density, proximity of roads to streams, areas of compacted soil, or percentages of nonrecovered openings within the transient snow zone would not be sufficient to produce incremental changes in the flow regime.
- Continued high road densities and roads crossing streams at many locations would result in continued increased peak flows.
- Stream channels would continue to be at an increased level of risk for adverse effects of increased peak flows. With no changes in management, stream channel conditions would trend downward over time, with drainages having the highest road densities and other disturbances seeing the most rapid declines in condition.
- Riparian areas where previous intensive harvest activities occurred would continue to gradually recover from past harvest impacts.
- Riparian areas on BLM lands would continue to be protected per direction in the Aquatic Conservation Strategy (ACS)(USDI 1995:22-23); however, with no road-related work in Riparian Reserves, watershed restoration direction regarding roads under the ACS might not be met.
- The effect to riparian vegetation of taking "no action" on BLM land would be negative in many drainages, because RMP direction that silvicultural practices are to be applied to Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS and Riparian Reserve objectives (USDI 1995:27) would not be implemented.
- Water quality conditions would not change in the Planning Area, but there would also be no action to correct problems associated with roads, so any temperature effects from channel conditions aggravated by roads would be expected to continue. Streams would continue to have some degree of warming due to a combination of natural influences, areas of past intensive harvest in riparian areas, and degraded riparian and channel conditions at some locations. Stream sedimentation would also remain a problem with sediment input to streams expected to remain relatively constant, except for the sedimentation/turbidity resulting from use of a stream ford in the Little Applegate River as part of non-BLM harvest activities. This use would not result in a long-term change in conditions, because this ford has been in place and delivering sediment and turbidity to the River for many years[8].
- Little Applegate Key Watershed road density would remain unchanged, meeting minimum management direction in the RMP (USDI 1995: Appendix A, page B-19).

Alternative 2

- Overall road density would decrease, including roads in Riparian Reserves.
- Roadwork would better disconnect roads from the stream system through renovation of existing roads, decommissioning roads, and relocation of some roads further from streams; this would help to control and prevent road-related runoff and sediment production, one of the most important components of a watershed restoration program under the ACS (USDI 1995:23). The beneficial effect of the proposed roadwork in improving drainage and relocating roads further from streams would offset some localized increases in road density necessary to make those road system improvements.
- The overall reduction in road density, reduction in Riparian Reserves road density in many drainages, removal of numerous stream crossings, and more disconnection of roads from the stream

[8] John Samuelson, BLM Ashland Resource Area, personal communication to BLM hydrologist David Squyres.

network through drainage improvements would reduce the peak flow impacts and therefore reduce sediment delivery to streams. This in turn would improve or maintain stream channel conditions.

- Compacted area due to proposed harvest and roads would increase slightly in the Waters Gulch drainage (LA0327); however, this is not of great concern because the amount of change is small and the location is high on a ridge, so there would be no additional flow or sediment reaching streams as a result.
- There would be no impacts to streams from disturbance on highly erodible soils.
- There would be no significant changes in total nonrecovered transient snow zone openings.
- Stream temperatures would not be affected.
- Naturally unstable areas identified in dry draws and on the north face of the ridge locally known as Trillium Mountain would be protected as Riparian Reserves and protected from ground disturbance.
- Road density in the Little Applegate Key Watershed would be unchanged.
- Although some effects (both good and bad) to water quality and quantity could possibly be apparent at times immediately downstream of some project activities, any changes would be very small and would not be discernable at the mouth of the individual 7th field drainages in which they occur. With no effects at the 7th field drainage level other than the sedimentation/turbidity from a stream ford in the Little Applegate River, there would be no potential for incremental changes in hydrology/water resource conditions within the Little Applegate River and Applegate River-McKee Bridge 5th field watersheds. Downstream watersheds in the Applegate Subbasin and ultimately the Rogue River would therefore also not be affected. The sedimentation/turbidity resulting from use of the stream ford would not result in an incremental change in conditions, because this ford has been in place and delivering sediment and turbidity to the River for many years[9], and that part of this proposal would maintain the status quo. The sediment/turbidity increases would only be slightly greater than those identified under Alternative 1 (Squyres and Smith 2005). The Medford PRMP/EIS disclosed that the allocation of Riparian Reserves and implementation of Best Management Practices (Chapter 2 Project Design Features) would greatly reduce potential adverse effects, but that these adverse effects would not be entirely eliminated (USDI 1994:4-23).
- Implementation of the Chapter 2 Project Design Features (which incorporate Best Management Practices (BMPs)(USDI 1995:Appendix D) along with the allocation of Riparian Reserves would greatly mitigate potential adverse effects of management activities on water resources; however, adverse effects would not be totally eliminated. The water resources effects identified here in Chapter 4 and discussed in greater detail in the drainage-specific analyses in Appendix A are either the same as or less than those identified in the Medford District PRMP/EIS (USDI 1994:4-12 to 4-24).

Alternative 3

- There would be a greater decrease in road density than under Alternative 2, but the impact to water resources would not change much, because road density in Riparian Reserves would be nearly identical to Alternative 2. The exception is Lick Gulch (LA0218), where additional streamside roads would be eliminated; peak flow and sedimentation impacts to Lick Gulch would decrease even more than under Alternative 2.
- There would be less new compacted area in Waters Gulch (LA0327) than under Alternative 2, because the proposal for new road construction would be dropped in this drainage under this alternative.
- There would be slightly less disturbance on highly erodible soils than under Alternative 2, still with no impacts to streams.
- Stream temperatures would not be affected.

[9] John Samuelson, BLM Ashland Resource Area, personal communication to BLM hydrologist David Squyres.

- Naturally unstable areas identified in dry draws and on the north face of the ridge locally known as Trillium Mountain would be protected as Riparian Reserves and protected from ground disturbance.
- Road density in the Little Applegate Key Watershed would decrease slightly.
- Although some effects (both good and bad) to water quality and quantity could possibly be apparent at times immediately downstream of some project activities, any changes would be very small and would not be discernable at the mouth of the individual 7th field drainages in which they occur. With no effects at the 7th field drainage level, there would be no potential for incremental changes in hydrology/water resource conditions within the Little Applegate River and Applegate River-McKee Bridge 5th field watersheds. Downstream watersheds in the Applegate Subbasin and ultimately the Rogue River would therefore also not be affected. The sedimentation/turbidity resulting from use of the stream ford would not result in an incremental change in conditions, because this ford has been in place and delivering sediment and turbidity to the River for many years[10], and that part of this proposal would maintain the status quo. The sediment/turbidity increases would only be slightly greater than those identified under Alternative 1 (Squyres and Smith 2005). The Medford PRMP/EIS disclosed that the allocation of Riparian Reserves and implementation of Best Management Practices (Chapter 2 Project Design Features) would greatly reduce potential adverse effects, but that these adverse effects would not be entirely eliminated (USDI 1994:4-23).
- Implementation of the Chapter 2 Project Design Features (which incorporate Best Management Practices (BMPs)(USDI 1995:Appendix D) along with the allocation of Riparian Reserves would greatly mitigate potential adverse effects of management activities on water resources; however, adverse effects would not be totally eliminated. The water resources effects identified here in Chapter 4 and discussed in greater detail in the drainage-specific analyses in Appendix A are either the same as or less than those identified in the Medford District PRMP/EIS (USDI 1994:4-12 to 4-24).

Alternative 4

- Overall road density would decrease slightly, although less than under either Alternative 2 or Alternative 3. Road density would also decrease in Riparian Reserves, but the improvements would be limited to a much smaller area than under the other action alternatives.
- There are a number of drainages where road improvements that would reduce stream sedimentation potential under Alternatives 2 and 3 would not be done or would be much less extensive under Alternative 4. Lick Gulch, which would have benefited the most under the other Alternatives, would have no work done under Alternative 4. Overall, benefits from road density reduction would be substantially less under this alternative than under Alternative 2 or 3.
- Unlike Alternatives 2 and 3, no activity would occur in several drainages with elevated levels of existing road density and/or compaction concerns: Glade Creek between Garvin Gulch and the confluence with the Little Applegate River (LA0145), Waters Gulch (LA0327), and Yale Creek between Waters Gulch and the confluence with the Little Applegate River (LA0330).
- Peak flows from roads would be reduced (although substantially less than under Alternatives 2 or 3) due to overall reduction in road density, reduction of Riparian Reserve Road density in some drainages, removal of some stream crossings and more disconnection of roads from the stream network.
- There would be very little disturbance on highly erodible soils, less than either Alternative 2 or Alternative 3, still with no impacts to streams.
- Stream temperatures would not be affected.

[10] John Samuelson, BLM Ashland Resource Area, personal communication to BLM hydrologist David Squyres.

- Naturally unstable areas identified in dry draws and on the north face of the ridge locally known as Trillium Mountain would be protected as Riparian Reserves and protected from ground disturbance.
- Although riparian areas would continue to be protected and managed per direction in the Aquatic Conservation Strategy (USDI 1994:22-23), the effect of "no action" being taken in a number of drainages under Alternative 4 would maintain current declining riparian conditions in 6 drainages that would have seen improvement under Alternatives 2 and 3.
- Road density in the Little Applegate Key Watershed would be unchanged.
- Although some effects (both good and bad) to water quality and quantity could possibly be apparent at times immediately downstream of some project activities, any changes would be very small and would not be discernable at the mouth of the individual 7th field drainages in which they occur. With no effects at the 7th field drainage level, there would be no potential for incremental changes in hydrology/water resource conditions within the Little Applegate River and Applegate River-McKee Bridge 5th field watersheds. Downstream watersheds in the Applegate Subbasin and ultimately the Rogue River would therefore also not be affected. The sedimentation/turbidity resulting from use of the stream ford would not result in an incremental change in conditions, because this ford has been in place and delivering sediment and turbidity to the River for many years[11], and that part of this proposal would maintain the status quo. The sediment/turbidity increases would only be slightly greater than those identified under Alternative 1 (Squyres and Smith 2005). The Medford PRMP/EIS disclosed that the allocation of Riparian Reserves and implementation of Best Management Practices (Chapter 2 Project Design Features) would greatly reduce potential adverse effects, but that these adverse effects would not be entirely eliminated (USDI 1994:4-23).
- Implementation of the Chapter 2 Project Design Features (which incorporate Best Management Practices (BMPs)(USDI 1995:Appendix D) along with the allocation of Riparian Reserves would greatly mitigate potential adverse effects of management activities on water resources; however, adverse effects would not be totally eliminated. The water resources effects identified here in Chapter 4 and discussed in greater detail in the drainage-specific analyses in Appendix A are either the same as or less than those identified in the Medford District PRMP/EIS (USDI 1994:4-12 to 4-24).

4. VEGETATION

a. Conifer Forest Stands

For the purpose of conducting the analysis of direct, indirect, and cumulative effects of the Bald Lick Project, the planning area boundary was selected as the appropriate scale of analysis. The effects of treatment on tree vigor and growth are generally are detected within the area treated. The effects of no treatment of some forest stands are generally detected for surrounding areas in the immediate vicinity (e.g. the susceptibility of treated stands to bark beetle infestation that are located in the immediate vicinity of forest stands left untreated).

Alternative 1 - No Action

Direct and Indirect Effects

The No-Action Alternative would allow forest stands to remain overstocked and individual tree vigor and growth would remain poor. A sample of dominant trees showed an average decadal radial growth of 0.48 inches or 0.96 inches diameter growth per decade in the Bald Lick Project area. During the drought year

[11] John Samuelson, BLM Ashland Resource Area, personal communication to BLM hydrologist David Squyres.

2001, the radial growth of dominant trees was less than 1 millimeter. During 2002, radial growth averaged 1 millimeter. When radial growth is less than 0.5 inches per decade, pine trees cannot pitch-out bark beetles and tree mortality results (Dolph, 1985). Tree mortality represents a reduction in stand volume production and a loss of revenue and poor forest health.

Without action, forest structure and species composition could not be controlled. On pine sites, Douglas-fir would remain the most prevalent species and stands would remain in the stem exclusion stage of development if mortality does not occur. Old-growth ponderosa pine and Douglas-fir trees with seedlings through pole-size trees within their dripline would continue to die from competition for water. Pine and oak species would continue to decline in number from competition with 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 lightning, wind-throw, or insects and disease. Resources previously used by the dead tree are reallocated to the surviving vegetation. The hundreds of trees per acre also present a high fuel hazard across the landscape.

Selection of the No-Action Alternative would be in conflict with the Medford District Resource Management Plan forest condition objectives in regard to forest health and would not meet the Purpose and Need for this project to reduce tree mortality and the risk of high intensity wildfire by restoring the vigor, resiliency, and stability of conifer forest stands (see Chapter 1, Purpose and Need).

With no forest stand density reduction, slow tree growth and vigor would result in individual tree and perhaps stand mortality. If severe stand mortality results, silvicultural options in the future would be reduced. It is possible that after bark beetle attack, there may be less than 16 trees per acre remaining in some forest stands. If this happens we would not be able to harvest live trees for approximately 30 to 50 years. The bark beetles may also disperse to adjacent unthinned watersheds and kill more trees.

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

Where dense forest stands persist overtime, canopy closure would remain at 90 to 100 percent. When tree mortality is singular or in small patches, canopy closure may approach 50 to 80 percent. Where large patches of trees die, canopy closure would be 0 to 40 percent.

Cumulative Effects

hile forest health and fuel hazard reduction would not occur under the no-action alternative, about 1,000 acres of fuels reduction would still occur in the project area in association with the Little Applegate Fuels Reduction project and another xxx acres of fuels reduction occurred in 2003/04 in association with the Bobar Landscape project. These non-commercial fuels reduction projects focus on noncommercial vegetation treatments primarily in hardwood and shrubland plant communities. While hazardous fuels are being reduced in near proximity to residential and other strategic areas, no forest health treatments would occur. High tree densities would continue in conifer forest stands contributing to high tree mortality rates, an abundance of dead vegetation and ladder fuels. No treatment of conifer forest stands would leave areas with moderate to high fuel hazard ratings that would otherwise be reduced to varying degrees under the action alternatives. While the timing and length of future droughts or changes in climatic conditions cannot be predicted with any certainty, conifer forest stands left untreated would be much less resistant to reduced rainfall or higher temperatures as the competition for water and nutrients would remain high.

Alternative 2

Direct and Indirect Effects
The proposed prescriptions to be applied across the forest landscape are based upon the present vegetation structure, species composition, aspect, and vegetation condition class, to allow for the creation of desired old-growth forest structure and the desired tree series over time. Through forest stand treatments tree densities are 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 Section 6, Fire & Fuels). Table 2 of the silvicultural prescriptions (Appendix B) shows projected 20-year diameter growth for treated and untreated stands (projections from the southwest Oregon ORGANON growth analysis model). Table 4 (Appendix B) shows the growth of one large conifer (11 to 21 inches DBH) and one mature conifer stand with and without management. In the mid-sized stands hundreds of trees per acre are lost through natural mortality versus being utilized through timber harvesting at a specified rate as recommended in Table 3 (Appendix B).

Table 2 (Appendix B) also shows that 10-year diameter growth would increase substantially versus the no treatment alternative if the stands are treated accordingly. Trees would then be vigorous enough to withstand bark beetle attacks. Leaf area index values would also begin to increase after the stands are thinned.

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

The various prescriptions meet the specifications of restoration thinning and density management as outlined in the Medford District Resource Management Plan.

There is within stand variation in canopy closure and this variation would remain across the landscape. On Douglas-fir sites, including pole stands, canopy closure would be 50 percent or greater. On pine and Douglas-fir regeneration harvest sites, canopy closure would be 35 to 50 percent. Pine species are shade intolerant so canopy closure must be lower.

In addition to the commercial treatment 1,372 acres would be pre-commercially thinned. 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 would 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.

Cumulative Effects
Using a landscape approach to implement various silvicultural prescriptions to improve forest stand health, would maintain and improve forest stand growth, thus options for future forest production would be maintained consistent with managing forest (Chapter 1, Purpose and Need). With the maintenance and improvement of tree vigor, maintenance of more fire and drought tolerant species (such as pine and incense cedar), and reduction of hazardous fuels, forest stands would also be more tolerant of future droughts and climate changes, and would be more resilient in the event of wildfires. Forest health treatments combined with other fuels reduction treatments including the Little Applegate Fuels Reduction project and the Bobar non-commercial fuels reduction would contribute a more fire safe landscape. While wildfires would not be prevented altogether, the severity of their effects would be reduced (see Section 6, Fire & fuels).

Untreated forest stands in the planning area would still be at higher risk to bark beetle attacks which could increase the occurrence of bark beetle attack in the treated stands. Mortality of untreated stands could lead to epidemic levels of bark beetle species that could infect adjacent thinned forest stands. However, treated stands would have improved vigor and would have a higher resistance to succumbing to bark beetles.

If surrounding private lands are intensively harvested as anticipated (see drainage by drainage assessment in Appendix A) greater importance is placed on the maintenance of healthy mature forest stands on BLM administered lands to provide habitats for a variety of species.

Alternative 3

Direct and Indirect Effects
Silviculturally, this alternative would be the same as Alternative 2. Only yarding methods would differ and it may be more difficult to access areas for pre-commercial thinning do to reduction in road construction.

Cumulative Effects
Cumulative effects would be the same as Alternative 2.

Alternative 4

Direct and Indirect Effects
This alternative would eliminate forest thinning needed to maintain forest stand growth and vigor on a substantial portion of the project area (45 percent). The effects for the acres treated would be the same as Alternative 2, however, for only about half of the area proposed for treatment. Through forest stand treatments tree densities would be reduced thus improving individual tree vigor and growth, and improved forest stand health. Forest stands receiving low commercial thinning treatments would be less subject to crown fires (see Section 6, Fire & Fuels). For the area treated, the ten-year diameter growth would increase substantially and trees would then be vigorous enough to withstand bark beetle attacks. Leaf area index values would also begin to increase after the stands are thinned. Pine and cedar species would be favored to increase their prevalence in the forest stands thus enhancing species diversity and fire resiliency. The various prescriptions meet the specifications of restoration thinning and density management as outlined in the Medford District Resource Management Plan.

There is within stand variation in canopy closure and this variation would remain across the landscape. On Douglas-fir sites, including pole stands, canopy closure would be 50 percent or greater. On pine and Douglas-fir regeneration harvest sites, canopy closure would be 35 to 50 percent. Pine species are shade intolerant so canopy closure must be lower.

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 would 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.

The effects for the acres not treated would be the same as those discussed under the No-Action Alternative. Forest health would decline because individual tree vigor would remain low and forest tree densities would remain high, and undesirable tree species shifts would continue. The effects would vary by the age of the forest stand.

Younger pole stands would decrease in vigor due to overstocking. Tree mortality would result over time. Without treatment some conifer forests could shift to a hardwood forest eliminating sustainable conifer forest production. Fewer trees per acre would develop into old-growth trees and it would take a longer time period to do so.

On pine sites tree mortality would continue and species composition shifts would continue. Douglas-fir which is more shade tolerant would continue to dominate the pine sites. Douglas-fir trees cannot survive as

long as pine species on the droughty sites. Hardwoods can also take the place of conifer species with no treatment.

For older forest stands designated for regeneration harvest, the future trajectory of the forest in terms of species composition and trees per acre would remain uncertain. Some of the older trees would die over time and the species regenerating the site would remain uncertain. With proper forest management the trajectory of the future forest can be controlled.

Cumulative Effects

About 1,000 acres of fuels reduction would still occur in the project area in association with the Little Applegate Fuels Reduction project and another 2,164 acres of fuels reduction occurred in 2003-05 in association with the Bobar Landscape project. These non-commercial fuels reduction projects focus on noncommercial vegetation treatments primarily in hardwood and shrubland plant communities. While hazardous fuels are being reduced in near proximity to residential and other strategic areas, forest health treatments would be reduced in comparison to Alternatives 2 and 3.

In the areas treated, forest stands would also be more tolerant of future droughts and climate changes, and would be more resilient in the event of wildfires. Forest health treatments combined with other fuels reduction treatments including the Little Applegate Fuels Reduction project and the Bobar non-commercial fuels reduction would contribute a more fire safe landscape. While wildfires would not be prevented altogether, the severity of their effects would be reduced (see Section 6, Fire & fuels).

In the areas left untreated, high tree densities would continue in conifer forest stands contributing to high tree mortality rates, an abundance of dead vegetation and ladder fuels (see Fire and Fuels). While the timing and length of future droughts or changes in climatic conditions cannot be predicted with any certainty, conifer forest stands left untreated would be much less resistant to reduced rainfall or higher temperatures as the competition for water and nutrients would remain high.

Untreated forest stands in the planning area would still be at higher risk to bark beetle attacks which could increase the occurrence of bark beetle attack in the treated stands. Mortality of untreated stands could lead to epidemic levels of bark beetle species that could infect adjacent thinned forest stands. However, treated stands would have improved vigor and would have a higher resistance to succumbing to bark beetles.

If surrounding private lands are intensively harvested as anticipated (see drainage by drainage assessment in Appendix A) greater importance is placed on the maintenance of healthy mature forest stands on BLM administered lands to provide habitats for a variety of species.

Table 4-3. Estimated acreage, canopy closure and the percent acres by logging system for each silvicultural prescription in the Bald Lick Project.

Prescription	Acres Planned for Treatment	% Canopy Closure Remaining (Estimated)
Moist Douglas-fir	437 ac.	50%+
Dry Douglas-fir	2644 ac.	50%
Pine thinning	1685 ac.	40%
Regeneration	254 ac.	Pine: 40% Fir: 40 - 90%
Douglas-fir poles	326 ac.	50%+

Douglas-fir mistletoe	48 ac.	Varies
TOTAL	**5115 ac.**	

Effects of Implementing Mitigation Measures

1. *No treatment on the northside of the ridge referred to as "Trillium Mountain" by some Little Applegate residents and change of prescription for one unit from regeneration harvest to dry Douglas-fir thinning.*

From a forest health/silviculture perspective, the forest stands are declining in tree vigor/growth. Average decadal radial growth ranges from 0.4 to .55 inches. In 10 years some dominant trees are growing less than 1 inch in diameter. Maximum diameter growth is 1.1 inches per decade. Tree stocking ranges from 140 to 360 square feet of basal area per acre. In order to maintain diameter growth rates of 1 inch or more per decade, ideal stocking should be approximately 100 to 120 square feet of basal area per acre. The stands on the north side of Trillium Mountain are young (less than 104 years of age). In 1999 when the forest stands were inventoried, sample trees ranged in age from 84 to 99 years of age. The pine stand in section 27 was 131 years of age. The moist Douglas-fir stand in section 23 ranged from 101 to 130 years of age. Thinning this area now would help create old-growth tree and stand characteristics in less time. Letting nature take its course may result in patches of tree mortality. Without thinning, nature will thin the stands over time with the same result – less trees per acre with mortality in an unpredictable, random pattern. Without thinning it would take decades longer to achieve old-growth characteristics and forest health would decline.

If the regeneration harvest unit is not treated, old-growth tree mortality would probably continue. The forest stand is 228 years of age and large Douglas-fir trees are dying. In 1999 when this forest stand was inventoried, there were dead trees ranging in size from 18 to 35 inches DBH. The plant association for this stand is Douglas-fir/Poison Oak/Piper's Oregongrape, so this is an indication of a dry site (Atzet and Wheeler, 1984). Ponderosa pine is present also. Douglas-fir dwarf mistletoe is present which makes the infected trees more susceptible to bark beetle attack. Presently, canopy closure is 87 percent. The prescription for this forest stand would leave 23 conifer trees per acre and 125 square feet of basal area per acre. There are an additional 5 hardwood trees per acre. There would be a tree every 40-feet with no less than 40 percent canopy closure after thinning. From a distance the forest would look slightly more open than the adjacent thinned forest. A tourist visiting the area would probably not even know that the forest was thinned. A regeneration harvest is not the same as a clearcut. This prescription would allow more light to reach the forest floor so that Douglas-fir seedlings could grow. The largest, healthiest trees would be left standing ranging from 12 to 48 inches DBH. Thinning would provide the remaining old-growth trees with more water and may allow them to live a longer time on the droughty site

2. No treatment of economically challenged units.

The main reason for treating the isolated forest areas is to put the vegetation on the proper trajectory for the future in regard to species composition. Fire exclusion has allowed Douglas-fir to invade this droughty area and shade-out the drought tolerant species such as ponderosa pine and California black oak. There are too many stems per acre of undesirable trees taking water away from the drought tolerant species. This has resulted in large diameter ponderosa pine and black oak mortality. Even though pine and oak are more drought tolerant than Douglas-fir, when there are too many trees, even the drought tolerant species cannot get enough water to survive, especially the large diameter trees. Not treating these forest stands would allow the species composition shift to continue resulting in a decline of the desired tree species. Structural diversity would be simplified. With mortality of the large diameter trees the number of tree layers would decline. Ecosystem diversity would be diminished with the loss of large diameter pine and black oak and the simplification of forest stand structure.

b. Analysis of 5th field Late-Successional Habitat 15 % Retention

The Northwest Forest Plan provides a Standard and Guideline to retain late-successional forest patches where 15 percent or less of federal forest lands are comprised of late-successional forest. Within Adaptive Management Areas, 15 percent or less late-successional habitat is to be considered as a threshold for analysis rather than a strict standard and guideline (NWFP p. D-11).

The Little Applegate Watershed Analysis assessed the Little Applegate watershed to be occupied by 36,899 forest capable acres of federally managed lands. Of these acres, 10,384 (28.1 percent) were in late successional stand conditions. Analyzing federal forest management projects which have occurred since 1995 or are reasonably foreseeable (Buncom Project – BLM, Little Applegate Project-FS, Wagner Gap Timber Sale-FS, and Little Applegate Stewardship project-FS) an estimated 905 acres of late-successional habitat would be altered by forest thinning treatments. This would lower the percentage of unaltered late-successional habitat to approximated 25.6 percent. According the Glade and Yale Creek Watersheds Late-Successional Reserve Assessment approximately 1,395 acres of Late-Successional habitat on both public and private lands was removed by the Quartz Fire. Even if one assumed the entire reduction in late-successional acres was on federal lands the percentage of forest capable acres in late-successional habitat conditions would remain at about 22 percent. Alternatives 2 and 3 of the Bald Lick Project would treat about 818 acres in late-successional condition, lowering the percentage of unaltered stands to about 20 percent. It must be noted that while thinning projects would alter current stand conditions, the majority of treatments would retain canopy closers at or above 50 percent, using prescriptions that would thin from below. While the vertical and horizontal structure would be modified the stands would remain to provide habitat benefits for a variety of species. Refer to wildlife section for species specific discussions.

The Applegate-Star Boaz Watershed Analysis assessed the Applegate-Mckee Bridge Watershed for the percentage of Late-Successional Habitat. Approximately 2,200 acres of late-successional habitat comprising 18 percent of the analysis were present (USDI 1998 p. 52, Map 178). Late-succesional habitat retention areas were recommended on Map 24. The Bald Lick project would not enter any late-successional habitat areas recommended for retention (USDI 1998 p. 179).

c. Effects of Implementation – Non-Conifer Vegetation

No Action Alternative

About 2.64 percent of the non-conifer plant communities (primarily shrublands and woodlands) in the Bald Lick Planning Area were recently treated (or will soon be treated) with slashbuster machines to reduce hazardous fuels. These treatments are associated with the Little Applegate Fuels Reduction Project and the Bobar Project. Another 10.8 percent of non-conifer plant communities were (or will soon be) treated manually in association with the Little Applegate Fuels Reduction Project and the Bobar Project. Combined this represents about 13.44 percent of the non-conifer plant communities.

The untreated areas would continue to reflect structural development in the absence of fire. For instance in-growth of Douglas fir would be prominent in ponderosa pine black oak communities and would also intrude into white oak/grass meadows along with ceanothus and manzanita. Many areas would also continue to carry heavy accumulations of fuels that are a result of brush species that have already grown and died. Overall these communities would retain an older seral (fire exclusion) structure.

Most of the untreated areas would continue to grow and develop with fire exclusion. Generally brush would be more prominent at the expense of hardwoods and occasional pine. Given the small percentage of non-conifer that is proposed for treatment, little effect would be noted at the landscape level within this project area.

Effects of Implementing the Action Alternatives

The Bald Lick proposal would treat about 1.03 percent of the non-conifer plant communities (primarily shrublands and woodlands) within the planning area using slashbuster machines to reduce hazardous fuels. Another 3.34 percent of the non-conifer plant communities would be treated using manual cutting and handpiling and burning methods to reduce hazardous fuels. Combined this represents 4.37 percent of the non-conifer plant communities on public lands within the planning area. Because of the small percentage of treatments scheduled the overall effects would be localized. An estimated 95.63 percent of the non-conifer plant communities would retain a late seral heavy fuel structure. Some that are treated would show an early seral character and few midseral plant associations would be present at a landscape level.

Woodlands

Slashbuster and prescribed fire treated woodlands would experience removal, but not elimination of understory species such as ceanothus and manzanita that was not as common prior to fire exclusion. Some larger older manzanita would be retained as would some of the present character of these plant communities through retention of untreated upland and riparian areas. Oaks, ponderosa pine and pacific madrone would become more dominant on site. Ponderosa pine would be more vigorous on the sites where they are found. Douglas fir, which is often an intrusive species, would decrease in frequency as it is selected against. Less vertical structure would be one result of treatments. Grasses would likely increase overall, but may not be the species desired especially in slashbuster areas where accumulated fuels would tend to smother out native bunchgrasses. The fuel loading effects of thinning by fire or slashbuster would generally be short lived unless fire is introduced again within five or ten years. Treatment areas would cause a seral change to younger plant associations over the planning area.

Effects from slashbuster treatments in any plant community would probably be noted in terms of high percentage of disturbed ground, some loss of soil productivity due to compaction (see soils section) and some noxious weed invasion.

Chaparral/Shrubs

Chaparral communities intruded by brush species would tend to retain chaparral characteristics if prescribed burning occurs. Chaparral communities that are slashbusted would lose some chaparral character and annual grasses would replace native bunchgrasses within these area. Prescribed burning would invigorate older chaparral and promote beneficial sprouting.

Brush

Removal of brush would reduce fuels and mature dead material while allowing for sprouting/regrowth of more vigorous younger brush. Areas disturbed and burned would likely regrow thick young manzanita where present previously.

Cumulative Effects

The area to be treated in Bald Lick project combined with the Little Applegate Fuels Reduction Project and the Bobar Project constitute about 17.8 percent of the non-conifer plant communities on public lands within the planning area. The remaining 82.2 percent of the non-conifer plant communities on public lands would remain untreated. Because of the small percentage of treatments scheduled the overall effects would be

localized. A large are of non-conifer plant communities would remain to provide for a diversity of untreated habitats. About 5,782 acres (about 21 percent) are privately owned within the Bald Lick planning area and represent a mix of all plant community types (conifer and non-conifer) that are also present on public lands. Fuels reduction is on-going on private lands generally the creation of defensible space around homes, particularly in 100 to 200 foot perimeter around homes and along driveways. Fuels treatments on private lands would contribute to changes in non-conifer plant communities similar to those described on public lands, and the effects would be localized. Large percentages of undisturbed non-conifer plant communities on public lands on some on privately owned lands would continue to provide for a diversity of habitat types.

6. FIRE & FUELS

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). Variables such as weather, topography, and location of where a fire starts cannot be controlled. Therefore, management activities on landscapes seeking to affect wildland fire extent and severity focus on treating fuels, the factor which can be influenced. 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 et al 2005; Weatherspoon 1996), fire exclusion practices, and natural events.

For the purposes of this analysis the planning area boundary was used to assess direct, indirect, and the potential for cumulative effects. 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.

Due to ownership patterns and political constraints in southwest Oregon, the use of wildfire to meet resource objectives is not possible. There are stipulations within the protection agreement with ODF that allows BLM to designate areas that require special fire management activities during suppression efforts in order to insure damage to resources are minimized. During suppression activities on BLM lands the following guidelines are followed:

- BLM resource advisors will be dispatched to fires which occur on BLM lands. These resource advisors are utilized to ensure that suppression forces are aware of all sensitive areas and to insure damage to resources is minimized from suppression efforts.
- When feasible, existing roads or trails will be used as a starting point for burn-out or backfire operations designed to stop fire spread. Backfires will be designed to minimize fire effects on habitat. Natural barriers will be used whenever possible and fires will be allowed to burn to them.
- In the construction of fire lines, minimum width and depth will be used to stop the spread of fire. The use of dozers should be minimized and resource advisors will be consulted when appropriate. Live fuels will be cut or limbed only to the extent needed to stop fire spread. Rehabilitation of fire lines will be considered.
- The felling of snags and live trees will only occur when they pose a safety hazard or will cause a fire to spread across the fire line.
- The construction of helispots should be minimized. Past locations or natural openings should be used when possible. Helispots will not be constructed within riparian reserves, or areas of special concern.
- Retardant or foam will not be dropped on surface waters or on occupied spotted owl nests.

- Resource advisors are used to determine rehabilitation needs and standards in order to reduce the impacts associated with fire suppression efforts.

No-Action Alternative

Under the No-Action Alternative, stand densities would continue contribute to tree mortality within forest stands. The transition from ponderosa pine stands to excessively dense fir stands would also continue at the lower elevations of the project area. Trees growing under these conditions often become weakened and are more susceptible to insect epidemics and tree pathogens. Younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods (see Section 4, Vegetation).

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 burning at higher intensities and severity during wildfire events within the project area. As described in Chapter 3, Fire & Fuels, the potential for crown fire initiation and spread would remain higher than action alternatives that would reduce surface, ladder, and aerial fuels that contribute to crown initiation and sustainability. Four of the six stands modeled in the Bald Lick planning area transitioned from initiation to active crowning on at least 3 to 82% of the days within the time period modeled. These are not extreme weather events, but a potential for severe fire activity in every average fire season due to the fuel structure and frequent environmental conditions (analysis file Bobar/Bald Lick).

Fire fighter safety would continue to be an issue as well as the potential of resource damage and threats to residents living in the Wildland Urban Interface. This Alternative would be inconsistent with the Medford District RMP, as well as State and Federal land management policy regarding the reduction of hazardous fuels and wildfire threats to Wildand Urban Interface Areas.

Cumulative Effects
About 1,000 acres of fuels reduction treatments would still occur in the project area in association with the Little Applegate Fuels Reduction project and another 2,164 acres of fuels reduction was recently implemented in 2003/04 in association with the Bobar Landscape project. These non-commercial fuels reduction projects focus on noncommercial vegetation treatments primarily in hardwood and shrubland plant communities. While hazardous fuels are being reduced in near proximity to residential and other strategic areas, high tree densities would continue in conifer forest stands contributing to high tree mortality rates, and an abundance of dead vegetation and ladder fuels. No treatment of conifer forest stands would leave areas with moderate to high fuel hazard ratings that would otherwise be reduced to varying degrees under the action alternatives. If predicted climate changes do occur (Chapter 3, Fire & Fuels) the potential for increased fire behavior would be greater than under the action alternatives which treat fuels to reduce the effects of wildlife.

Alternatives 2 and 3

In 1995 a new federal fire policy (USDA and USDI 1995) was issued directing federal land managers to expand the use of prescribed fire in order to reduce the risk of large, intense wildfires due to unnatural high fuel loadings and to restore and maintain healthy ecosystems. The fuels management activities proposed for this project are intended to modify fire behavior and meet the objectives described in Chapter 1, Purpose and Need.

The Proposed Action, Alternative 2 and Alternative 3 both utilize a landscape approach to vegetation management including fuels reduction. “A landscape-level approach to fuels looks at the large areas as a whole, in an attempt to fragment existing continuous, heavy fuel in high risk areas” (Weatherspoon and Skinner 1996). A Landscape-level approach to fuels management is the most effective method in

modifying fire behavior (intensity and size) of a wildfire. "Landscape-level treatments have been proposed as a fuel management strategy that can aid wildfire control and help achieve more broad-based ecosystem management goals" (Agee and Edmonds 1992, Weatherspoon 1996, Weatherspoon and Skinner 1996), "particularly in areas that have historically low- to moderate severity fire regimes" (Agee 1993).

Fire behavior is comprised of three components, surface fuels, ladder fuels, and aerial fuels, or crown fuels (see Chapter 2, Components of the Action Alternatives). The proposed Bald Lick Landscape project would reduce the overall surface, ladder and aerial fuels through a combination of treatments.

Commercial thinning prescriptions designed also to improved tree vigor and forest stand health would also reduce the aerial fuels (crown density) present in the stands. Commercial thinning would also remove some of the smaller diameter trees (trees 6 to 7 inches diameter and above) that also act as ladder fuels. The combination of removing some of the aerial component as well as the ladder and surface fuels would reduce the chance of sustaining a crown fire in these stands (Omi and Martinson 2002). Over time, the commercial thinning would also increase diameter growth of the residual stand. Larger diameter trees are more tolerant to surface fires so there would be less mortality to the stand in the event of a surface fire. The commercial thinning would also favor more fire tolerant species such as pine. Lowering basal area through thinning and prescribed fire can increase the long term vigor in the residual trees within a stand (Agee and Huff, 2000). The commercial thinning from below of timber stands proposed under this project would reduce the aerial component (crown density) of fuels that is currently present as well as some of the existing ladder fuels. The post harvest fuels reduction treatments (handpiling and burning and followup maintenance underburning) would reduce the surface and remaining ladder fuels.

Recent studies have demonstrated the effectiveness of management activities designed to reduce fuel hazard and minimize the impacts of wildfire in areas with fire regime historically characterized by frequent, low severity fires (Omi and Martinson 2002; Pollet and Omi 2002). 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).

Management of forest stands usually results 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 1972), and increased shrub and forb growth; therefore, it is important to manage surface fuels so that potential fire line intensities remains at a manageable level. 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. Live fuels with higher moisture content can have a dampening effect on fire behavior compared to dead fine fuels. Cured grasses and forbs can increase fire line intensity (Agee 1996); however, 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; Wagtendonk 1996). However, by managing sites to more closely represent historical conditions, an open stand condition exists which promotes low intensity fire spread. The vegetation components maintained are resilient to this management, and will in most cases, aid the prevention of large-scale high severity wildfire. These conditions also contribute to the abilities of fire managers to exercise a better measure of control of wildfires and future prescribed fire treatments. Post harvest fuels reduction treatments combined with follow-up maintenance underburning would manage surface fuels in combination with commercial thinning treatments to reduce the overall fuel hazards within the areas treated.

Forest thinning treatments would reduce canopy fuels, increasing and decreasing fire hazard simultaneously. Slash generated from the commercial thinning of timber stands, **if not treated**, would create surface fuels that would be greater than current levels. The existing surface fire behavior fuel model

in the majority of stands proposed for commercial thinning are represented by a Timber Group fire behavior fuel model. Fuel amounts are measured in tons per acre for different size material. Material up to 3 inches in diameter has the greatest influence on the rate of spread and flame length of a fire, which has direct impacts on fire suppression efforts. It is anticipated that fuel loadings (material 3 inches and less) after commercial thinning would be increased by approximately 3-11 tons to the acre. 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 can outweigh increases in surface fire hazard (Omi and Martinson 2002). This temporary increase in surface fuels is usually less than one year (but can be up to two years) for that is the time period that it takes fuel treatments to dispose of the surface and ladder fuels in these stands.

Treatment of slash

Fuels created from commercial thinning, as well as the treatment of noncommercial size material (ladder fuels), within forest stands would be treated along with existing surface fuels to eliminate or greatly reduce the increased fuel hazard generated from forest thinning. Post harvest fuels reduction treatments effectively reduces both surface and ladder fuels thus altering potential wildfire behavior by reducing 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. The fire effects (severity) on forest stands and soils would also be reduced. The reduction of flame length would also increase fire fighting capabilities by improving safety conditions for firefighters allowing for a more direct attack of a wildfire, which could reduce acres burned.

To minimize loss in soil productivity and surface erosion, underburning would be planned and scheduled to result in low intensity burns, whenever possible, to reduce the loss of organic matter, nutrients, and subsequent site productivity. Project design features are included to ensure that all fuel management activities would meet Aquatic Conservation Strategy and Riparian Reserve Objectives (see Chapter 2 Project Design Features).

Impacts of Spring versus Fall Burning

The season in which underburning is implemented is based on achieving hazard reduction objectives while minimizing impacts to the site. Fall underburning is utilized when fuel loadings are low enough to allow for a low intensity burn which was historically common in these fire regimes. Due to the long absence of fire, fuel loadings in most cases are too high to initially burn a unit in the fall.

The surface fuel loading in a unit dictates fire intensity. A common method to reduce fuel loadings before underburning is implemented is to use manual treatment (slashing, hand piling and burning). Even after manual treatments surface fuel levels in the 1, 10, and 100-hour fuels (1/4" to 3") are often high so that a low intensity burn is not possible. When this is the case underburning is done in the spring.

Burning in the fall with high surface fuel loadings would have adverse impacts to numerous resources due to fires being of higher intensity. Large down woody debris consumption is higher in the fall. Duff consumption is higher and soil heating tends to be higher. Mortality to the residual stand as well as other vegetation is higher due to higher intensity fires low live fuel moisture. Snag retention is difficult due to the low dead fuel moistures and higher fire intensity. With higher fire intensities and lower live and dead fuel moistures the risk of escape is greatly increased.

Prescriptions are developed for spring burning to consume the smaller fuels (1/4" - 3") and retain the majority of large down woody debris due to the higher dead fuel moistures. Soil moisture is also higher in

the spring so duff consumption is also minimal. Burning under these conditions keeps fire intensity low so impacts to residual vegetation would be minimal and the chance of escape is also minimized. Visual observations (post treatment monitoring) of areas that have been underburned in the spring across Applegate over the past six years have shown any negative impacts to the site.

Other activities associated with underburning such as fireline construction and mop-up operations after the burn have minimal impacts to the site. Firelines are 1 to 2 feet in width and are water-barred to minimize soil erosion. Re-growth of vegetation on the firelines normally occurs within one growing season. Mop-up operations are normally limited to a 100 foot perimeter around a burned unit. Soil disturbance is scattered in localized areas within this perimeter.

Areas planned for post harvest fuels treatment may be reexamined by resource specialists at any stage of treatment to determine if the planned fuels treatment would still applicable. At the discretion of resource specialists, planned treatments may be changed to better meet the objectives outlined in this EA. Proposed changes would be limited to treatments allowed under this EA. If needed changes were determined to be outside the original scope of analysis conducted under this EA, additional environmental analysis and documentation may be warranted.

Effects of canopy reduction on fuel moistures

Silvicultural prescriptions proposed for the Douglas fir sites (Dry and Moist) would retain average canopy closures greater than 50 percent. The pine prescriptions would open stands up more, retaining average canopy closures at about 40 percent (Table 4-3).

Estimates of fuel moisture can be made from the measured ambient air temperatures and relative humidity. The following example is used to demonstrate the effects of canopy fuels reduction on fuel moistures. An ambient air temperature of 90 to 109 degrees and a relative humidity of 15 to 19 percent, would result in a 3% fuel moisture for 1-hour time lag fuels: the fuel moisture of 10-hour fuels would be 5%; and the 100-hour fuel moisture would be 7%.

Corrections to fuel moistures are then needed to account for slope, aspect, time of day, month, and percent shading. Percent shading is calculated by using greater than 50% shading (shaded) or less than 50% shading (exposed). Cloud cover as well as timber overstory (canopy closure) is utilized in calculating percent shading.

Utilizing the example from above (1 hour time lag fuels at 3%) to correct fuel moisture on a site that has the following attributes you would add 3% to the fuel moisture for a total of 6%.:

- north slope
-slope greater than 31%
-12:00 pm in August
- shading greater than 50%

Utilizing the same parameters but for an area that has shading that is less than 50% you would add 4% for a fine fuel moisture of 7%. The difference between the two sites is 1% which would have minimal impacts to fire behavior.

The reduction in stand density would make it possible to use prescribed fire as a tool to further reduce fire hazard in these stands. Fuels treatments for stands that are commercially thinned are proposed for treatment usually within two years (and up to 5 years) after a unit is commercially harvested. Treatments would take place where slash three inches in size and less exceeds 5 to 6 tons per acre. Treatments should ensure that under most climate conditions, flame lengths would be less than three feet allowing for direct

attack of a wildfire.

Non-Conifer treatments

The objective of reducing fire hazard in treated shrublands and oak woodlands would be achieved under Alternatives 2 and 3. The high fire hazard, which exists in these areas would be greatly reduced by decreasing the continuity of fuels within these plant communities.

Cumulative Effects
About 1,000 acres of fuels reduction treatments would still occur in the project area in association with the Little Applegate Fuels Reduction project and another 2,164 acres of fuels reduction was recently implemented in 2003/04 in association with the Bobar Landscape project. These non-commercial fuels reduction projects focus on noncommercial vegetation treatments primarily in hardwood and shrubland plant communities. The Bald Lick Landscape project combined with hazardous fuels reduction in near proximity to residential and other strategic areas would help to reduce the potential effects to residents living in wildland urban interface areas, forest vegetation and associated wildlife habitats, and soil and aquatic resources in the event of a wildfire in the Project Area.

Alternative 3

Impacts are the same as Proposed Action with the following discussion: Access to an area plays a critical role in determining if fuels treatments can occur and the type of fuels treatment. The risk of escape is a major factor when conducting burning operations especially underburning and broadcast burning. Limited or no access increases the risk of escape due to the lack of availability and mobility of people, equipment and water. Limited or no access would preclude the use of underburning and broadcast burning. Cost associated with manual treatment of units (slashing and handpiling) increases when access is limited. Future treatment of units with limited access would be with manual treatments which have significantly higher cost than underburning or broadcast burning.

Human caused fires could increase with more roads. This can be mitigated to a large degree by blocking roads. However, for both Alternatives 2 and 3 there would be a net decrease in road access in the planning area. Human caused fires on BLM land over the past 30 years has been a minor component of fires that have occurred within the project area. The majority of fires that have started on BLM land have been caused by lightning (74%). Roads also play an important role in the suppression of fires. Access into an area allows for quicker response time to a fire which can help minimize the size of a fire.

Alternative 4

Similar to Alternatives 2 and 3, this Alternative 4 also uses a landscape approach to forest management. However, this alternative would result in 3,259 fewer acres treated in comparison to Alternatives 2 and 3. The effects of fuels reduction would be the same as described under alternatives 2 and 3 for the areas treated.

For the areas left untreated, the effects would be similar to the No-Action Alternative. Untreated areas have been shown to result in higher fire intensities and fire severities than treated areas (Pollet and Omi 2002; Omi and Martinson.2002). The transition in species composition would continue. Untreated surface fuels, ladder and aerial fuels (crown density) would continue to contribute to an increased potential for crown fire initiation and spread.

Although some areas would be treated, for the areas left untreated fire fighter safety would continue to be an issue as well as the potential of resource damage and threats to residents living in the Wildland Urban Interface.

7. BOTANY

Analysis Area

Fungi

- Direct, indirect, cumulative effects of the implementation of the Northwest Forest Plan and land use management plans are addressed in USDA, USDI 2004.

SSP

- Direct, indirect effects are analyzed in the project area
- Cumulative effects are analyzed in the 5th field watershed and each individual species' range

Alternative 1 – No Action

Direct effects

Because no physical disturbance would occur, there would be no direct effects to Special Status Plants and Fungi, their habitat, or noxious weed and invasive nonnative plant populations.

Indirect effects

Without vegetation treatment, Special Status Plant and Fungus populations would continue to decline due to the slow degradation of suitable habitat. Through fire suppression, the plant communities will continue to become overly dense, decadent thickets with increased competition for resources. Fire risk and fire hazard would remain high.

Noxious weed and nonnative plants will continue to spread and establish throughout the area, particularly roadside and in open areas. Invasive weed species populations will increase without active management. Without treatment, the potential remains for a stand replacement fire that would produce habitat favorable for weed invasion.

Cumulative effects

Natural plant communities, including rare plant habitat, would continue to degrade due mainly 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 and ranching, industrial, etc.

Alternative 2 – Proposed Action

Direct/Indirect/Cumulative effects.

Special Status Vascular and Nonvascular Plants

Special Status Plants not protected by "no treatment" buffers (including drop unit) or seasonal restrictions may be directly impacted by proposed treatments (Table 4-4). Plants may be harmed or killed by direct physical damage from machinery, log skidding, foot traffic, burning, and slash piling. Seasonal restrictions on operations generally cover the period of Special Status species above-ground growth. Operations occurring outside this period would take place while these plants are below ground and dormant and would

not be subject to direct physical damage. Potential death and damage to individuals would initially decrease local population (subpopulation) numbers. With time, local population numbers are expected to increase due to the beneficial indirect effects of improved condition of occupied and potential habitat. Loss of some individuals will not contribute to the need to list the species as threatened or endangered.

All protection/mitigation buffer areas that allow some treatment are designed to produce beneficial habitat changes. Generally, proposed treatments would produce stand conditions that are less dense and decadent with stand structure resembling a more natural pre-Euro-American condition. Buffer area sizes vary from 0' to 150' (i.e. defined area is the population polygon to 150' away from the population boundary).

While "no treatment" buffers provide the maximum protection from site disturbance, habitat conditions are allowed to deteriorate. Habitat modification through sites of *Cypripedium fasciculatum, Cypripedium montanum,* and *Fritillaria gentneri* are usually reserved for projects with a research and monitoring plan in the Ashland Resource Area. Sites of *Sedum oblanceolatum* are rocky, harsh habitats with slow-growing trees and shrubs. Habitat modification is less often necessary for these areas. *Sedum oblanceolatum* "no treatment" buffers provide protection from site disturbance due to proposed treatments.

Table 4-4. Special Status Plant Protection/Mitigation

	NT	Drop	NC	RR	Seas	None
Carex serratodens			●			
Cirsium ciliolatum						●
Cimicifuga elata			●			
Crumia latifolia				●		
Cypripedium fasciculatum	●					
Cypripedium montanum	●	●				
Enemion stipitatum (Isopyrum s.)			●	●		
Eucladium verticillatum			●			
Eucephalus vialis (Aster v.)					●	
Fabronia pusilla			●			
Festuca elmeri				●	●	
Fritillaria gentneri	●					
Hedwigia stellata			●			
Lewisia cotyledon var. *howellii*			●			
Lithophragma heterophyllum			●		●	
Ribes inerme var. *klamathense*				●		
Sedum oblanceolatum	●	●				
Sedum spathulifolium ssp. *purdyi*			●			
Tripterocladium leucocladulum		●	●	●		

NT= No treatment within the buffer area
Drop = Drop unit (usually isolated portion) from proposed treatment
NC = Non-commercial treatment mitigation/restriction
RR = Species protection by location in riparian reserve and associated protection measures

Seas = Seasonal restriction on some or all proposed treatments
None = No buffer, no protection. Species mis-identification

Federal timber sales and non-commercial vegetation projects in the watershed considered under cumulative effects have been forest health and fuels reduction type treatments. These treatments attempt to remedy the effects of long-term fire suppression and, as such, are generally beneficial to native plant communities (including rare plants and fungi). However, data from a BLM research project on excavator mounted brush cutter ("slashbuster") plant community effects shows undesirable consequences. There are 1422 acres of past and planned slashbuster treatments in the affected 7th field hydrologic units (10422 total acres), including 79 acres proposed for the Bald Lick project. Adverse effects by using a slashbuster can include unnatural landscape homogeneity, a too open resultant stand, lower shrub recruitment, favoring of weedy annuals over native perennial vegetation, and soil compaction effects on plant community vigor, structure, and composition. Natural native plant communities, including potential rare plants and fungi habitat, would be adversely impacted for these reasons. However, if left untreated the chances for a stand replacing, catastrophic fire are increased. .

Timber sale and slashbuster activity on private land is described in Table 4-1. It is estimated that 1120 acres have been tractor logged and 40 acres have been slashbuster treated. Proposed treatments on private land are assumed to continue as land owner work to create defensible space for protection from wildfire; it is unknown the mix of slashbuster v. manual treatments that would be used. It is assumed that most timber sale/slashbuster 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 as federal laws 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.

Noxious Weeds and Introduced Plants

Project design features are incorporated to minimize spread of noxious weeds and invasive alien plant species. However, not all weed seed transported by humans can be excluded. Additionally, long distance weed seed transport can be accomplished by wind, water, and animals. With suitable weed habitat increasing (short-term) via proposed treatment accomplishments and natural seed transport mechanisms available, total exclusion of new weed establishments is unattainable. Particularly troublesome areas will be new road construction (11.8 miles), slashbuster treated areas (79 acres), and fuels treatment areas (334 acres). With adequate funding for vegetation inventory and weed treatment, existing noxious weed population sizes are expected to decrease and new establishments are expected to remain small (< 2 acres).

Former Survey & Manage-Surveys Not Practical; Now Bureau Special Status

The 11 species of rare lichens and fungi that were former Survey & Manage list species (where pre-disturbance surveys were impractical because these species were difficult to identify and/or their occurrence was sporadic or unpredictable) were not surveyed for. These species are now on the Bureau Special Status (BSS) Species List. All 11 species are associated with a forest component found in the project area, i.e. habitat exists in the project area to support these species, see Table 4-5. All fungi on this list are mycorrhizal and depend on wind and/or animals to spread the spores. The one lichen reproduces asexually via soredia and thallus fragmentation. Soredia can be dispersed long distances by wind or animals, especially birds. Thallus fragments are usually dispersed over short distances only. Known sites nearest the project area range from 2.5 to 81 air miles. Four species occur on the Medford District and four species occur within the Medford District boundary but on other lands (US Forest Service, State of Oregon, and private).

Table 4-5. Bald Lick Forest Community Component x Former S&M; Now BSS Species

	PSME	PIPO	ABCO	QUKE	Pina	Near
Rhizopogon ellipsosporus	●					2.5
Gastroboletus vividus			●		●	6.6
Phaeocollybia olivacea	●		●	●	●	15
Boletus pulcherrimus	●	●	●			**17.5**
Rhizopogon exiguus	●					27
Phaeocollybia californica	●					29.5
Bryoria subcana	●	●	●			**32**
Rhizopogon chamaleontinus	●					38
Ramaria spinulosa var. diminutiva	●				●	61
Dermocybe humboldtensis	●	●				**64**
Phaeocollybia oregonensis			●			81

Bolded species = occurs on or within Medford District
PSME = Douglas-fir, forest community component
PIPO = Ponderosa pine, forest community component
ABCO = White fir, forest community component
QUKE = California black oak, forest community component
Pina = Pinaceae family (includes pine, fir, Douglas-fir, spruce, hemlock), forest community component
Near = nearest known site, miles to the project area

An analysis of forest habitat in the project area, known site proximity to the project area, species distribution patterns and range, species ecological requirements, past surveys, and habitat fragmentation results in four species (*Rhizopogon ellipsosporus, Gastroboletus vividus, Phaeocollybia olivacea, Bryoria subcana*) having a moderate-high likelihood of occurrence in the project area, four species (*Boletus pulcherrimus, Rhizopogon exiguus, Phaeocollybia californica, Rhizopogon chamaleontinus*) having a moderate likelihood, two species (*Ramaria spinulosa var. diminutiva, Dermocybe humboldtensis*) having a moderate-low likelihood, and one species (*Phaeocollybia oregonensis*) with a low likelihood of occurrence.

Because these species were considered impractical to survey for, much of the surveys and species information came from the Regional Ecosystem Office and the Regional Mycologist's staff. Survey areas and methods were not designed to meet the objectives of site specific, pre-disturbance surveys. Survey methods used in selected areas were line transects, plotless transects, and randomized plots. Of the four species found on the Medford District, three were discovered by BLM or contract botanists performing pre-disturbance surveys.

The 2004 FSEIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines addresses incomplete or unavailable information. For these 10 fungi and one lichen, species specific information on connectivity and habitat requirements, range (including occurrences within the project area), and disturbance effects is lacking. Environmental consequences are based on information regarding habitat condition and proposed treatments, and similar species or species groups response to disturbance.

The 10 species of fungi are all mycorrhizal, forming associations with their hosts, mostly conifers. 52.5% of the commercial forest land in the planning area will be treated. Forest tree harvest would have varying degrees of adverse impacts depending on the level of tree removal and ground disturbance. Commercial harvest effects to fungi include changes in microsite conditions (including temperature, humidity, light

intensity, and wind), edge effects, localized loss of the mycelial network and connections, loss of host trees necessary to sustain the fungi, fungal species composition change, fungal species diversity decrease, fungal biomass decrease, decreased soil moisture, decrease in organic soil layer, soil compaction/bulk density increase, and a decrease in the amount of coarse woody debris that may serve as a source of moisture in the dry months.

A study examining levels and patterns of green-tree retention effects on ectomycorrhizal sporocarp production by Luoma, et al. suggests that a combination of dispersed and aggregated green-tree retention is desired when sporocarp production is the goal. Levels tested were 15, 40, 75, and 100% of green tree basal area retention in dispersed and aggregated patterns. The study results showed:

- All harvested treatments showed some reduction in sporocarp production.
- Sporocarp production was nearly eliminated in 15% Aggregated treatment
- Significantly reduced fall mushroom and truffle biomass in 40% Aggregated and 15% treatments (whereas 40% Dispersed did not).
- Least reduction in number of fruiting taxa in 75% Aggregated treatment.
- Use of a combination of dispersed and aggregated retention patterns is supported.

Prescriptions for the Bald Lick commercial forest units are: Poles 30-61% basal area retained, Mid-mature 24-58% retained, Mature 43-71% retained. Retention patterns will range from dispersed, aggregate (mistletoe prescription), and small openings (group selection). Rare fungi, that were not surveyed for but could be present, may survive subsequent habitat conditions due to commercial harvest treatment design.

Increases in soil bulk density from ground disturbing activities limit available soil moisture and inhibit root growth of host species for fungi. Road building, tractor yarding, and cable yarding can have intense effects at a localized level on soils. An estimated 11.8 miles of new roads are proposed under alternative 2. For new road construction it is estimated that the road prism occupies a width of 40 feet (4 acres per mile). Approximately 312 acres are proposed for tractor harvest. Tractor yarding utilizes tractors to drag logs to landing locations along narrow skid trails (about 9 to 12 feet wide) that are located approximately 150 feet apart. An estimated 2147 acres of commercial units are proposed for cable yarding. Parallel skyline corridors 9 to 15 feet wide and 200 feet apart through the treatment unit are used to pull logs to landing areas. Dahlberg and Stenlid (1995) found that ectomycchorizal mycelial networks may range in size from 1.5 – 27 meters. If special status fungi are present in the project area, ground disturbing impacts may fragment the hyphal network, reducing or eliminating populations.

Soil organic matter and coarse woody debris protect mineral soil from compaction, reduce erosion, maintain soil nutrition and maintain long term soil moisture. Mycorrhizal fungi prefer moist sites and rotten wood for colonization. Organic soils and abundance of coarse woody debris may be impacted by tree harvest and prescribed burning. While some coarse woody material can be lost through underburning, 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.

The use of pile and/or broadcast burning to treat logging slash or prepare the site for planting also would have adverse impacts to fungi. Burning effects may include death of fungi down into mineral soil (the more diverse portion of the soil), incineration of the organic soil layer, loss of available nutrients, reduce soil moisture, decrease in fungal biomass, decrease in fungal species diversity, fungal species composition change, degradation of soil physical structure, and reduce fungi which increases non-mycorrhizal species' (many that are weedy) ability to become established at the site.

A recent study by Smith, et al. examined short-term effects of seasonal prescribed burning on ectomycorrhizal fungi. Results showed that fall underburning (in dry ponderosa pine stands of eastern Oregon) significantly reduced duff depth, live root biomass, and ectomycorrhizae species richness compared to spring underburning, for at least two years. Also, the probability of residual tree mortality was greater for fall burning. The data suggests that spring burning should be favored over fall burning if the objective is to maintain ectomycorrhizae species diversity. See mitigation measures.

A Forest Research Extension Note (Wiensczyk, A. M., et al.) discusses forest management practices that can maintain a diverse community of ectomycorrhizal fungi across the landscape. These include:

- Retaining refuge plants, mature trees, and old-growth forests;
- Retaining the forest floor during harvest and mechanical site preparation;
- Avoiding high-intensity broadcast burns;
- Minimizing the effects of species shifts, particularly following grass seeding;
- Maintaining the edge-to-area ratio of harvested areas within certain limits;
- Planting a mixture of tree species soon after harvest;
- Retaining coarse woody debris; and
- Managing for the fruiting bodies formed by ectomycorrhizal fungi, including edible mushrooms and truffles, fungi species used by wildlife, and rare and endemic species.

The 2004 FSEIS has determined that for nine of the 11 Former Survey & Manage-Surveys Not Practical species (*Bryoria subcana, Boletus pulcherrimus, Gastroboletus vividus, Dermocybe humboldtensis, Ramaria spinulosa* var. *diminutiva, Rhizopogon chamaleontinus, Rhizopogon ellipsosporus,* and *Rhizopogon exiguus*) that habitat (including known sites) is insufficient to support stable populations in the Northwest Forest Plan area. For eight of the nine species, this outcome is not due to federal actions but other factors such as: (1) limited potential habitat and few populations on federally managed lands; (2) potential for stochastic events; (3) low number of individuals; (4) limited distribution; and, (5) narrow ecological amplitude. Because habitat is insufficient to support stable populations and is not due to federal actions, the Bald Lick Landscape project proposed treatments would not change the species viability condition (based on habitat) for nine of the 11 species.

For one of the nine species (*Phaeocollybia californica*), the outcome of insufficient habitat is due to land management activities. Known sites of *Phaeocollybia californica* are not substantially protected by reserves and are susceptible to adverse impacts from soil disturbance and/or a significant loss of host species (Table 4-x). Loss of even a few known sites could adversely impact this species persistence within the Northwest Forest Plan area (USDA, USDI 2004, p. 154). Management activities proposed under the Bald Lick project are consistent with those activities anticipated under the Northwest Forest Plan 1994 FSEIS and 2004 FSEIS to Remove Survey and Manage Mitigation Measure Standards and Guidelines. Currently, there are no known sites within the Bald Lick project area. Any sites discovered would be protected and the site maintained. If unknown sites of *Phaeocollybia californica* are present in the project area, this project could adversely impact this species as described above and in the 2004 FSEIS.

Two of the 11 Former Survey & Manage-Surveys Not Practical species (*Phaeocollybia olivacea, Phaeocollybia oregonensis*) were determined to have habitat (including known sites) sufficient to support stable populations in the Northwest Forest Plan area. These species would stabilize in a pattern similar to or different from their reference distribution because a substantial number of known sites are located in reserves or managed under the Agencies' Special Status Species Programs (USDA, USDI 2004, p. 152). This determination was based on 2002 data. For *Phaeocollybia oregonensis* the number of known sites dropped from 36 to 11 with corrected and updated data. This update may lead to a different determination on the sufficiency of habitat to support stable populations in the Northwest Forest Plan area.

Table 4-6. Former Survey & Manage-Surveys Not Practical Species in Reserves

Scientific Name	Number Sites in NFP[1]	Number Sites in Reserves[2]	% in Reserves
Habitat Not Sufficient – not due to federal action			
Boletus pulcherrimus	36	5	13.9
Bryoria subcana	20	1	5.0
Dermocybe humboldtensis	4	1	25.0
Gastroboletus vividus	4	2	50.0
Ramaria spinulosa var. diminutiva	1	0	0
Rhizopogon chamaleontinus	1	0	0
Rhizopogon ellipsosporus	3	0	0
Rhizopogon exiguus	5	3	60.0
Habitat Not Sufficient – due to management			
Phaeocollybia californica	30	5	16.7
Habitat Sufficient			
Phaeocollybia olivacea	93	19	20.4
Phaeocollybia oregonensis	11	5	45.5

[1] Source: ISMS database 11-20-04, Handbook to Strategy 1 Fungal Species in the NWFP, Handbook to Additional Fungal Species of Special Concern in the NWFP, Medford District data.
[2] Reserves = Land Use Allocations Late Successional Reserve and Congressionally Reserved.

Because of the rarity of the 11 species of rare lichens and fungi that were former Survey & Manage list species, the favorable level and pattern of green-tree retention, and the mitigating measure to reduce adverse effects due to burning (if adopted), the probability of direct impacts to populations is slight. However, if a species is present and directly impacted, the probability of extirpation of a small population is high.

Alternative 3

Direct/Indirect/Cumulative effects.
Effects are the same as Alternative 2 except:

- Reduction of 4.7 miles of new road construction and an additional 1.1 miles of mechanical road decommissioning. Because less ground would be disturbed, noxious weed and introduced plants would have less opportunity to become established.
- Additional 252 acres of helicopter yarding; reduction of 9 acres of crawler and 243 acres of cable yarding. Helicopter yarding in place of ground-based systems would produce less ground disturbance and soil compaction. Noxious weed and introduced plants would have less opportunity to become established. Soil structure in these additional areas would likely remain in a condition able to support a diversity of fungi species (including rare fungi).

Alternative 4

Direct/Indirect/Cumulative effects.
Effects are the same as Alternative 2 except:

- Reduction of 7.8 miles of new road construction and 2,833 less acres of commercial vegetation treatments. Because less ground would be disturbed, noxious weed and introduced plants would have less opportunity to become established. Fewer operations in commercial conifer forests would equate to less impacts to potentially occurring rare fungi and known sites of special status vascular and nonvascular plants. However, fewer acres treated would also mean fewer acres of habitat improvement (see Alternative 1, indirect effects).
- Of the units being treated, 381 acres will be alternatively yarded by helicopter rather than crawler tractor or cable. Helicopter yarding in place of ground-based systems would produce less ground disturbance and soil compaction. Noxious weed and introduced plants would have less opportunity to become established on highly disturbed ground. Soil structure in these areas would likely remain in a condition able to support a diversity of fungi species (including rare fungi).
- Reduction of 788 acres of noncommercial vegetation treatments. Because less ground would be disturbed, noxious weed and introduced plants would have less opportunity to become established. Fewer operations in noncommercial vegetation units would equate to less impacts to known sites of special status vascular and nonvascular plants. However, fewer acres treated would also mean fewer acres of habitat improvement (see Alternative 1, indirect effects).

Mitigating Measure

Because of the adverse effects to the post-treatment natural plant community, all units proposed for treatment by an excavator mounted brush cutter ("slashbuster") would be alternatively treated manually. Adverse effects by using a slashbuster include unnatural landscape homogeneity, a too open resultant stand, lower shrub recruitment, favoring of weedy annuals over native perennial vegetation, and soil compaction affects on plant community vigor, structure, and composition.

To reduce the adverse effects to potentially present but "unsurveyed for" rare fungi, broadcast burning, in commercial units for the purpose of logging slash treatment should be limited to the spring season. Additionally, pile burning in commercial units should be performed in the winter or spring seasons. Subsequent maintenance broadcast burning may be performed any season unless restricted for other purposes.

Known site - Historic and current location of a species reported by a credible source, available to field offices, and that does not require additional species verification or survey by the Agency to locate the species. Known sites include those known prior to the signing of the Northwest Forest Plan Record of Decision, as well as sites located in the future. Known sites can be based on any documented and credible source (such as herbaria/museum records, published documents, Agency records, species expert records, and documented public information). Historic locations where it can be demonstrated that the species and its habitat no longer occur do not have to be considered known sites. A credible source is a professional or amateur person who has academic training and/or demonstrated expertise in identification of the taxon of interest sufficient for the Agency to accept the identification as correct. These can include Agency staff and private individuals.

The known site identification should be precise enough to locate the species by geographic coordinates, maps, or descriptions sufficient to design specific management actions or to be located by other individuals.

8. WILDLIFE

Alternative 1 - No Action

Because no projects are planned under this alternative, the effects to wildlife that are discussed in the action alternatives would not immediately occur. However, habitat conditions in the proposed project 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 – there are up to 40 snags per acre in some areas (BLM 2004). The larger live trees add an element of diversity to the landscape and provide adequate tree size for nesting, roosting, foraging, and denning by some of the large wildlife species in the project area, e.g.; red-tailed hawk, porcupine, and black bear.

Encroachment of shrubs and conifers into the oak-woodland savannah habitat is prevalent in the proposed project area and the encroachment will continue without some type of intervention/disturbance, whether human-caused or natural, e.g., fire. The larger oaks, which are important to some wildlife species for some of their life functions (e.g., nesting and foraging), are experiencing die-off as a result of the encroachment of shrubs and conifers. As the encroachment continues more large oaks will die and there will be less food (acorns) for deer, squirrels, woodpeckers, etc. Unfortunately, if fire is the disturbance agent, fuel loads are so high due to tree and shrub encroachment that many of the acorn-producing oaks would be killed.

Most of the shrubland habitat is fire-dependent, and due to the lack of fire (except for that portion of the proposed project area in the 1987Cantrell Fire) much of it is in a decadent state. Without some type of intervention/disturbance to set back succession, early seral vegetation will continue to be deficient in the shrublands.

Alternative 2

Direct/Indirect Effects of Timber Management

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 habitat conditions would be modified on approximately 5,115 acres of commercial conifer forest stands. Due to the variety of stand conditions in the proposed project area, numerous prescriptions/marking guidelines have been developed. With the exception of the regeneration prescription, 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 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 proposed harvest would adversely affect species preferring a high degree of canopy closure, snag-dependent species, and species preferring shaded understory shrub habitat (e.g., northern spotted owl, pileated woodpecker, and Swainson's thrush, respectively). Conversely, the treatments would benefit species preferring or adaptable to more open canopies and/or early seral conditions, e.g., American robin and black-tailed deer.

The winner/loser scenario is played out by innumerable species throughout all forested habitats when there is disturbance. As practical examples, Janes (1988) 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, and 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.

Land Use Allocation Mitigation:

(1) Late Successional Reserves - The large LSR network incorporated in the Medford District RMP mitigates the impacts of local projects by providing for late-successional forest habitat on a landscape scale. LSR forest structure is characterized by multispecies and multilayered stands; moderate to high canopy closure; moderate to high accumulations of down logs and snags; and moderate to high numbers of trees with physical imperfections, e.g., cavities and broken tops (NWFP ROD pg. B-5). Also scattered about the planning area are six smaller LSRs (100 acre spotted owl activity centers) that will continue to provide the habitat characteristics described above.

Riparian Reserves – Approximately 3,900 acres of the planning area are in riparian reserves, and only approximately 200 acres of these reserves are planned for treatment – primarily precommercial thinning. Much of the remaining 3,700 acres that will remain untreated provide the habitat elements that would be affected by the proposed action in other parts of the project area.

Project Design Mitigation

Siskiyou Mountains Salamander Habitat - Approximately 1,500 acres of occupied Siskiyou Mountains salamander habitat are protected in the planning area in accordance with the Medford District RMP. Much of this habitat is late-successional forest and provides the habitat characteristics described above.

Snag Retention – Snags are not marked for removal; therefore, the only snags that would be affected 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 project area would likely remain on the landscape.

Within the proposed project area, the distribution and abundance of species would change. However, with the mitigation described above, adequate habitat would remain in the project area to support the full complement of species now present.

<u>Priority Species</u>

The remainder of the discussion will focus on priority species (and habitat) that were addressed during scoping. Because the northern spotted owl and designated critical habitat for the spotted owl would be adversely affected by the proposed timber harvest, formal consultation with the U.S. Fish and Wildlife Service is required. The consultation was completed through a programmatic consultation with the Service for timber sales and other projects in the Rogue River/South Coast basin that are to be sold (timber sales) or implemented (other projects) in fiscal years 2004 through 2008. The biological opinion concluded that the programs consulted on would not jeopardize the continued existence of the northern spotted owl, or destroy or adversely modify critical habitat for the northern spotted owl. The Biological Assessment **(**BA**)** for Rogue River/South Coast FY 04/08 Timber Sale and Other Projects, and the Biological Opinion (BO) (Log # 1-15-03-F-511) issued by the Service are available for review at the Medford District Office, or online at:

http://www.or.blm.gov/Medford/planning/planning_docs.htm

The mandatory terms and conditions of the BO require the implementation of specific project design criteria, such as seasonal and distance restrictions for certain operations. These criteria would be incorporated in the design of the Bald Lick project (see PDFs). Reference is made to the BA and BO in the discussion that follows.

Threatened/Endangered Species

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 6,000 acres of suitable spotted owl habitat, and 3,070 acres of dispersal-only habitat in the proposed project area. It is estimated that Alternative 2 would remove or downgrade approximately 2,655 acres of suitable habitat (approximately 1,455 acres would be removed and 1,200 acres would be downgraded to dispersal habitat). Additionally, approximately 930 acres of dispersal-only habitat would be removed. The table below displays the estimated pre and post-project spotted owl habitat conditions in the proposed project area. It should be noted that the 1,200 acres of suitable habitat that will be downgraded to dispersal habitat could again be suitable habitat in 20-30 years if no further harvesting occurs in these stands during this time period.

Table 4-7. Spotted Owl Habitat in the Planning Area

Spotted Owl Habitat Pre & Post-Project			
Suitable Habitat (Acres)		**Dispersal-only Habitat**	
Pre-project	**Post-project**	**Pre-project**	**Post-project**
6,000	3,345	3,070	3,340

The habitat modification described above would take place within portions of the median home range radius (1.3 miles) of 11 historic northern spotted owls sites – 6 sites are within the project area, and 5 sites are adjacent to the project area. These sites have been monitored at various intensities since the mid-1990s. Eight of the 11 sites are known to have been occupied during the 1994-2003 10-year period. Five of these sites are known to have produced young during this period. 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. However, it is obvious that the removal and downgrading of approximately 45 percent of the suitable habitat in the project area would likely impair the ability of at least some of the owls to breed, feed, and shelter. Some mitigation is provided for 10 of the spotted owl sites discussed above by the Standards and Guidelines of the NWFP. These sites were found prior to January 1994, and approximately 100 acres of the best habitat are protected at these sites. These reserves are intended to preserve an intensively used portion of the breeding season home range (USFS/USDI 1994).

The Service evaluated the impact of habitat removal, including the proposed action, in their biological opinion. They concluded that the programs consulted on would not jeopardize the continued existence of the northern spotted owl, and that the AMA and Matrix land allocations in the action area would continue to provide sufficient suitable habitat for spotted owls for at least the next several decades. They also noted that the overall impact would be tempered by the acres that would be downgraded (rather than removed) and that could return to suitable habitat in approximately 20 years.

In the biological opinion, the Service also evaluated the Applegate watershed, which includes the project area, with respect to its function in providing connectivity between LSRs in light of the harvest anticipated in the watershed. They concluded that the remaining habitat within the watershed would continue to provide for east-west spotted owl movement through the watershed to connect the Coast and Cascade Range spotted owl populations. This connection is important for genetic interchange.

Several reports have been published recently concerning the status of the northern spotted owl – Courtney et al. (2004); Anthony et al. (2004); USFWS, November 2004; and Lint, Technical Coordinator, (2005). Anthony et al. (2004) found greater than expected adult owl population declines in Washington and

northern Oregon, but also found the populations in southern Oregon and northern California to be more stable. The reasons for both the population decline in one portion of the range of the owl and the good demographic performance in another portion are unknown. Courtney et al. (2004) noted that current habitat loss didn't appear to be a factor since areas with good demographic performance had the highest level of timber harvest, and the areas with greatest declines had the lowest rates of harvest. This indicates that there are likely a number of interacting factors at play in the declines. Courtney et al (2004) also pointed out that there could be lag effects of previous timber harvest, and that habitat loss from wildfires, and competition from barred owls are current threats. USFWS (November 2004) found that even though the spotted owl population was declining in some areas and there were some additional threats the scientific data did not support changing the spotted owl status from threatened to endangered. USFWS (November 2004) also did not identify the need to change the existing conservation strategy, i.e., NWFP

Northern Spotted Owl Critical Habitat

The proposed project encompasses approximately 10,315 acres of the 19,365 acres that make up Critical Habitat Unit (CHU) OR-75. There are approximately 5,015 acres of suitable habitat in the CHU (USDI FWS 2003), and approximately 3,165 of the suitable habitat acres are within the proposed project area. CHU OR-75 was designated to maintain an adequate distribution of nesting, roosting, and foraging habitat, and to improve connectivity between CHUs in a region of high fragmentation (USDI FWS 2003). Also, CHU OR-75 together with CHU OR-74 provides an east-west connection along the southern portion of the Klamath Mountains Province (USDI FWS 2003).

The proposed timber harvest would remove or downgrade approximately 1,410 acres of the suitable habitat in the CHU (approximately 765 acres would be removed, and 645 acres would be downgraded to dispersal habitat). If not subjected to further harvesting, the downgraded habitat would likely again function as suitable habitat in 20-30 years. Approximately 400 acres of dispersal-only habitat would also be removed. The table below displays the estimated pre- and post-project spotted owl habitat condition of CHU OR-75 within the proposed project area.

Table 4-8. Acres of Spotted Owl Habitat within Critical Habitat – Pre & Post-project

CHU OR-75 Spotted Owl Habitat Within the Proposed Project Area			
Suitable Habitat (Acres)		**Dispersal Habitat (Acres)**	
Pre-project	**Post-project**	**Pre-project**	**Post-project**
3,165	1,755	1,640	1,885

The Service in its Biological Opinion recognized that the suitable habitat loss in CHU OR-75 would be substantial, and that the loss of the habitat would diminish the ability of the CHU to provide for the owls that are present (USDI FWS 2003) - five of the spotted owl sites that would be affected by the proposed action are in the CHU. However, the rule designating spotted owl critical habitat designated the physiographic province as the scale for analysis to determine if range-wide conservation goals were being met (USDI FWS 2003). In the Biological Opinion, the Service analyzed the projected impacts to CHU OR-75 in this context and concluded the proposed action would not preclude the intended function of the CHU (USDI FWS 2003).

As with the impacts to the species, the Service findings indicate that the impacts of the proposed project to designated critical habitat would not be deemed significant in the context of spotted owl recovery which is a goal of the NWFP.

Special Status Species (SSS)

Five SSS (i.e., Bureau Assessment and Sensitive Species) are known to be present in the proposed project area. These species are northern spotted owl (addressed above), northwestern pond turtle, black salamander, Siskiyou Mountains salamander, and purple martin.

Northwestern Pond Turtle

The Little Applegate Watershed Analysis (1995) indicates that pond turtles are present in the Little Applegate River up to Muddy Gulch. Also, pond turtles are known to be present in ponds on private property within the boundary of the proposed project area.

It is unlikely that the proposed project would affect northwestern pond turtles due to the following factors: (1) The riparian buffers provided by the Aquatic Conservation Strategy (ACS) would maintain water quality in the Little Applegate and in the upstream portions of the drainages that flow into the private ponds. (2) Pond turtle nests are generally found in open areas on south-facing slopes within approximately 300 feet of the water source (Storm et al. 1995). The proposed project is designed to treat areas of dense vegetation, not open areas, and the riparian buffers, which are approximately 320-360 feet wide, would likely encompass most nests. (3) Riparian buffers would minimize potential impacts to overwintering sites. Although some turtles overwinter in forested areas and have been known to move approximately ¼ mile from water, most overwintering occurs within approximately 200 feet of their aquatic habitat (Rathbun et al. 2002) at http://www.placerdata.org/bioresources/species/northwestern_pond_turtle.htm (accessed 20 Jan 05). Riparian buffers extend approximately 320-360 feet from the Little Applegate.

Black Salamander

Black salamanders have been found along the Little Applegate River near the Rush Creek Road. Black salamanders can be found in a variety of habitat types, but they are most commonly found in moist conditions (Nussbaum et.al. 1983; Nauman and Olson 2004)). In the project area, moist conditions are generally found year round only in riparian zones. The riparian buffers in the project area would mitigate potential impacts to this species.

Siskiyou Mountains Salamander

Numerous Siskiyou Mountains salamander sites were found during surveys in the project area. Approximately 1,500 acres of occupied habitat have been delineated and would be protected. A small amount of habitat in the project area was not surveyed for salamanders due to the reclassification of the salamander within the Survey and Manage program as a result of the 2001 Annual Species Review (USDI/USDA 2001). The reclassification eliminated the survey requirement for Siskiyou Mountain salamanders. The rationale for discontinuing the survey requirement was that enough known sites were already protected to ensure persistence of the species in the northern portion of its range. In the unsurveyed areas, only non-commercial operations would be implemented. This would mitigate impacts to salamanders if they are actually present.

Purple Martin

In May 2001 a purple martin was detected in the proposed project area along the Sterling Mine Ditch Trail. It is not known if the martin was nesting. It is unlikely that the proposed project would adversely affect purple martins even if they were nesting in the area. Generally, martins found in upland habitat nest in large snags in open areas (Horvath 1999). Snags in this type of location would not normally be cut.

Four SSS currently are not known to be present in the proposed project area, but they are likely to be present based on known range and habitat associations. These species are northern goshawk, Lewis' woodpecker, foothill yellow-legged frog, and fringed myotis.

Northern Goshawk

The proposed action would modify approximately 2,655 acres of habitat considered to be suitable for the northern goshawk. This habitat modification would likely adversely affect the ability of goshawks to breed, feed and shelter should they be present in the project area.

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 (BLM 1997). 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.

Lewis' Woodpecker

In Southwest Oregon, Lewis' woodpeckers are primarily a winter population (Rogue Valley Audubon Society 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 the 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

Habitat for these frogs is low-gradient streams with bedrock and gravel substrates, along with the adjacent grass/sedge banks (Corkran and Thoms 1996). The required stream buffers would protect the habitat of this species.

Fringed Myotis

Fringed myotis 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. Within the proposed project area there are no known mines, caves or abandoned buildings that would be suitable for bat roosting. Some trees to be harvested could be used as roost sites. Riparian and other reserves and the snag retention guidelines would mitigate this potential impact (USDI 1994).

Former Survey and Manage Species

Although no longer required, protocol surveys for great gray owls, S&M molluscs, and red tree voles were conducted in the project area prior to the Survey and Manage Standard and Guideline being eliminated. No great gray owl nest sites, S&M mollusks, or red tree voles were found in the project area. Therefore, these species are not likely to be affected by the proposed project.

As previously discussed, surveys for Siskiyou Mountains salamanders were conducted in most of the suitable habitat in the project area. Known occupied habitat is protected. See the Siskiyou Mountains salamander discussion above.

Deer Winter Range

The Little Applegate Deer Winter Range is entirely within the proposed project area. The primary impact of the proposed timber harvest in deer winter range would be the reduction in thermal cover effectiveness due to a reduction in canopy closure in the commercial-sized conifer stands. The Medford District RMP ROD recommends maintaining at least 20 percent of designated deer winter range in thermal cover (i.e., conifer/evergreen canopy closure >70%).

Approximately 9,000 acres of the Little Applegate deer winter range are on BLM managed land. Of this total, approximately 2,750 acres currently provide thermal cover. Based on observed use and professional judgment, thermal cover includes conifer stands with high canopy closure and approximately 25 percent of the manzanita dominated brushlands. Approximately 965 acres are scheduled for treatment in the proposed project, and 910 of those acres would not provide the current thermal cover effectiveness post-harvest. Post-harvest, this will reduce thermal cover on BLM-managed land to 1,840 acres which is approximately 20 percent of deer winter range on BLM. This minimally meets the current RMP guidance. Several other factors would mitigate this reduction in thermal cover effectiveness.

(1) Regeneration harvest is not proposed for any of the stands currently providing thermal cover. Post-harvest these stands will have canopy closures of 40-60 percent. Although not optimal, the thermal cover effectiveness of the stands would still be about 50 percent based on data in Thomas et al. (1979).

(2) The loss in thermal cover effectiveness would not be compounded by vehicular traffic. Most of the deer winter range is in an unroaded portion of the proposed project area, i.e., the south-facing slopes of the Little Applegate below Anderson Butte. The deer on the winter range do not have to waste an inordinate amount of energy in avoidance behavior.

(3) The harvest will probably improve forage conditions in the stands by stimulating the growth and abundance of shrub and herbaceous species. The improved forage conditions could offset and even exceed the theoretical energetic cost of reduced thermal cover effectiveness.

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

Direct/Indirect Effects of Oak Woodland Shrubland Treatments

General

Fuel/hazard reduction treatments are planned on approximately 335 acres of shrubland and oak-woodland. The treatments are designed to reduce fire hazard and restore oak-woodland habitat by reducing the density of both shrubs and hardwoods. As with the timber management portion of the proposed project, the fuel reduction treatments would adversely affect some species and benefit others.

Oregon Important Bird Area

The Muddy Gulch, Wolf Gulch and Bear Gulch portions of the project have been designated as an Oregon Important Bird Area. This designation was conferred on this area because several bird species associated with the shrubland/oak-woodland habitat complex reach their northern breeding limits in southwest

Oregon. Species specifically mentioned in the designation include blue-gray gnatcatcher, California towhee and oak titmouse. The proposed fuel reduction program would likely adversely affect these species; both by habitat modification and nesting disruption. There are approximately 7,000 acres of oak-woodland/shrubland habitat within the project area. Approximately 900 acres were treated under a fuels reduction categorical exclusion, and an additional 335 acres are proposed for treatment under this project. This total represents approximately 20 percent of the existing habitat for these species within the project area. As a project design feature, 10 percent of the units are reserved in refugia of 1-3 acres. Given the amount of habitat that would remain unaltered (approximately 85 percent), the impact to these species would be minimal. Also, it should be noted that these 3 species have extensive ranges e.g., from southern Oregon to Baja; therefore, they are not currently considered special status species.

If operations take place during the nesting season birds could be displaced and production for one season could be curtailed. Given the wide range that the species occupies, and the amount of habitat that will be retained, this is not considered a significant impact.

Threatened/Endangered Species

The fuel treatments would not remove/or downgrade suitable spotted owl habitat, or any of the constituent elements of critical habitat. Also, the treatments would not take place proximate to (i.e., within 65 yards) of known northern spotted owl sites; therefore, disturbance during the nesting season would not be an issue. Therefore, northern spotted owls would not be adversely affected by the proposed project.

Special Status Species

The only special status species associated with habitat to be treated in the non-commercial units is the Lewis's woodpecker. Opportunistic observations have not detected this species in the project area. Lewis' woodpeckers are associated with open oak-pine woodland habitat. The treatments prescribed for the oak-woodlands would potentially improve habitat conditions for this species in the long term by improving acorn production.

Deer Winter Range

The proposed treatments are in deer winter range. The treatments would improve forage conditions by removing decadent shrubs, and stimulating both the growth and abundance of herbaceous and shrub vegetation. Abundant and nutritious forage on deer winter range is necessary for survival and good reproductive performance of wintering deer. Therefore, the proposed treatments would benefit deer winter range.

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 5th Field Little Applegate watershed, and the Applegate-Star/Boaz Watershed. The proposed project is located in a portion of both of these watersheds. Watershed analyses were conducted for these watersheds, and data collected for watershed analyses 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 5th field watershed seems 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.

Northern Spotted Owl

Until implementation of the NWFP began in 1994, timber harvest on both federal and private land in the analysis area focused on the harvest of large-diameter trees due to their economic value. 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. 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.

It is estimated from watershed analyses (USDI BLM 1995 and 1998) that in the 1950s there were approximately 44,500 acres of commercial-sized conifer timber stands on both federal and private land in the analysis area. Approximately 35,800 acres are thought to have provided suitable spotted owl habitat. This estimate is based on interpretation of descriptive text by forest surveyors who subjectively described existing stand conditions.

The suitable spotted owl habitat baseline in the analysis area at the time the NWFP was signed in 1994 is estimated to have been approximately 23,600 acres on federal land. The 1994 baseline acreage accounts for habitat lost through timber harvest and natural causes and for suitable habitat ingrowth through succession from 1947 to 1994. The baseline acreage was derived from watershed analyses data (USDI BLM 1998) and Biological Assessment data (USDI BLM/USDA FS 2001). 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 approximately 1,990 acres of spotted owl habitat have been removed or downgraded to dispersal habitat through timber harvest in the analysis area. Additionally, approximately 3,000 acres of suitable habitat have been lost to fires. The current spotted owl suitable habitat acreage in the analysis area is approximately 18,600 acres. The Bald Lick project would remove or downgrade approximately 2,655 acres; thus, reducing suitable habitat to approximately 15,945 acres.

Upcoming projects in the analysis area have been planned through fiscal year 2009. Therefore, for the analysis, 2009 is considered the “reasonably foreseeable future”. Through this period it is estimated that timber harvest would remove or downgrade (to dispersal habitat) an additional 1,885 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 14,060 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 means to predict ingrowth of suitable habitat is not available. However, the amount of unsuitable habitat developing into suitable habitat in a 5-year period would be expected to be minimal.

Overall, this represents approximately a 60 percent loss of suitable spotted owl habitat in the analysis area due to past, present, and reasonably foreseeable actions. Habitat loss of this magnitude obviously impedes the ability of some spotted owls in the analysis area to feed, breed and shelter. However, the Service in their BO (Log # 1-15-03-F-511) for timber sales and other projects in the Rogue River/South Coast basins concluded that the timber sales and other projects from 2004 through 2008 are not likely to jeopardize the

northern spotted owl or destroy or adversely modify critical habitat for the northern spotted owl. (Note: Due to project rescheduling the projects scheduled out to 2009 in the analysis area were included in the BO analysis of effects even though the BO was for 2004-2008 projects.) Their analysis was on a larger scale, but their environmental baseline, cumulative effects, and the effects of the proposed actions included the Little Applegate and Star-Boaz watersheds, the Bald Lick Project, and the "reasonably foreseeable future" projects discussed above. The Service's findings indicate that habitat removal and downgrading in the analysis area would not preclude the conservation and recovery of the spotted owl which is a primary goal of the NWFP.

Non-Commercial Treatments

The non-commercial stands to be treated can generally be characterized as overstocked and decadent. Prior to the initiation of intensive fire suppression fires were common in the shrubland and oak-woodland plant communities. As a result, early seral vegetation was abundant in the shublands, and the fires kept shrubs and conifers from encroaching into the oak-woodlands. The goals of the treatments for the non-commercial lands, besides reducing fire hazard, are to provide a greater abundance of early seral vegetation, and remove competing vegetation in the oak-woodlands. The prescribed treatments would improve habitat conditions for those species that prefer early seral habitat, and for those species that feed on acorns. On the other hand, habitat would be reduced for those species that prefer dense, mature to over-mature shrubland conditions (e.g., wrentit and blue-gray gnatcatcher).

Based on data in the Little Applegate and Star-Boaz watershed analyses (USDI BLM 1995 and 1998), there are approximately 11,600 acres of oak-woodland/shrubland habitat in the analysis area. Treatment of oak/woodland/shrubland habitat was uncommon until implementation of the NWFP. Since 1994 it is estimated that approximately 2,800 acres of this habitat have been treated in the analysis area.

In the Bald Lick project an additional 350 acres will be treated. In the "reasonably foreseeable future"; i.e., from the present until 2009, it is estimated that an additional 800 acres of BLM-managed non-commercial land will be treated in the analysis area. This estimate is based on the amount of shrubland/oak-woodland habitat in the proposed project areas, and the percentage of this type of habitat that has been treated in past projects. It is not known how much private land will be treated during this period, but due to the emphasis on fire hazard reduction the treatments on private land will increase. For purpose of analysis, it is estimated that approximately 1,000 acres would be treated on private lands. Therefore, by 2009 approximately 4,950 acres (43 percent) of the 11,600 acres of oak-woodland/shrubland habitat in the analysis area would be treated. The treatments would obviously cause a change in the distribution and abundance of species. However, with greater than 50 percent of the habitat remaining untreated, all species now present in the oak-woodland/shrubland habitat would be accommodated.

Road Construction

Under Alternative 2, 11 miles of new road would be constructed and 16 miles of existing road would be decommissioned. The proposed new roads traverse a variety of habitat types, and would remove approximately 75 acres of habitat. In relation to the size of the proposed project area, the loss of this amount of habitat (approximately 0.3 percent of BLM managed land within the project area) would be inconsequential. However, there are other pervasive effects of roads to wildlife.

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 overhunting 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 overhunting remain. However, these impacts would be reduced to some extent because some 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 dessication 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 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 decommissioning 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, e.g., edge effects and microclimatic changes that degrade habitat conditions in adjacent habitat for some species.

Alternative 3

Direct/Indirect/Cumulative Effects
Under Alternative 3 new road construction would be reduced by approximately 5 miles. This would reduce direct habitat loss by about 35 acres, and the other effects of roads to wildlife would also be reduced accordingly. Timber harvest and other treatments would not change; therefore the effects from those operations would be the same as those addressed in Alternative 2.

Alternative 4

Direct/Indirect/Cumulative Effects
Alternative 4 would not harvest timber in CHU OR-75. Compared to Alternatives 2 and 3 the modification of existing habitat conditions would be reduced by approximately 2,800 acres. Also, road construction would be reduced by approximately 7 miles. Impacts to wildlife would be similar to those discussed in Alternative 2 (see Alternative 2), but they would occur on fewer acres. The following summarizes the changes in impacts.

Northern Spotted Owl

There are approximately 6,000 acres of suitable spotted owl habitat, and 3,070 acres of dispersal-only habitat on BLM-managed land in the proposed project area. It is estimated that Alternative 4 would remove or downgrade approximately 1,100 acres (19 percent) of suitable habitat (approximately 430 acres would be removed and 670 acres would be downgraded to dispersal habitat). Additionally, approximately 400 acres of dispersal-only habitat would be removed. The table below displays the estimated pre and

post-project spotted owl habitat conditions in the proposed project area. It should be noted that the 670 acres of suitable habitat that will be downgraded to dispersal habitat could again be suitable habitat in 20-30 years if no further harvesting occurs in these stands during this time period.

Table 4-9. Northern Spotted Owl Habitat

Spotted Owl Habitat Within the Proposed Project Area			
Suitable Habitat (Acres)		**Dispersal-only Habitat (Acres)**	
Pre-project	Post-project	Pre-project	Post-project
6,000	4,900	3,070	3,340

Purple Martin

Under Alternative 4, the known location for the purple martin is no longer in the project area.

Northern Goshawk

Modification of northern goshawk habitat would be reduced to approximately 1,100 acres versus 2,655 acres under Alternatives 2 and 3.

Deer Winter Range

The acreage of thermal cover being modified to the extent that the effectiveness is reduced is 580 acres under Alternative 4 versus 910 acres under Alternatives 2 and 3. Post-harvest, optimal thermal cover would comprise approximately 14 percent of the deer winter range. See Alternative 2 for a discussion on thermal cover.

Oak-woodland/Shrubland Treatments

Fuel/hazard reduction treatments are planned on approximately 150 acres of shrubland and oak-woodland under Alternative 4. Approximately 335 acres would have been treated under Alternatives 2 and 3. This is a direct reduction in the amount of preferred habitat that would be modified in the Oregon Important Bird Area.

Road Construction

Under Alternative 4, 4 miles of new road would be constructed and 7 miles of existing road would be decommissioned. Compared to Alternatives 2, this would be a 7 mile reduction in new road construction, and a 9 mile reduction in roads that would be decommissioned. Direct habitat loss due to road construction would be decreased by approximately 50 acres. However, post-project open roads would increase by 9 miles compared to Alternative 2.

Cumulative Effects

The current downgrading and removal of northern spotted owl habitat would be reduced by approximately 1500 acres. Other baseline habitat values in the Alternative 2 cumulative effects analysis would remain unchanged.

9. FISHERIES

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain ecological health of watersheds and aquatic ecosystems on public lands. The strategy would protect aquatic habitat on federal lands managed by the Forest Service and Bureau of Land Management within the range of Pacific Ocean anadromous species. All Action Alternatives proposed would meet the requirements of the Aquatic Conservation Strategy.

Threatened and Endangered Aquatic Species and Essential Fish Habitat
This project is determined to be a "May Affect, Not Likely Adversely Affect (NLAA)" for listed SONC coho salmon, their Critical Habitat (CCH), and Essential Fish Habitat. Project design features, Riparian Reserve stipulations and buffers, and site conditions would ensure that there is a less than negligible chance of negatively affecting Critical Habitat for listed SONC coho or Essential Fish Habitat for coho, steelhead, and chinook. The SW Oregon Level 1 Team has reviewed this project and concurs with the NLAA determination. The project has been submitted to NOAA Fisheries, and a Letter of Concurrence is expected.

Alternative 1 – No Action

Alternative 1 would have no direct effect on fish or fish habitat. Indirect effects would include continued fine sediment input from high road densities, poorly-designed and damaged roads, continued risk of culvert blow-out from undersized culverts, and increased wildfire potential because of fewer proposed fuels treatments.

Alternative 2

Direct and indirect negative effects
In the Bald Lick project, the only activities with potential negative effects to fish and aquatic systems would be those either in the stream channel, or with a physical route for fine sediments to reach the stream channel. Such activities include road construction, renovation, decommissioning and associated culvert removal, culvert replacement, and timber hauling. The effects of harvesting in Transient Snow Zone (TSZ) and on peak flow are discussed in detail in the Hydrology section.

Water temperature would not be affected by this project as no harvest would occur within Riparian Reserves of perennial streams. Large wood potential would improve at the site scale where riparian reserve harvest is proposed (15 acres on Lick Gulch tributaries) but there would not be any change to this habitat indicator at the project scale.

Within the project area, road densities in many of the HUC 7s are high and some of these drainages have very high road densities within Riparian Reserves (Table H3). According to the Klamath Province/Siskiyou Mountains Matrix of Factors and Indicators used in the Section 7 Consultation process, road densities must be <2.0 mi/mi2 to be considered properly functioning condition. For this project 12 miles of road construction and 16 miles of decommissioning are proposed. Approximately 4.5 miles of riparian reserve roads are proposed for natural decommissioning and of that approximately 2.0 miles are currently in stable condition with vegetation growing within the road prism.

Most of the new road construction is located on or near ridgetops in areas of stable soils. Approximately 1.5 miles of proposed new road construction is mid-slope and 0.3 miles is within Riparian Reserves. Two of the RR road construction segments (0.1 mile each) are located along the outer edges of Riparian Reserves. One proposed construction segment (0.1 mile) would require placing a culvert in an intermittent tributary to Lick Gulch, approximately 1.0 mile from CCH. Adding this new crossing would increase the

risk of additional sediments during flood events and as sediment generated from the road construction moves downstream. At the site scale, BMPs and PDFs are in place to reduce the amount of sediment that leaves any construction site. Although short-term erosion rates would moderately increase, the proposed action would decrease erosion from roads long-term by reducing the total miles of road in the planning area and by bringing the entire road system up to current BLM standards (see Soils report). The probability of this Riparian Reserve road construction negatively affecting sediment levels in CCH is low because of timing of sediment movement, the amount of sediment and the distance it would have to travel to affect CCH.

Most sediment produced from road decommissioning, road renovation, and timber hauling in the Bald Lick Project will be trapped by healthy riparian vegetation, downed wood and thick duff layers between roads and the streams. However, there would be localized increases in sediment especially where culverts are replaced. When culverts are replaced or removed, stream banks, vegetation, and substrate are disturbed. Project Design Features (PDFs) attempt to ameliorate these disturbances by requiring dry season work, bare soil stabilization, channel dewatering, and sediment traps. Sediment generated during road renovation and decommissioning would not persist beyond the first few substantial rainfall events and would not have any lasting effects at the site scale aquatic habitats. Over the long-term, road renovation and decommissioning would restore hydrologic connectivity and function by reducing the amount of sediment entering these streams from poorly constructed roads and by improving the ability of culverts to route substrate.

A road crossing the Little Applegate River by low-water ford is proposed for renovation and haul under this project. This crossing is expected to add approximately 3 yds^3 of fine sediment to the Little Applegate River during the summer low flow and this sediment is anticipated to be deposited within 500 yards downstream of the ford. Turbidity above the 10% DEQ standard would likely be detectable several miles downstream of the ford. The Little Applegate River is not properly functioning and does not have the capacity to move and store sediment as a stream system should. Short-term effects to the 500 yard section below the ford could include increased short-term embeddedness, reduced scour-pool quality and diminished macroinvertebrate habitat. As this sediment moves downstream it will be diluted by the much greater volume of water in critical habitat and not be discernable above background levels however, it will remain embedded. Approximately 41,000 acres of the Little Applegate watershed are upstream of the action area. So, while this sediment will not further degrade the system it will help maintain the current degraded condition. That being said it is unlikely that this amount of sediment will affect coho or CCH because even if coho accessed the habitat above the falls at river mile 1.6 there are 9.5 miles of habitat between the falls and the proposed ford where coho salmon could spawn and rear before being impacted by the low-water ford.

*Indirect **beneficial** effects to aquatic ecosystems*

Indirect beneficial effects include reduced risk of culvert failure, reduced road-related fine sediment input, and improved tree growth in treated Riparian Reserves. The culverts to be removed or replaced are all too small to withstand a 100-year flood event. Most are blocking the passage of sediment and wood. In the 1997 New Year's Day flood, many road failures across western Oregon were associated with culvert failures; either plugging and losing their ability to route water, or being too small forcing water over the tops of roads. Failed culverts can dump tons of fine sediments into downstream, fish-bearing reaches. Such huge fine sediment loads are well known threats to fish and aquatic insect production. Removing or replacing these culverts will remove this risk and restore some hydrologic function as larger substrate would be able to move downstream through the larger culverts.

Road renovation and decommissioning would improve drainage on BLM roads, away from stream channels. This renovation would fix current water routing and sediment source problems as well as ensure that stable roads remain that way. Sediment generated from the new stream crossing on Lick Gulch would

be offset in the long term by decommissioning of approximately 3.0 miles of road within the Riparian Reserve of Lick Gulch and associated culvert removal.

Removing small diameter trees around larger trees within some Riparian Reserves may improve the growth rate of these larger trees. If so, then trees may attain late-successional characteristics sooner, and provide larger wood to adjacent channels and riparian areas. Removing these small tress (almost all Douglas fir) will protect vegetative diversity in these sites. Regardless, the overstory canopy would not be reduced in these Riparian Reserves, so the humid characteristics of the riparian areas would be maintained, and water temperatures would remain the same (see Hydrology section).

Cumulative Effects

The cumulative effects of the Bald Lick Landscape Project to the aquatic habitats are well-addressed in the Hydrology section. As described earlier in the document, the Little Applegate and Applegate River-McKee watersheds have experienced numerous anthropogenic disturbances at many spatial and temporal scales. In the last 100 years, fire suppression, private industrial timber harvest, and road construction in riparian zones, road densities, instream wood removal, channel straightening, continued irrigation water withdrawals and rural residential development have all contributed to the degradation in fish habitat. Although another "perturbation" on the landscape, the Bald Lick project hopes to correct some of the problems in the watershed. The silvicultural prescriptions attempt to restore more "natural" forest, woodland, grassland, and riparian conditions in the hopes of facilitating natural ecological processes (e.g. nutrient cycling, low-impact and patchy wildfires). Riparian prescriptions, road renovation, culvert replacement, and road decommissioning help reduce fine sediment inputs to streams and improve stream channel function at the site-scale. By following the BMPs and PDFs, including the timing of the action during the dry season, seeding and mulching any exposed soil, dust abatement practices, river-run rock through the low water ford the amount of sediment expected to transmitted can be greatly reduced. In addition, surface rocking of natural-surfaced roads within the Riparian Reserve will result in an immediate reduction in potential sediment delivery from these roads. Decreases in this type of sediment source will improve substrate conditions at the site scale, but will not be enough to ameliorate the conditions in the Little Applegate or mainstem Applegate River. The overall effect of the project is a short-term but insignificant negative effect and a long-term slightly positive effect. During the project, risk levels related to roads would be comparable to what existed prior to the start of the project. Once harvest activities were completed, all roads would receive a final round of maintenance to fix "wear-and-tear" to surfacing and erosion control measures incurred during the project. Effects to hydrology, while potentially observable within a short distance of the work, would not be discernable over background levels at or beyond the mouth of individual 7th field drainages (see Hydrology write-up).

At the larger scale (HUC-5), there are no expected changes to fish habitat condition (see Hydrology section).

Alternative 3

Approximately 7.1 miles of new road construction is proposed under this alternative along with 17.5 miles of road decommissioning. The effects to fish and fish habitat would be less than those outlined in Alternative B especially with regards to sediment because there would be less ground disturbance. Road construction is reduced under this alternative and helicopter logging is increased.

Alternative 4

This alternative would be less ground disturbing than Alternatives B and C because activities planned between Grouse Creek and Owl Gulch have been removed. So there is less road construction, reduced harvest (~45% of Alt. B), and increased helicopter logging. At the same time, fewer miles of road would

be renovated (< 50% of Alt. B) and 4.5 miles of riparian road would not be decommissioned. The trade-off is this: less riparian reserve road decommissioning and less road renovation for reduced harvest and haul and overall ground disturbance in the Lick Gulch, Owl Gulch, Grouse Creek, and Yale Creek. In terms of fish habitat the amount of sediment, less disturbance will mean less fine sediment input in the short-term and potentially greater sediment input over the long term because of lack of road renovation and stream-side road decommissioning.

10. AQUATIC CONSERVATION STRATEGY AND THE BALD LICK LANDSCAPE PROJECT

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[57]. How the four components of ACS relate to the Bald Lick Landscape Project is explained below:

1. Riparian Reserves: Riparian Reserve widths for streams, springs, wetlands, and unstable soils have been determined according to the protocol outlined in the NWFPs Aquatic Conservation Strategy and are listed in the PDFs for the Bald Lick 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. Portions of the Little Applegate River Watershed are within several Tier 1 Key Watersheds.

3. Watershed Analysis: BLM and USFS completed the Little Applegate Watershed Analysis in 1995 and BLM completed the Star/Boaz Watershed Analysis in 1998.

4. Watershed Restoration: Most of the restoration activities in the Little Applegate Watershed have focused on restoring fish passage to better habitat on federal lands and dealing with irrigation ditch issues. Projects by the local watershed council, ODFW and/or BLM include culvert removal and replacement, road decommissioning, irrigation ditch fish screens, flood berm removal, and riparian planting.

Evaluation of This Action's Consistency with Northwest Forest Plan Aquatic Conservation Strategy Objectives

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

> Topography, slope, forest fire regime, climate, and the distribution of soil types and plant communities are some of the landscape-scale features affecting aquatic systems in the Little Applegate River watershed. One of the primary treatment objectives of the Bald Lick project is to compensate for an altered fire regime and restore certain plant communities. The intent of this objective is to restore the function of landscape-scale processes like wildfire in order to protect the complexity and distribution of plant communities (including riparian areas) across the landscape.

2. Maintain and restore **spatial and temporal connectivity** within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater

[57] November 9, 1999 Regional Ecosystem Office memorandum concerning NWFP requirements for ACS consistency determination.

tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

In the Little Applegate River Watershed, BLM-managed land is concentrated in the steeper slopes of tributaries to the Little Applegate River. Here, longitudinal connectivity and road densities are the primary issues for aquatic species. Planned culvert removal, culvert improvements and road decommissioning in the Bald Lick project will restore or improve migration corridors within streams for aquatic species and eventually improve lateral drainage connections. Actions that restore stream crossings and decommission Riparian Reserve roads in the project area far outweigh the one new action that may further limit connectivity. There is one proposed new stream crossing on the intermittent tributary to Lick Gulch that would limit connectivity, although PDFs and BMPs would ensure that the culvert would accommodate 100-year flood event and offer some degree of connectivity for aquatic organisms that may use this stream section on a seasonal basis. Within the project area, numerous culverts are being removed and approximately 16 miles of road are being decommissioned in Riparian Reserves. These improvements would only be noticeable at the site scale and would not affect fish species as most of the work is being conducted in intermittent or non-fish bearing streams.

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

Removing or improving culverts will remove some artificial constraints on the shape of small streams in the Bald Lick project area. This will help restore the physical integrity of these streams. Where the new road is being constructed across an intermittent tributary to Lick Gulch, some bank damage would occur. PDFs and BMPs would minimize the disturbance but in the short-term there would be increased sediment. The sediment generated by this action would be washed out in the first couple high flow events. In the long term, there would be a stream crossing where there was none before. Improvements in road drainage on existing roads would help prevent routing of stormflow and sediment to streams by roads, in turn preventing degradation to the physical integrity of the system that could be caused by elevated peakflows and sediment delivery. Otherwise, the activities in the Bald Lick project have no influence on the physical integrity of streams: roads are not being constructed across channels, and vegetation management actions (thinning, burning, etc.) are not sufficient to change peak flows. BLM's actions, however, will be unnoticeable at the 5th field watershed scale, due to the already existing extensive channel modification along the Applegate River, Little Applegate River, and Yale Creek.

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

There would be no effect on water temperature, because shade would be maintained along all stream channels. There may be some small amount of fine sediment entering stream channels at culvert removal or replacement locations; however, this small amount of fine sediment should not be above normal turbidity levels if project BMPs and PDFs are implemented properly. Upland work will have little discernable 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 addition, the road renovation and decommissioning will reduce fine sediment at many locations across the project area, reducing the cumulative amount of fine sediments reaching stream channels downstream. Culvert removal and improvement will reduce the risk of large sediment input from culvert "blow-outs." Any sediment increases resulting from the proposed road work would be minor relative to existing sediment levels and would be offset by the substantial sediment decreased resulting from road renovation and decommissioning. This will ultimately

benefit aquatic systems. The beneficial effects of these actions would be unnoticable at the large spatial scale of the Applegate River - McKee Bridge and Little Applegate River watersheds, due to continuing water quality problems from historical and present-day activities.

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.

Improved roads and culverts would decrease fine sediment input to the system. Improved or removed culverts would also restore natural sediment routing at those locations. These improvements are too minor to be noticed at the watershed scale. Also see ACS Objective #4. In general, high road densities in the area will continue to impact the sediment regime.

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 would not be affected by the Bald Lick Project at the 5th-field watershed scale. Please see the Hydrology report for details. Any effects on stream flow from the Bald Lick Project would be too small and localized to be noticeable at the watershed scale. Water withdrawals for agricultural and residential use, and streamflow regulation by the Applegate Dam have the most significant impacts to mainstem river flows. With an overall reduction in road density, reduction of Riparian Reserve road density in many drainages, removal of numerous stream crossings, and more disconnection of roads from the stream network, there would be less rapid delivery of storm runoff directly to streams from roads. Peak flows from roads would be reduced; however, this reduction would not be discernable over background levels at or beyond the mouth of individual 7th field drainages.

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

Most of the Riparian Reserves would remain untreated in the Bald Lick Project, 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 wetlands would experience any change in water table elevation. The few (~160) Riparian Reserve acres planned for non-commercial understory thinning are along steep-gradient streams. Any extra water in the soil would be used by the remaining trees and shrubs and would not be measurable in the adjacent streams. At the watershed scale, the adverse impacts from over a century of road network development, hydraulic mining, agricultural irrigation, and settlement in the floodplains dwarf any impacts from the Bald Lick Project.

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.

For the most part, Riparian Reserves will be left completely alone; therefore, their current condition will be maintained. The non-commercial thinning and/or underburning (in shrub communities) in Riparian Reserves is designed to restore the species composition and structural diversity of riparian plant communities. This includes forbs, grasses, shrubs and trees; snags, “old-growth,” and thickets of young trees; rotten logs and newly-downed wood of various sizes. Thinning competing small-diameter Douglas fir from larger riparian trees may improve the long-term supply of coarse woody debris at a few sites. However, the mainstem Applegate River and Little Applegate River will remain unaffected by these improvements.

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

The treated Riparian Reserves were chosen carefully to restore habitat and riparian function at those sites. Otherwise, Riparian Reserves remain untreated. Untreated reserves include those with special plant and animal protected areas. The intent is to provide habitat for both species with small home ranges as well as those with large home ranges. Species that must move across the highly developed Applegate River and Little Applegate River floodplains may not benefit from riparian condition in the Bald Lick area.

11. SPECIAL AREAS, WILDERNESS & UNROADED AREAS

Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) directed the Secretary of the Interior and the BLM to review all public land roadless areas 5,000 acres or more in size, or roadless islands with wilderness characteristics, to determine their suitability or nonsuitability for wilderness designation. However, Section 603 has limited application to the revested Oregon and California lands (O&C lands). The O&C Act takes precedence where mandatory wilderness review of Section 603 would prevent commercial timber management of O&C lands (Memorandums from Office of the Solicitor, Washington DC, August 27, 1979 and September 5, 1978). The majority of BLM lands (21,000 acres) the within the Bald Lick Planning Area are O&C lands; therefore, these lands are not eligible for Wilderness Study.

The "Dakubetede" area was nominated by local residents to study its potential as an **Area of Critical Environmental Concern** (ACEC). The area was studied and was eliminated as an ACEC through the Medford District Resource Management Plan analysis process (Draft RMP, Appendix 2-SA-2. Management of Candidate ACECs not selected in the Preferred Alternative; PRMP EIS, Table 2-12, p. 2-139).

The Sterling Mine Ditch ACEC would be protected as described in the RMP (and Bald Lick PDFs) under all alternatives; no timber harvesting would occur within 30 feet either side of the trail/ditch to protect the integrity of the ditch.

Timber harvesting and road construction associated with all action alternatives would change the character of unroaded areas to varying degrees, by action, by alternative, and by area. Alternatives 2 and 3 would treat the same number of acres within unroaded areas; however, alternative 3 would construct fewer miles of roads through areas currently unroaded. Alternative 4 would treat fewer acres in unroaded areas, and no treatment would occur in Trillium Mountain and Quartz Lick unroaded areas. Alternative 4 would result in even fewer miles of road construction than Alternative 3. The feeling of solitude and appearance of naturalness of an area would be changed to the greatest degree in the immediate vicinity of new road construction. As one moves away from road development sites into areas only accessed by helicopters for forest thinning, the feeling of solitude and appearance of naturalness would increase; however, the presence of human activities would be visible in areas treated in the form of tree stumps. Where no actions are planned, the character would remain unchanged, except as influenced by adjacent managed areas. The following table (Table 4-10) describes the effects in the way of acres harvested and miles of new road construction within each unroaded area identified. The unroaded area names submitted by local residents are used for reference only and do not imply any formal designation of any type. Project design features including road gating and decommissioning would help to reduce effects to people who recreate in these areas for their undeveloped character.

Considering Mitigation Measures #1 and #2, effects would be further reduced as no treatment would occur on the northside of trillium mountain and would be reduced in the Dakubeted unroaded area similar to Alterative 4.

Table 4-10. Acres treated by unroaded area.

Unroaded Area[12]	Alternative 1 (No-Action)		Alternative 2		Alternative 3		Alternative 4	
	Acres Harvested (% of area)	Miles of Road Const.	Acres Harvested (% of area)	Miles of Road Const.	Acres Harvested (% of area)	Miles of Road Const.	Acres Harvested (% of area)	Miles of Road Const.
Dakubetede	0	0	455	0	455	0	212	0
Buncom A	0	0	1359	2.4	1359	2.4	566	2.0
Buncom B	0	0		2.8		1.6		0
Bald Mountain	0	0	122	0.5	122	0	122	0.5
River Canyon	0	0	163	0	163	0	163	0
Eagle Canyon	0	0	58	0	58	0	58	0
Trillium Mtn.	0	0	492	1.0	492	0	0	0
Cinnabar-Boaz	0	0	179	0	179	0	179	0
Quartz Lick A	0	0	302	0.6	302	0	0	0
Quartz Lick B	0	0		0		0		0

12. CULTURAL RESOURCES

The entire project area was surveyed under contract for cultural resources and all known sites are flagged and are to be avoided with all ground disturbing activities; this includes any planned fire activities. If any other cultural resources are discovered during the project activities, all work in the discovery area will be stopped until the District archaeologist can be consulted.

Assuming all known cultural sites will be avoided; there are no negative impacts to cultural resources anticipated from this project.

13. VISUAL RESOURCE MANAGEMENT

Resource development patterns that disrupt the land surface (road construction) and vegetative patterns (vegetation thinning) can have adverse effects on visual resources (RMP/EIS p. 4-86). The entire Bald Lick Planning Area is classified as either VRM Class III or IV (RMP Map 10; EA, Chapter 3, Visual Resource Management). The mix of thinning prescriptions, designed to meet Southern General Forest Management Area guidance of the RMP (Appendix E, Silvicultural Systems Utilized in the Design of the Resource Management Plan), and utilized for the Bald Lick Project would generally meet VRM class II management objectives exceeding visual management objectives for VRM Class III; however, some cases it could only meet VRM Class III (RMP/EIS p. 4-88).

In accordance with the RMP a visual resource contrast rating system analysis was completed for the Bald Lick Project (Appendix G). It was determined the Bald Lick project would meet visual resource management objectives for VRM Class III and IV for all alternatives.

14. RECREATION

[12] Names are described by local residents and are used only for reference and do not imply a formal designation.

Recreation in the sale area includes hiking, horseback riding, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering. A section of the Sterling Mine Ditch is within the planning area and it is designated as an Area of Critical Environmental Concern (see discussion of special areas above). No timber harvest or disturbance to the ditch or the berm created by the ditch construction is to be disturbed. The ditch is closed to motorized use.

Negative impacts to recreation would be in the form of disturbance and effects would be short-term and intermittent lasting for only the duration of the project implementation (about 3 years).

15. RURAL INTERFACE AREAS

Residents living near the project area within the Little Applegate and Applegate area expressed their concerns for increased traffic and noise from helicopter logging as a result of the Bald Lick Project and the effects it would have on their quality of life. The Medford District RMP analyzed and estimated the effects of timber harvesting and road building on Rural Interface Areas (RIA) across the Medford District BLM. It was anticipated that all alternatives considered in the RMP/EIS including the proposed resource management plan would result in some level of conflicts and controversy with rural interface residents associated with amount of lands designated to timber production. The effects were identified as an unavoidable adverse effect of the land use management plan (RMP p. 4-119). In Rural Interface Areas, some BLM neighbors share the feeling that timber management (including road building) would impact their viewshed, open space, and domestic water sources. (RMP p. 4-115).

The BLM received similar comments from the public as a result of the Bald Lick Project public outreach (see Chapter 1, Scoping section of this EA and Appendix E). Neighbors living in the Little Applegate area also expressed concern for helicopter noise, dust from increased traffic on roads, and concern for safety on roads during log hauling operations. Some RIA residents have lived in the area for decades, while others are new to the area. An increasing number of people move to rural interface areas for the peace and quiet of country and mountain living. It seems from letters and comments received that few who move to the rural interface areas research the land use zoning, policies, and plans of adjoining public and private forest lands prior to moving into the area. Many are dismayed when they discover that timber harvesting is planned for neighboring public and privately owned timber lands. BLM also received a few comments reflecting the concern of neighbors that needed commercial forest thinning and fire hazard reduction was taking too long, placing their property at higher risk for wildfire impacts.

The site specific effects of the Bald Lick Landscape project on RIAs are analyzed under various sections of this EA, including Air Quality, Water Resources, Visual Resource Management, and this section, Effects on Rural Interface Areas. The RMP disclosed there are 5,402 acres of Rurul Interface Area allocated to timber production within the Little Applegate Watershed and 1,426 acres in the Upper Applegate Watershed (of which the Applegate-Mckee Bride Watershed is part of). These areas would be affected by timber management actions. Of these acres, an estimated 1,986 acres are located in the Baldlick Project Area. Alternatives 2 and 3 would treat 964 acres designated as rural interface area (BLM administered lands within ¼ mile of rural residential land); Alternative 4 would treat 450 acres of land designated as Rural Interface Area. The effects to rural interface areas are within those effects analyzed and disclosed in the RMP/EIS.

Increased Noise From Helicopter Logging

The Medford District RMP anticipated there would be adverse impacts from helicopter logging on BLM neighbors living in Rural Interface Areas. Increased use of helicopter logging under the Proposed Resource Management Plan would have increased noise impact on residents living in the rural interface. The impacts would occur during daylight operating hours and the frequency could be as few as two to as many as 150 helicopter passes per day. Although noise from helicopters would be audible for most of the day, it is most

audible when the helicopter is within 500 feet of residences. Experience indicates that effects to residents are the greatest in the morning and evening hours. Family relationships can become strained and domestic livestock and wildlife can be disturbed. Project design features limiting hours of operation can reduce this impact however would not eliminate the impact altogether. This is an unavoidable adverse impact that cannot be avoided and would likely increase as the populations in the rural interface increase (RMP/EIS p. 4-115). Concerns

The Bald Lick Landscape project would implement 2,655 acres of helicopter yarding under Alternative 2, about 2,987 acres under Alternative 3, and 1,309 acres under Alternative 4. Of these acres, there are 41 acres of commercial thinning units (under Alternatives 2 and 3) to be yarded by helicopter within 500 feet of structures mapped on Jackson County's Geographic Information System, and 21 acres under Alternative 4. Helicopter yarding operations would be the most concentrated outside of fire season (generally from October through June). Timber operators generally do not move helicopter operations into a project area when the hours of operation are limited due to fire danger restrictions since this could drive up the cost of operations. Additionally, helicopters can be contracted out for fire suppression activities during fire season generally receiving higher economic returns than is made through helicopter logging.

Project design features are included to reduce the impacts to residents living near the project area. Helicopter operations closer than ½ mile of a residence would be limited to an operating period of 8:00 AM to 5:00 PM, Monday through Friday. Any helicopter logging located ½ to one (1.0) mile from a residence would be restricted to an operating period of 6:00 AM to 6:00 PM, Monday through Saturday; and no operating time restrictions would be enforced when helicopter operations are greater than one (1.0) mile from a residence. These restrictions on operations would reduce impacts from helicopter noise to the extent possible for the duration of project operations.

Effects from Log Truck Traffic

"Historically, roads were constructed improved and maintained to support timber management activities. In addition to timber management, roads now provide access for the removal of other forest products, recreational use, mineral exploration and development, and access to rural homes." (RMP/EIS , p. 3-5). The RMP/EIS anticipated there would be effects to RIA residents from timber harvest activities (RMP p. 4-115). One of the impacts from timber harvesting is an increase in vehicle traffic and logging trucks on County and BLM-administered roads providing access to BLM-administered lands. Some of these roads also provide access for BLM neighbors to their homes. Many residents are concerned for their safety while sharing these roads with logging trucks.

Increased vehicle and logging truck traffic would occur as a result of the Bald Lick Landscape project. Increased traffic would increase dust locally (also see Effects of Implementation, Air Quality), noise, and would cause an increase in encounters between log trucks and other vehicles during periods of logging operations. An analysis was completed to estimate the number of log trucks per day that would be generated from BLM-administered lands in various drainages (Table 4-xx) as a result of the Bald Lick Landscape project.

As described in the RMP/EIS some level of conflicts would occur with rural interface residents as a result of the Bald Lick Landscape project. The effects were identified as an unavoidable adverse effect of the land use management plan (RMP p. 4-119); however, the site specific effects to residents living in the project area would be short term, about 3 years. Dust abatement would be required on all BLM-administered roads during operations (see Chapter II, Alternatives, Project Design Features, Roads). Dust abatement would reduce concerns for dust and can improve visibility concerns on roads for drivers as well, thus improving the safety of drivers. The maintenance of County-administered roads is the responsibility of Jackson County. Communications with Jackson County road maintenance department suggests that the County

would be responsive to dust abatement needs during the Bald Lick project implementation. Thus, effects of dust on traffic and immediately adjacent homes would be minimized to the extent possible.

As requested by neighbors BLM completed an analysis of the number of logging trucks per day would occur as a result of the Bald Lick Project (Table 4-11). The number of loads of logs per day were estimated based on the anticipated volume of timber that would be produced from the implementation of silvicultural prescriptions. The volume was estimated as a range with a low and high end. A log truck can typically haul about 3 to 4 thousand board feet of logs per load. The number of trucks per day was estimated based on agency experience with past logging operations considering the average production rate for tractor, cable, and helicopter operations. The volume harvested would be the same for alternatives 2 and 3. So, for the purposes of estimating log trucks per day the differences between Alternative 2 and 3 were determined to be minor and undetectable. Alternative 4 would treat less than half of the acres (and associated volume) proposed for Alternatives 2 and 3, and would therefore affect neighbors and visitors using BLM roads for a shorter period of time in comparison to Alternatives 2 and 3.

Timber sales are usually given 36 months for completing all operations associated with the contract. There would be periods of time during the 36 month contract period where operations would be slowed or shut down entirely due to wet weather, fire season, seasonal operating restrictions, etc. BLM requires that operations be completed within the contract period; however, contract extensions can be granted if severe fire seasons or other unforeseen circumstances cause unreasonable delays in operations during the 3-year contract period. Timber hauling from private timber lands in the same geographic areas could cause increases (cumulative effects) over BLMs estimates of the number of loaded trucks per day. In the immediate future (2005/06) it is anticipated about 65 truck loads would be hauled from private timber land in the Rush Creek area.

While increased logging truck traffic may be an annoyance and may cause considerable stress to some people who depend on these roads for their daily commute, there is no data to suggest that an increased number of accidents would occur during logging operations with the Bald Lick project. The effects to those using the area would be short-term lasting for the duration of the project operations.

Table 4-11. Estimated log truck traffic for the Bald Lick Project

		Alternatives 2 and 3		Alternative 4	
Road	**EA Volume Estimate**	**Tractor/Cable Yarding (5 trucks /day/side)**	**Helicopter Yarding (15 trucks/day/ helicopter)**	**Tractor/Cable Yarding (5 trucks /day/side)**	**Helicopter Yarding (15 trucks/day/helicopter)**
North of Boaz Mtn Area	Low High	64 days 79 days	54 days 66 days	34 days 43 days	47 days 57 days
Grouse Creek/Yale Creek Area	Low High	84 days 108 days	30 days 40 days	0	0
Eagle Canyon Area	Low High	6 days 7 days	6 days 8 days	6 days 7 days	6 days 8 days
Cantrall, Wolf & NW Muddy Gulch Area	Low High	0 days 0 days	8 days 15 days	0	0
Rush Creek Area	Low High	80 days 181 days	25 days 53 days	60 days 145 days	23 days 49 days
Lick Gulch Area	Low High	110 days 200 days	30 days 50 days	0	0
First and Second Waters Gulch Area	Low High	40 days 61 days	10 days 18 days	40 days 61 days	10 days 18 days

16. ECONOMICS

a. Efficiency Of The Alternatives

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. Tractor skidding is usually the least expensive logging system, followed by cable yarding. Helicopter yarding is usually the most expensive system. As the yarding distance increases, so does the cost for each of these yarding methods.

An analysis was completed to compare the costs of six new roads (Table 4-xx) and the cost of various logging systems with or without these proposed new roads. The cost of yarding the timber from approximately 521 acres of commercially treated units would be affected by these proposed roads. Under Alternative 2, the roads listed below would be constructed, resulting in 11 acres of tractor yarding and 285 acres of cable yarding instead of helicopter yarding. The timber on an additional 225 acres would still have to be helicopter yarded; however, the yarding distance would decrease, reducing the flight time and therefore the cost. Under Alternative 4, only the 39-1-17.4 and 39-1-20.1 roads would be constructed of the six roads which were analyzed, resulting in 6 acres of tractor yarding and 95 acres of cable yarding instead of helicopter yarding. For five of the six roads, the expense of the road construction and the associated logging costs would be less than the increased cost for helicopter yarding for the same timber without the new roads (Alternative 3). These savings are associated with only the first commercial treatment. The changes in logging costs represent the savings of yarding 4 to 5 mbf/acre during the first commercial entry. Additional cost savings would be realized for any future forest management, since the roads would already be constructed. For road 39-2-31.0, the cost of the road would be greater than the increase in logging cost for the units accessed by that road.

Table 4-12. Road Cost and Yarding Cost Comparison Analysis

Road	Change tractor logging to helicopter # and (ac.)	Change cable logging to helicopter # and (ac.)	Increase flight distance # and (ac.)	Road construction cost	Increase in logging cost (first entry only)
39-1-17.4	0	B27 (34ac)	0	$10,000	$25,075
39-1-20.1	B33 (6ac)	B33 (61ac)	0	$35,000	$46,420
39-1-21.0	0	B36 (37ac)	B36(103ac)	$25,000	$39,930
39-2-31.0	74B (2ac)	74B (4ac) 74C (3ac) 74F (42ac) 74G (5ac)	74F (25ac) 74G (10ac)	$85,326	$44,289
39-2-34.1	0	B55 (26ac)	B55 (4ac) B56 (58ac)	$45,000	$52,746
39-2-35.1	B40 (3ac)	B40 (73ac)	B40 (25ac)	$30,000	$69,075
SUM	11 ac.	285 ac.	225 ac.	$230,326	$277,535

Tractor and cable logging costs were determined using the Pacific Northwest Logging Cost program and helicopter logging costs were determined using Helipace.

Mitigation #1
An estimated 198 acres would not be commercially thinned and 93 acres would change from regeneration harvest to Dry Douglas-fir thinning if this mitigation measure is selected. Approximately 700 to 1,000 (mbf) of commercial timber would not be harvested in this project.

Mitigation #2
This mitigation measure was designed to reduce the costs associated with thinning and yarding isolated forest stands with limited road access. Approximately 244 acres would not be commercially thinned and approximately 600 mbf to 1,100 mbf of commercial timber would not be harvested if this mitigation measure is selected. The economic efficiency of the project would be improved; receipts to the government on the remaining portion of this project would be expected to be approximately $35,000 to $63,000 more if this measure is accepted.

c. Ecosystem Services

Natural resource economists have, in recent years, begun to place their focus on another aspect of resource management, which sees natural ecosystems as essential components of the planetary life support system and attempts to quantify these functions under the general term "ecosystem services". Direct relationships and clear principles for accounting for such things are only beginning to be developed. The goal, however, is to understand the true value of the standing timber as a form of "natural capital", the biophysical structures that provide these critical services. A fairly inclusive and broad list of such services is shown below. Ecosystem Services can include:

- purification of air and water
- mitigation of droughts and floods
- generation and preservation of soils and renewal of their fertility
- detoxification and decomposition of wastes
- pollination of crops and natural vegetation
- cycling and movement of nutrients
- control of the vast majority of potential agricultural pests
- maintenance of biodiversity
- protection of coastal shores from erosion by waves
- protection of stream channels and banks from erosion during high water
- protection from the sun's harmful ultraviolet rays
- partial stabilization of climate
- moderation of weather extremes and their impacts
- provision of aesthetic beauty and intellectual stimulation that lift the human spirit

In general, these are global sorts of concerns, such that changes that might occur in the overall picture from actions at this scale would be of a most marginal value, sometimes approaching zero. At the same time, many are clearly location dependent – e.g., timber stands that are quite distant from any agricultural activities won't contribute much to pollination services. On the other hand, providing quality transitory habitat for migratory songbirds is very much a part of management forest management.

Direct, Indirect, and Cumulative Effects

This includes the potential changes in ecosystem services associated with standing timber as natural ecosystems, the opportunity and existence values of undisturbed areas, and large trees and the future growth benefits of reduced competition in thinned stands. These relationships, including project design features, are more fully discussed within the appropriate resource sections: vegetation, hydrology/water resouces, wildlife, cultural, visual resource management, and recreation.

The Bald Lick Project is designed, to the extent that actions are proposed to maintain or restore forest health would bring about an increase in the overall provision of ecosystem services (or benefits supplied to human societies by ecosystems "at the natural end of the spectrum)."

Of the items in the above list, those which are most applicable to the analysis of these proposals would include: water quality, soil productivity, maintenance of biodiversity and, under the general topic of "the provision of aesthetic beauty and intellectual stimulation that lift the human spirit", recreational opportunities, visual resources, cultural resources. Impacts to the ability of the ecosystem to provide these services are discussed, both qualitatively and quantitatively, in the appropriate sections of this EA document, relating to each of these individual resources.

It is also important to note that stand-replacement fires also greatly reduce ecosystem services in the short-term, and some truly catastrophic fire events, when they burn exceptionally hot, would alter soil chemistry and physical properties in ways that limit future productivity for many centuries. Thus, steps that are taken to prevent or ameliorate such occurrences would tend to maintain and maximize the provision of ecosystem services over time.

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