Final Environmental Impact Statement

for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management

Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District

Volume I

BLM

Salem, Eugene, Roseburg, Coos Bay, Medford, and Klamath Falls Offices

October 2008

WESTERN OREGON PLAN REVISIONS

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts

Salem, Eugene, Roseburg, Coos Bay and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District

October 2008

Lead Agency: Bureau of Land Management - U.S. Department of Interior

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Abstract

Resource Management Plan and Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts

1. Responsible Agency: United States Department of the Interior,
   Bureau of Land Management
2. Draft ( ) Final (X)
3. Administrative Action (X) Legislative Action ( )
4. Abstract: This proposed resource management plan/final environmental impact statement addresses resource management on approximately 2.6 million acres of federal land, which is mostly revested California Railroad and Coos Bay Wagon Road Grant Lands Act lands (i.e., the O&C lands), within the approximately 22 million acre western Oregon planning area. This document acknowledges the primacy of the O&C Act in regards to management of timber resources. Therefore, specific changes to the current management direction for areas of critical environmental concern, scenic values as identified through a visual resource management inventory, and wilderness study areas are proposed across the alternatives. Public comment played an important role in shaping the Proposed Resource Management Plan, which includes elements of all three action alternatives from the Draft. The Proposed Resource Management Plan provides for the harvest of a sustainable supply of wood and other forest products as mandated by the O&C Act and an increase, from the existing level, in payments to the counties, while also meeting requirements of other applicable laws. Conservation of species that are listed under the Endangered Species Act is provided through establishment of Late-Successional Management Areas that are based on the recent final recovery planning efforts and critical habitat designations for the northern spotted owl. Timber harvest is deferred on substantially all of the existing older and more structurally complex multi-layered conifer forests through the year 2023 in support of recovery efforts for the Northern Spotted Owl. Riparian Management Areas, including a substantial no disturbance area along streambanks, provide for aquatic conditions that contribute toward meeting the goals of the Clean Water Act and the Safe Drinking Water Act. Uneven-age management in drier parts of the planning area uses a combination of uneven-age harvesting methods to promote development of fire-resilient forests and reduce the risk of wildfire. A diversity of developed and dispersed recreational experiences would be maintained; the collection or harvest of a diversity of special forest products would continue; and Congressionally Reserved Areas would be retained and managed for the purposes for which they were established.
5. The BLM intends to revise six resource management plans with this single draft environmental impact statement.

Notice

Readers should note that the Assistant Secretary, Lands and Minerals, U. S. Department of the Interior, is the responsible official for this proposed action. Therefore, protest through the Bureau of Land Management will not be available on the Record of Decision under 43 CFR 1610.5-2. Because there is no administrative review of the decision, the Record of Decision will not be signed until 30 days after the Notice of Availability for the Final EIS appears in the Federal Register (see 40 CFR 1506.10[b]).

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965
Portland, Oregon 97208

IN REPLY REFER TO:
1610 (OR-930)

SEP 25 2008

Dear Reader:

The Proposed Resource Management Plans (RMP) in this Final Environmental Impact Statement (EIS) describe management direction for approximately 2.6 million acres of lands administered by the Bureau of Land Management (BLM), primarily in western Oregon and Klamath County.

Since 2005, the BLM has engaged the public, scientists, tribes, and elected officials and worked cooperatively with other Federal, State, and local government entities to craft a plan to provide for the appropriate level of protection and use of these public lands. Our goal from the beginning has been to engage the public, to hear all sides of the debate, and to bring sound science to the process. The BLM received 29,500 comments on the Draft EIS during a five-month comment period, and we had the draft plan reviewed by scientists. We posted the public comments and the science report on our website in February 2008. Based on what we heard and what we learned, we now have a better plan to provide for permanent forest production, contribute to the conservation of species listed under the Endangered Species Act, and comply with all the other laws that govern these lands.

The Proposed RMP is a modification of the Preferred Alternative presented in the Draft EIS. It consists of "parts" of the alternatives analyzed in the Draft EIS. You have already seen all the "parts" of the new plan; they are just arranged in a new way.

Throughout the planning process, we heard from many of you about the management of forests and their value to wildlife. As the BLM implements the Proposed RMP, we will provide a range of forest conditions to meet the needs of wildlife dependent on young and intermediate-aged forests, as well as those dependent on older forests.

The Late-Successional Management Areas in the Proposed RMP are consistent with the Northern Spotted Owl and Marbled Murrelet Recovery Plans. In addition, we will defer harvest of nearly all older and more structurally complex multi-layered conifer forests through the year 2023 while more is learned about the interaction between the northern spotted owl and barred owl.

This Proposed RMP provides for clean water and high quality aquatic and stream-side habitat for fish. Riparian Management Area buffers were expanded to one site potential tree (an average of about 180 feet each side) on perennial or fish-bearing streams and one-half site potential tree (an average of about 90 feet on each side) on intermittent, non-fish-bearing streams.

We will establish an uneven-age timber management area in the southern part of the Medford District, depending on the fire regime condition class and precipitation zone, and all of the Klamath Falls Resource Area to reduce fire hazard and improve the forest's ability to survive and recover from fire.

We expect this plan to yield just over 500 million board feet of timber per year from a mixture of regeneration harvest and a vigorous program of thinning younger stands. In addition, habitat improvement projects in Late-Successional Management Areas and Riparian Management Areas will produce another 86 million board feet per year for several decades. This timber volume, the estimated $75 million in annual receipts to the counties generated from the sale of this timber, and the jobs that go with it are important to western Oregon counties. Contributing to the economic stability of local communities is a major objective of the Oregon and California Lands Act.

The management of public lands under the Oregon and California Lands Act of 1937 are of critical importance to the State of Oregon and many communities throughout western Oregon. The Proposed RMP is also nationally significant because of the high levels of public interest and controversy over the management of older forests, endangered species and the BLM's obligations to manage these lands for permanent forest production. Therefore, the Assistant Secretary, Land and Minerals Management, in the Department of the Interior is the responsible official for these proposed plan amendments. This is consistent with previous regional level documents such as the Northwest Forest Plan and numerous amendments to the Northwest Forest Plan. The Federal Land Policy and Management Act and its implementing regulations provide land use planning authority to the Secretary, as delegated to this Assistant Secretary. Because this decision is being made by the Assistant Secretary, Land and Minerals Management, it is the final decision for the Department of the Interior. This decision is not subject to administrative review (protest) under the BLM or Departmental regulations (43 CFR 1610.5-2). The Record of Decision will not be signed until at least 30 days after the Notice of Availability for the Final EIS appears in the Federal Register (see 40 CFR 1506.10[b]).

When approved, the RMP will not authorize any on-the-ground action. Site-specific management decisions for projects will be made in the future. The BLM District Managers will continue to involve the public in local management actions as the plan is implemented. Before those decisions are made, the BLM will complete an appropriate level of environmental analysis and consult with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service on those projects that may affect species listed under the Endangered Species Act.

I would like to thank you for your continued interest and involvement in the Western Oregon Plan Revisions. I also appreciate the efforts of the BLM employees, the members of the Science Team, and all our cooperators for their contributions to the most comprehensive and state-of-the-art management plan ever developed for BLM-administered lands in western Oregon.

Sincerely,

Edward W. Shepard
State Director,
Oregon/Washington

Preface

Reader's Guide

This final environmental impact statement is designed to provide a logical progression of information to the reviewer. The summary, five chapters, and appendices explain the management purpose and need being addressed, the scope of the issues involved, the alternatives designed to address the purpose and need, a description of the current biological and physical environment, and an analysis of the anticipated environmental consequences resulting from implementation of any given alternative.

The progression of information in this document starts with a summary. The Summary presents a digest of the document. Descriptions of the No Action Alternative and each of the four action alternatives are presented in enough detail to explain each alternative's overall management strategy for achieving the purpose and need, and to explain its associated land use allocations and management direction. The Summary also includes a comparison of the major land use and resource allocations and actions by alternative. For brevity, the Summary relies heavily on graphics and brief descriptions of rather complex topics. Also, for brevity and simplicity, the citations, references, and definitions included in the main text are omitted from the Summary. Therefore, the details provided in the five chapters of the document are needed to fully understand the alternatives and their effects.

Chapter 1 presents the purpose and need for the revision of the western Oregon resource management plans. Central to these plan revisions is the interplay between the laws directing or influencing management of the Bureau of Land Management's O&C lands in western Oregon and the various legal precedents and opinions that guide implementation of various laws. To help the reader clearly understand the purpose and need and the five major issues identified for analysis, this chapter contains a more detailed discussion of these laws and legal precedents than is normally found in an environmental impact statement. This chapter also describes the planning area; past management of the O&C lands; the planning process; and involvement of local, state, and other federal agencies that collaborated in preparation of the plan revisions. Finally, this chapter identifies the nine recognized tribes within the planning area that are engaged in government-to-government relationships with the BLM.

Chapter 2 presents four action alternatives: the Proposed Resource Management Plan and the three alternatives that were in the Draft. The No Action Alternative would continue management under the current resource management plans as amended (refer to the 1995 resource management plans for the districts of Salem, Eugene, Roseburg, Coos Bay, and Medford; and the Klamath Falls Resource Area of the Lakeview District). The action alternatives consist of a range of management approaches or strategies designed to meet the purpose and need and to resolve the planning issues. The alternatives consist of management objectives, land use allocations, and management direction to achieve the objectives.

Chapter 3 presents the existing condition and trends of the resources and programs within the planning area that would be affected by implementing the alternatives. Understanding the affected environment serves as a baseline for measuring potential effects, including the cumulative effects, of implementing an alternative. The description of the affected environment also provides the information necessary to understand the analysis of the environmental consequences in Chapter 4.

Chapter 4 presents the potential direct, indirect, and cumulative effects that would result from implementation of individual action alternatives. The effects of the alternatives on the various resources are compared and contrasted against each other and against the No Action Alternative. This chapter also includes brief discussions of the use of models and the assumptions used in analyzing the alternatives. Adverse effects that cannot be avoided if the alternatives were to be implemented are disclosed, and potential mitigation is identified. A summary of the environmental consequences is provided in the Summary and in Chapter 2. However, as in any overview or summary, detail is sacrificed for brevity; therefore, the information in Chapter 4 needs to be read to fully understand the effects.

Chapter 5 presents information on the consultation and coordination that occurred in preparation of both the draft environmental impact statement and this final environmental impact statement. The public involvement, cooperators, and preparers are identified. Also discussed are the future actions such as the consultation of species listed under the Endangered Species Act, adaptive management, and plans for monitoring.

Following Chapter 5 is a list of acronyms, a glossary of words and terms that are not in common usage, and references that were cited in the document.

The appendices are numbered A through T and are included in Volumes III and IV of this document, with a separate table of contents.

A map packet is included to provide some maps at the district-specific level.

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Summary

This *Summary* provides a synopsis of the information presented in this final environmental impact statement for the proposed revision of the resource management plans of the six western Oregon BLM districts that are within the planning area.

In this chapter:

Introduction

For those who are new to the planning process

This final environmental impact statement (EIS) has been prepared because the Bureau of Land Management's ability to implement timber management decisions has been substantially constrained compared to what was anticipated in the current resource management plans. This final EIS puts forth a proposed Resource Management Plan (RMP) and other alternatives that would address this problem.

This final EIS is divided into the following sections:

- *Chapter 1*, which provides the purpose and need for revising the resource management plans.
- *Chapter 2*, which details alternative management strategies for achieving the purpose and need presented in Chapter 1.
- *Chapter 3*, which details the current condition of the affected environment.
- *Chapter 4*, which provides the effects on the environment that result from each of the alternatives.
- *Chapter 5*, which lists those who participated in development of this environmental impact statement and includes the proposed monitoring plan.
- A two-volume appendix that provides details regarding analyses of the alternatives, responses to public comments, and certain agency letters.
- Map packet providing district-specific maps.

The Bureau of Land Management (BLM) administers the use of a variety of natural resources on approximately 2.6 million acres within an area of approximately 22 million acres, which is the western Oregon planning area. Resource management plans (RMPs) define the management direction for specified areas of BLM-administered lands (typically for individual BLM districts or BLM resource areas) and are designed to continue a defined management direction for a specified period of time. Periodically, the resource management plans are formally evaluated to determine whether there is significant cause for amending or revising them.

For the approximately 2.2 million acres of land called the O&C lands that lie within the approximately 2.6 million acres of BLM-administered lands in western Oregon, the primary administration direction is derived from the statutory authority of the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act). The remaining BLM-administered lands within the western Oregon planning area are public domain lands; other statutory authorities direct administration of those lands.

The BLM is preparing resource management plans for five western Oregon districts (Salem, Eugene, Roseburg, Coos Bay, and Medford) and the Klamath Falls Resource Area of the Lakeview District. These are the six BLM districts within the western Oregon planning area. This final environmental impact statement provides the analysis for these proposed resource management plans.

Evaluations done in 2004 of the current resource management plans for the above listed districts show that many decisions in the current RMPs are being implemented as intended. However, plan evaluations found that timber harvest levels have not been achieving the levels directed by the current existing plans.

What is the purpose and need for the action being proposed?

The goals for the Northwest Forest Plan were broader than the specific requirements of the Endangered Species Act, Clean Water Act, and other laws, and sought to provide more consistent management of federally managed lands by applying National Forest Management Act requirements to BLM-administered lands. The selected alternative for the Northwest Forest Plan was chosen because it would "maintain the late-successional and old-growth forest ecosystem and provide a predictable and sustainable supply of timber, recreational opportunities, and other resources at the highest level possible." The purpose and need for this plan revision is focused on specific legal requirements and intended benefits of the BLM's unique mandate under the O&C Act, which is distinct from the mandate to the U.S. Forest Service under the National Forest Management Act.

The purpose of this proposed action is to manage the BLM-administered lands for permanent forest production in conformity with the principles of sustained yield, consistent with the O&C Act.[1] The plans will also comply with all other applicable laws including, but not limited to, the Endangered Species Act, the Clean Water Act, and (to the extent that it is not in conflict with the O&C Act) the Federal Land Policy and Management Act (FLPMA). In accord with the Endangered Species Act, the plans will use the BLM's authorities for managing the lands it administers in the planning area to conserve habitat needed on these lands for the survival and recovery of species listed as threatened or endangered under the Endangered Species Act.[2]

The need for revising the RMPs now

The 2004 Plan evaluations showed the BLM's timber harvest levels, as directed by existing plans, were not being achieved. The BLM now has more detailed and accurate information on the effects of sustained yield timber management on other resources.

Departures from expectations and assumptions of the existing resource management plans regarding the ability of BLM to supply timber at a predictable and sustained level under the Northwest Forest Plan have created substantial uncertainty as to whether the timber harvest objectives under the O&C Act can be met in the short or long term.

The plan evaluations generally found that other resource programs were functioning as anticipated in achieving most goals, but identified potential for improvements.

The BLM now has more detailed and accurate information on the effects of sustained yield timber management on other resources, because BLM has additional resource data and improved analytical capabilities since the analysis for the existing plans. The current database has a resolution many times finer than that used in the previous plan revisions.

There is an opportunity to coordinate the BLM's management plans with new recovery plans and re-designations of critical habitat currently under development.

Concurrent to this resource management plan revision, the National Marine Fisheries Service and U.S. Fish and Wildlife Service have been reviewing, revising, or drafting recovery plans and critical habitat designations for some listed species in the planning area. This RMP revision allows the BLM to coordinate its resource management plans with those agencies' decisions on the recovery plans and designations or re-designations of critical habitat.

[1] The Ninth Circuit Court in *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990) confirmed that in the O&C Act Congress mandated timber production as the dominant use of these BLM-administered lands.

[2] This revision process will satisfy a settlement agreement resolving long-standing litigation of the Northwest Forest Plan (*AFRC v. Clarke*, Civil No. 94-1031-TPJ [D.D.C.]) that alleged the current RMPs violate the O&C Act. The settlement agreement requires BLM to consider revisions to the RMPs by the end of the year 2008, and to include at least one alternative that "will provide permanent forest production across the O&C lands without reserves except as required to avoid jeopardy under the Endangered Species Act." See *Appendix A. Legal Authorities* for more discussion.

Late-Successional Reserves in the Northwest Forest Plan do not coincide completely with critical habitat that was designated for the northern spotted owl by the U.S. Fish and Wildlife Service in 1992. This resulted in lands allocated to the harvest land base being overlain with the critical habitat designation, creating conflicts and uncertainty as the harvest land base was where timber harvesting to meet the declared allowable sale quantity was expected to occur.

The BLM has re-focused the goal for management of the BLM-administered lands to the statutory mandates specifically applicable to these lands.

Statutory requirements of the O&C Act include, but are not limited to: managing the O&C lands for permanent forest production by selling, cutting, and removing timber in conformance with the principles of sustained yield; determining the annual productive capacity of the lands managed under the O&C Act; and offering for sale that determined capacity annually under normal market conditions. The statute states that the purpose of sustained yield management of these lands is to provide a permanent source of timber; contribute to the economic stability of local communities and industries; as well as to benefit watersheds, regulate stream flows, and provide recreational use.

The BLM interprets this O&C Act language on watersheds, stream flows and recreation as explaining the rationale for the required sustained yield forest management, rather than an enumeration of additional objectives for management. The legislative history of the O&C Act and the Ninth Circuit Court ruling in *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990) make it clear that management of these lands for sustained yield forest management is expected to result in "… a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." It would be inconsistent with the O&C Act to treat these expected benefits as additional objectives that must be balanced against sustained yield forest management, and thereby might reduce the annual productive capacity that would be offered for sale.

What alternatives are being proposed?

There are four action alternatives, along with the No Action Alternative being proposed. The No Action Alternative would continue management of the current resource management plans, which were approved in 1995 and subsequently amended. The four action alternatives consist of a proposed resource management plan (PRMP) and the three alternatives that were analyzed in the Draft EIS. These alternatives represent a range of management strategies proposed to meet the purpose and need discussed in *Chapter 1*. These management strategies encompass management objectives, land use allocations, and management directions. Some management objectives, land use allocations, and management directions are common to all four action alternatives. Examples of management objectives, land use allocations, and management directions that are common to the four action alternatives are:

- Congressionally reserved areas would be retained and managed for the purposes for which they were established.
- A diversity of developed and dispersed outdoor recreational experiences would be maintained. District recreation sites, management areas, facilities, trails, and visitor service programs would be carried forward.
- The BLM would take actions to reduce fire hazards to communities that are at risk from uncharacteristic wildfires.
- The BLM would provide for the harvest and collection of special forest products.

Some management objectives, land use allocations, and management directions vary by action alternative. These differences result in a variance in the degree to which, or the rate at which, each action alternative achieves the identified purpose and need for the proposed action. There are key differences among the alternatives in the following:

- Width and management of riparian areas.
- Retention of green trees, snags, and down wood.

- Salvaging of timber after fire or other disturbances.
- Management of habitat for the northern spotted owl and the marbled murrelet.

Proposed Resource Management Plan

The following explains how the Proposed Resource Management Plan (PRMP) was developed, using Alternative 2 as the basis:

- Incorporated the Riparian Management Area widths from Alternative 1. Added an exclusion of thinning and silvicultural treatments within 60 feet of perennial and intermittent fish-bearing streams, and within 35 feet of intermittent streams.
- Refined the boundaries of several Late-Successional Management Areas and added stands within boundaries of the new proposed marbled murrelet critical habitat units that contain one or more primary constituent elements.
- Added the Eastside Forest Management Area land use allocation for forested lands east of Highway 97 in the Klamath Falls Resource Area of the Lakeview District.
- Added the Uneven-Age Timber Management Area land use allocation in a part of the Medford District and Klamath Falls Resource Area.
- In the Timber Management Areas, deferred harvest of substantially all stands that are currently older and more structurally complex multi-layered conifer forests through the year 2023.
- Extended application of the BLM Special Status Species policy to all land use allocations.
- Applied Visual Resource Management (VRM) II to certain public domain lands in the Molalla Block of the Salem District.
- Added a requirement to include marbled murrelet nest sites found in the future to the Late-Successional Management Area land use allocation and to survey prior to habitat-disturbing activities.
- Dropped the Management Area Adjacent to the Coquille Forest land use allocation.
- Provided for the Medford District to manage seven new Special Recreation Management Areas (OHV emphasis areas) to accommodate focused off-highway vehicle management.

The key features for this alternative are:

- **Late-Successional Management Areas.** These areas would provide habitat for the northern spotted owl (large, connected blocks of suitable habitat) and the marbled murrelet. Salvage harvesting of timber would be allowed to recover economic value after stand-replacement disturbances. The Late-Successional Management areas are based on final recovery plan efforts and critical habitat designations for the northern spotted owl.
- **Riparian Management Areas.** These areas would maintain or promote development of mature or structurally complex forests and provide for the riparian and aquatic conditions that supply streams with shade, sediment filtering, leaf litter, and large wood and root masses that stabilize stream banks. The reserves are one site-potential tree height on each side of a stream channel as measured from the ordinary high water line on perennial and intermittent fish-bearing streams and perennial non-fish-bearing streams, and one-half of one site-potential tree height on each side of a stream channel for intermittent non-fish-bearing streams. The riparian management areas contain a restriction on thinning and silvicultural activities within an area 30 to 65 feet from the edge of the stream channel.
- **Eastside Forest Management Lands.** These lands consist of the areas east of Highway 97 on the Klamath Falls Resource Area of the Lakeview District. This allocation consists mainly of Public Domain lands and would be managed on a sustainable basis for multiple uses including: grazing, wildlife habitat, recreational needs, riparian habitat, cultural resources, community stability, and commodity production including commercial timber and other forest products.

- **Timber Management Areas.** These areas would be managed to achieve a high level of continuous timber production that provides an allowably sale quantity of timber that could be sustained through a balance of growth and harvesting. There are three types of timber management areas:

    Timber Management Area: In these areas, forests would be managed to achieve a high level of continuous timber production that could be sustained through a balance of growth and harvesting, and an allowable sale quantity of timber. The rotation age would be approximately 80 to 100 years and there would be no green tree retention after regeneration harvesting.

    Uneven-Age Timber Management Area. In these areas forests would be managed to contribute to the annual productive capacity using a combination of uneven-age harvesting methods that include thinning, single tree selection harvest, and group selection harvest that would promote development of fire-resilient forests

    Deferred Timber Management Area. In these mapped areas, harvest from the underlying land use allocations of Uneven-Age Timber Management Area and Timber Management Area would be deferred to maintain substantially all of existing levels of older and more structurally complex multi-layered conifer forests through the year 2023 in support of the recovery efforts for the Northern Spotted Owl.

Alternative 1

The key features for this alternative are:

- **Late-Successional Management Areas.** These areas are designated to provide structurally complex forests. They are similar to the existing Late-Successional Reserves under the No Action Alternative. There would be no salvaging after disturbances in these areas, except for safety or operational reasons.
- **Riparian Management Areas.** These areas would maintain or promote development of mature or structurally complex forests, and provide for the riparian and aquatic conditions that supply streams with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize stream banks. They are half the width of the current riparian reserves under the No Action Alternative (with the exception of non-fish-bearing perennial streams, which remain the same).
- **Timber Management Areas.** In these areas, forests would be managed to achieve a high level of continuous timber production that could be sustained through a balance of growth and harvesting, and an allowable sale quantity of timber. The rotation age would be approximately 80 to 100 years, and there would be no green tree retention after regeneration harvesting.

Alternative 2

The key features for this alternative are:

- **Late-Successional Management Areas.** These areas would provide habitat for the northern spotted owl (large, connected blocks of suitable habitat) and the marbled murrelet. Salvaging would be allowed to recover economic value from the timber harvested after stand-replacement disturbances. These areas are based on new recovery planning efforts for the northern spotted owl.
- **Riparian Management Areas.** These areas would maintain or promote development of mature or structurally complex forests and provide for the riparian and aquatic conditions that supply streams with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize stream banks.

- All streams, except for intermittent non-fish-bearing streams, would have a 100-foot nonharvesting and shade retention area on each side of the stream. Intermittent non-fish-bearing streams that have a high risk of debris flows (a source of large wood) would also have a 100-foot nonharvesting and shade retention area on each side of the stream. Other intermittent non-fish-bearing streams would retain a 25-foot area with noncommercial vegetation on each side of the stream.
- **Timber Management Areas.** These areas would be managed to achieve a high level of continuous timber production that could be sustained through a balance of growth and harvesting and an allowable sale quantity of timber. The rotation age would be approximately 80 to 100 years, and there would be no green tree retention after regeneration harvesting.

Alternative 3

The key features for this alternative are:

- **General Landscape Areas.** These areas would provide for the habitat conditions that are required for late-successional species; maintain and promote development of mature or structurally complex forests; provide continuous timber production that could be sustained through a balance of growth and harvesting; and offer an allowable sale quantity of timber. The rotation age would approximate natural stand-replacement disturbances (generally, 360 years north of Grants Pass and 240 years south of Grants Pass).

  There would be a deferral of regeneration harvests until 50% of an assessment area is older than the threshold stand age of 90 years north of Grants Pass and 140 years south of Grants Pass. In the meantime, partial harvesting and commercial thinning would be applied to stands that are at or beyond the partial harvest interval age (60 to 120 years, depending on the vegetation series).

  There would be 6 to 9 green trees retained after harvesting, depending on the vegetation series; salvaging for economic purposes would be allowed after a disturbance (with legacy retention requirements).
- **Riparian Management Areas.** These areas would maintain or promote development of mature or structurally complex forests and provide for the riparian and aquatic conditions that supply streams with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize stream banks.

  All streams, except for intermittent non-fish-bearing streams, would have a 100-foot nonharvesting and shade retention area on each side of the stream. On intermittent non-fish-bearing streams, there would be no harvesting within 25 feet of the stream.

Comparing the Alternatives

The areas included within the land use allocations vary significantly among the alternatives. See *Figure S-1 (Land use allocations under the alternatives)*. Note that Alternative 3 contains a land use allocation called General Landscape Area that covers much of the landscape and provides habitat for late-successional species and also allows timber production.

See *Table S-1 (Comparison of the key features of the alternatives)*. This table highlights specific examples of the differences among the alternatives. For a complete discussion of the alternatives, see *Chapter 2*.

Figure S-1. Land Use Allocations Under The Alternatives

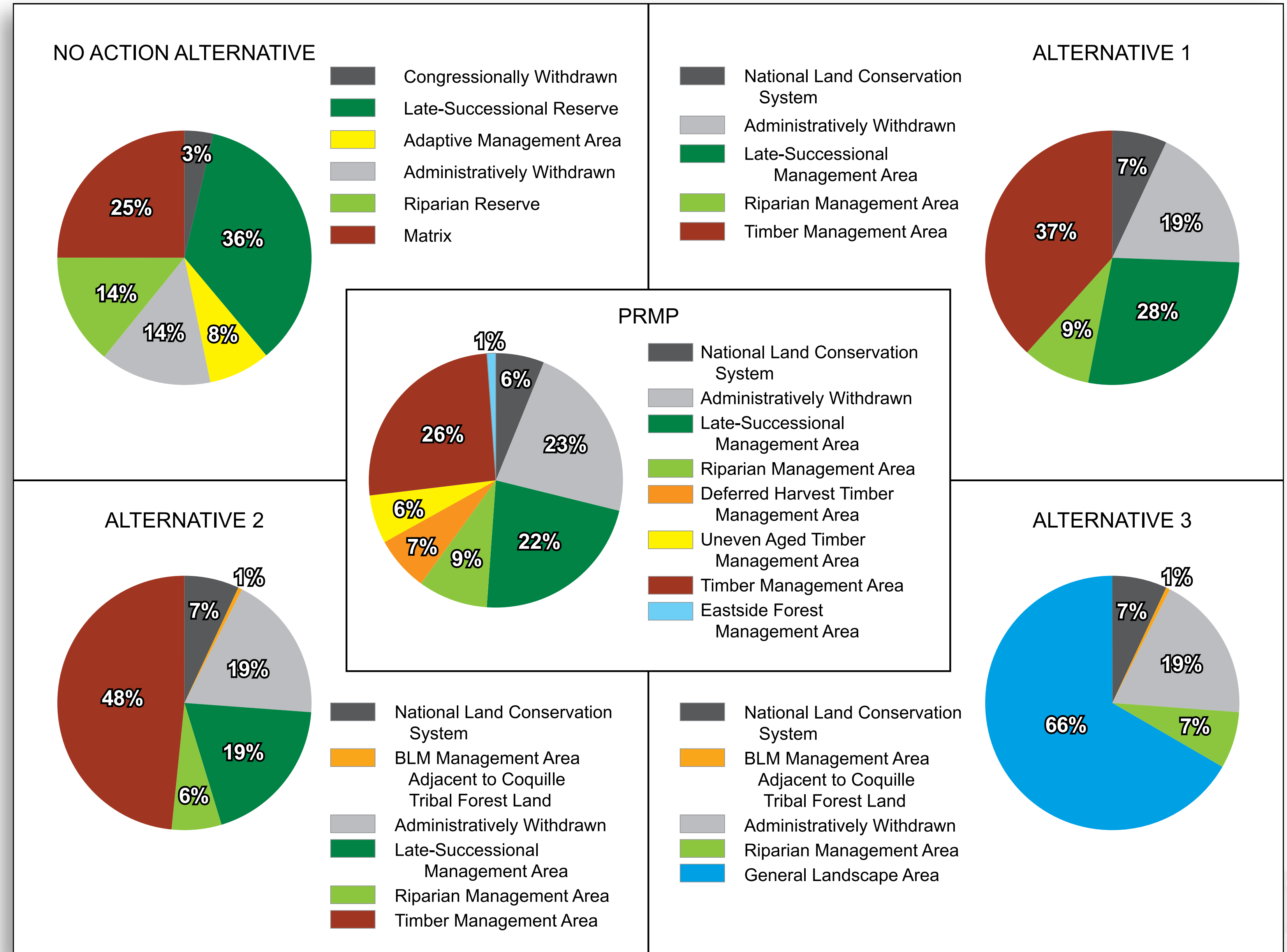


Table S-1. Comparison Of The Key Features Of The Five Alternatives

Features	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Late-Successional Vegetation	• Maintain Northwest Forest Plan's late-successional reserve (LSR). • No treatment of stands older than 80 years.	• Establish a late-successional management area (LSMA). • Treat LSMA to promote development of structurally complex forests.	• Establish a Late-Successional Management Area (LSMA). • Treat LSMA to promote development of suitable habitat.	Establish landscape target for regeneration harvest that requires 50% or more of acres in an assessment area (physiographic province within a sustained yield unit) be of the required age for harvesting (90 years roughly north of Grants Pass, and 140 years roughly south of Grants Pass).	• Establish a late-successional management area (LSMA). • Treat LSMA to promote development of suitable habitat.
Critical Habitat Units (CHUs) for the Northern Spotted Owl and the Marbled Murrelet	• CHUs for the marbled murrelet completely match with the LSR. • CHUs for the northern spotted owl partially match the LSR.	• CHUs for the marbled murrelet completely match with the LSMA. • CHUs for the northern spotted owl partially match the LSMA.	• CHUs for the marbled murrelet partially match with the LSMA. • CHUs for the northern spotted owl partially match the LSMA.	No special management.	• For the marbled murrelet, the primary constituent elements within the CHUs are retained and managed as LSMA. • CHUs for the northern spotted owl completely match the LSMA.
Northern Spotted Owl Activity Centers	Retain owl activity centers known as of January 1994.	Retain no owl activity centers in the Timber Management Area (TMA).	Retain 100-acre owl activity centers in the Timber Management Area (TMA).	• Retain 215-acre owl activity centers in the General Landscape Area. • Manage the owl activity centers until the landscape target is reached.	Retain no owl activity centers in the Timber Management Area (TMA).
Green Tree Retention	• North of Grants Pass: 6 to 8 trees per acre. • South of Grants Pass: 18 to 25 trees per acre. • In connectivity diversity blocks: 12 to 18 trees per acre.	None.	None.	6 to 9 trees per acre, depending on vegetation series.	None, except in the Uneven-age Timber Management Areas where overstory trees would be retained as needed within regeneration harvest areas for shade, frost protection, natural seeding, or other silvicultural needs.
Snag Retention	1.1 snags per acre	• In the LSMA: 2 to 6 snags per acre depending on vegetation series • In the TMA: Noncommercial only	• In the LSMA: 2 to 6 snags per acre depending on vegetation series • In the TMA: Noncommercial only	2 to 4 snags per acre. depending on vegetation series	• In the LSMA: 2 to 6 snags per acre depending on vegetation series • In the TMA: Noncommercial only
Down Wood	120 to 240 feet/acre	• In the LSMA: - 120 to 240 feet/ acre for stands with QMD > 14 inches - 60 to 120 feet/ acre for stands with QMD ≤ 14 inches • In the TMA: Noncommercial only	• In the LSMA: - 40 to 240 feet./ acre for stands with QMD > 14 inches - 20 to 120 feet/ acre for stands with QMD ≤ 14 inches • In the TMA: Noncommercial only	• In the Western hemlock zone: 240 feet/acre • In the Douglas fir/true fir and Tanoak zones: 120 feet/acre	• In the LSMA: - 120 to 240 feet/ acre for stands with QMD > 14 inches - 60 to 120 feet/ acre for stands with QMD ≤ 14 inches • In the TMA: Noncommercial only

Table S-1. (Continued)

Features	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Salvaging	• Allow salvaging in the LSR reserves when a disturbance is greater then 10 acres. • Allow salvaging in the matrix land use allocations for economic purposes.	• Allows no salvaging in the LSMA, except to reduce hazards in the wildland urban interface areas. • Allow salvaging in the wildland urban interface areas to reduce hazards. • Allow salvaging in the TMA for economic purposes.	• Allow salvaging in the LSMA for economic purposes with retention of legacy. • Allow salvaging in the wildland urban interface areas to reduce hazards. • Allow salvaging in the TMA for economic purposes.	Allow salvaging after stand-replacing events for economic purposes with retention of legacy.	• After a stand-replacing event, allow salvaging in the LSMA for economic purposes with retention of legacy. • Allow salvaging in the wildland urban interface areas to reduce hazards. Allows salvaging in the TMA for economic purposes
Zones for Riparian Management Areas	• For all fish-bearing streams: - 2 site-potential tree height • For all non-fish-bearing streams: - 1 site-potential tree height	• For all but intermittent non-fish-bearing streams: - 1 site-potential tree height • For intermittent non-fish-bearing streams: - 1/2 site-potential tree height	• For all but intermittent non-fish-bearing streams: - 0 to 25 feet no harvest - 25 to 60 ft. 80% shade retention - 60 to 100 feet 50% canopy retention • For non-debris-flow prone intermittent non-fish-bearing streams: - 0 to 25 feet noncommercial vegetation • For debris-flow prone intermittent streams: - 0 to 25 feet no harvest - 25 to 100 ft. managing for mature or structurally complex forests	• For all but intermittent non-fish-bearing streams: - 0 to 25 feet no harvest - 25 to 60 feet 80% shade retention - 60 to 100 feet 50% canopy retention • For all intermittent non-fish-bearing streams: - 0 to 25 feet no harvest	• For all but intermittent non-fish-bearing streams: 1 site-potential tree height - 0 to 60 feet no silvicultural or fuels treatments - 61 feet to 1 site-potential tree. Retain 50% canopy closure • For intermittent non-fish-bearing streams: 1/2 site-potential tree height - 0 to 35 feet no silvicultural or fuels treatments

LSMA - late-successional management area LSR - late-successional reserve QMD - quadratic mean diameter TMA - timber management area CHU – Critical habitat unit

What are the environmental consequences of the alternatives?

The following sections summarize the environmental consequences that are described in detail in *Chapter 4*. The consequences vary among the alternatives for the different resources and programs. For a comparison of the effects of the alternatives on the consistency or variation of key impacts on resources and programs, see *Table S-2 Comparison of the key impacts by alternatives.*

Note that the preciseness of the analyses for this final environmental impact statement has improved due to the increased quality and quantity of the data and the increased sophistication of the forest vegetation and habitat modeling that is now available compared to the analysis done in 1995 for the current resource management plans.

Table S-2. Comparison Of The Key Impacts Of The Five Alternatives

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Socioeconomics					
Change in Cumulative Jobs (8,948 current)	**- 3,768**	**- 525**	3,442	**- 1,288**	1187
Annual County Payment ($ million)	42	69	108	52	75
(percentage of 2005 payment) (%)	37	60	94	45	65
BLM Annual Budget ($ million)	173	202	238	192	210
(increase from 2006 Budget) (%)	18	37	62	31	43
Present Net Value of Timber (in 50 years) ($ million)	108	343	962	46	465
Timber					
Annual Sale Quantity (ASQ) (mmbf)	268	456	727	471	502
Annual Non-ASQ Volume (mmbf)	87	81	40	2	86
10-Year Revenues ($ billion)	0.84	1.37	2.15	1.04	1.50
Special Forest Products					
Availability	Abundant relative to demand				
Invasive Plants					
Risk of Introduction or Spread	Lowest	Low	High	Highest	Moderate
Special Status Species					
Populations or Occurrences	Maintain or increase	Decrease	Decrease	Decrease	Maintain or increase
Wildlife					
MAMU Habitat Creation (Coast Range & Klamath Provinces) – **100 years**	Increases				
MAMU Habitat Creation (Coast Range & Klamath Provinces) – **50 years**	Increase		Slight decrease		Increase
Northern Spotted Owl Suitable Habitat (Large block distribution & spacing) (>50yrs)	Sufficient		Not sufficient	Spacing not sufficient	Sufficient
Northern Spotted Owl (Movement and survival)	Improved				
Fish					
Large Wood Contribution	Most increase	Less increase			Most increase

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Water					
Susceptibility of Peak Flows	Lowest		Low		
Temperature	Maintains or improves shade		Maintains or improves shade (except on BLM-administered lands adjacent to the Coquille Forest)		Maintains or improves shade
Fine Sediment	Increases < 1%				
Landslide sediment	No increase over natural levels.				
Fire and Fuels					
Hazard and Severity (All except Klamath Falls Resource Area)	Reduces hazard and severity				
Hazard and Severity (Klamath Falls RA)	Decrease	Increase			Decrease
Resiliency (Medford District & Klamath Falls RA)	Reduce resiliency			Increase resiliency	
Air					
Quality	Air quality, Class 1 visibility areas, and air quality maintenance areas protected.				
Recreation					
Demand and Experiences	Meets recreational demand and improves quality of visitor experiences.				
Wilderness Characteristics					
Maintained (%)	59	55	52	53	57
Visual Resource Management					
Class II Maintained (%)	73	64	55	46	71
Class III Maintained (%)	69	57	43	39	62
Soils					
Residual Soil Disturbance in 2016 (acres)	8,400	10,700	10,800	15,300	15,000
Soil Productivity	Maintains				
Grazing					
Authorizations (acres)	560,000	419,000 (Reductions: Medford/Klamath Falls = inactive permits/leases Coos Bay = 16 acres active leases)			
Forage Production in Year 2106 (in AUMs)	28,950	19,673	19,867	22,805	20,447
Wild Horses					
Herd Management Level	Maintained				
Areas of Critical Environmental Concern					
Some Relevant and Important Values Degraded or Lost	No	Yes	Yes	Yes	Yes
Cultural					
Number Damaged	≤ 2% of the number of sites damaged per decade				
Energy and Minerals					
Availability and Quantity	Maintains similar levels of availability and quantity of energy and mineral resources.				

Forest Structure and Spatial Pattern

Forests are classified in the analysis of this draft environmental impact statement by the following four-stage structural classification system:

- **Stand establishment.** Forests that approximate the early-successional conditions that follow disturbances, such as timber harvesting or wildfires. This classification is subdivided based on whether or not the stand establishment forest includes trees (structural legacies) from the previous forest.
- **Young.** Forests that approximate the small conifer forests described in the FEMAT Report and Northwest Forest Plan. This classification is subdivided, like stand establishment, based on whether or not the young forest includes trees (structural legacies) from the previous forest.
- **Mature.** Forests that are defined similarly to the mature forests described in the FEMAT Report and Northwest Forest Plan. This classification is subdivided based on whether the forest has a single canopy layer or multiple canopy layers.
- **Structurally complex.** Forests that approximate the old-growth forests described in many analyses (e.g., the medium/large conifer multi-story forests of the FEMAT Report and the large, multi-storied older forests of the *Late-Successional Forest Monitoring Report*).

Together, the mature and structurally complex forests approximate the late-successional forests that are described in the FEMAT Report, the Northwest Forest Plan, and the existing resource management plans of the six western Oregon BLM districts that are within the planning area.

The abundance and spatial patterns of the forest structural stages (stand establishment, young, mature, and structurally complex) that would exist under the alternatives for the BLM-administered lands, as well as across all ownerships compared to average historic conditions, would be as follows:

- **Across all ownerships,** the abundance of the structural stages would not return to the average historic conditions within 100 years, even if there were no timber harvesting on the BLM-administered lands.
- The differences in the alternatives would result in only a 1% shift in the structural stage abundances across all ownerships within 100 years.
- **On BLM-administered lands,** only the No Action Alternative would result in a structural stage abundance that would be consistent with the average historic conditions. However, all five alternatives would decrease the abundance of young forests and increase the abundance of mature & structurally complex forests from current amounts.
- Retention of structural legacies in regeneration harvested areas, which would occur in the No Action Alternative and Alternative 3 and in some areas under the PRMP, would result in structurally complex forests that redevelop almost twice as fast after harvesting as in Alternatives 1 and 2.
- On the BLM-administered lands, the size and connectivity of the patches of the mature & structurally complex forests would increase from the current condition in most provinces under the No Action Alternative and the PRMP; would decrease in most provinces under Alternatives 1 and 2; and would decrease in all provinces under Alternative 3.

Carbon Storage

Forest management activities, including timber harvest, prescribed burning, and biomass recovery, can result in losses of onsite carbon storage. Some losses move carbon from onsite carbon storage to off-site carbon storage; for example, timber harvest transfers some of the carbon in live trees to harvested wood products. Some losses may constitute substitution of one carbon loss for another; for example, biomass recovery for electricity generation may displace electricity generation from coal. Some losses may prevent potentially greater carbon losses; for example, prescribed burning for fuels reduction may reduce the risk of wildfire, which would cause much large losses of carbon than the prescribed burning.

The PRMP and all alternatives would increase total carbon storage from current levels, ranging from 507 million tonnes in Alternative 3, to 596 million tonnes in the No Action Alternative in 2106. None of the alternatives would result in carbon storage of more than 1% of the current carbon stored in forests and harvested wood in the United States or 0.02% of current global carbon storage in vegetation, soil, and detritus

Socioeconomics

As shown in *Figure S-2 (BLM projected county payments compared to historic payments)*, none of the alternatives would produce timber receipts sufficient to bring payments to the O&C counties to the level provided by the BLM portion of the Secure Rural Schools payments. Alternative 2 would produce the highest payments to the counties at 94% of the O&C portion of the 2005 Secure Rural Schools payments; the No Action Alternative would produce the lowest payments at 37% of the O&C portion of the 2005 payment. The PRMP falls in the middle with 65% of the payments.

Effects vary widely by county. The BLM plays the greatest role in the Douglas County budget, where it accounts for 20% of the total budget and 70% of the discretionary budget.

Under all alternatives, timber harvesting would increase. There would be an increase in jobs and income along with a multiplier as impacts ripple through other sectors in the affected county economies. Economic effects would vary in proportion to increased timber harvest volumes.

Alternative 2 would have the most favorable impact on local economies, and the No Action Alternative would have the least favorable impact. Under all five alternatives, economic losses would be greatest in southwestern Oregon where the O&C lands are concentrated. *Table S-3 (Total economic impacts by alternative)* shows that under the No Action Alternative and Alternatives 1 and 3, the loss of Secure Rural Schools funding coupled with the reduction in the plywood industry would exceed the increased employment and earnings linked to increased BLM harvest levels. Alternative 2 and the PRMP would have increased employment and earnings that would exceed the loss of Secure Rural Schools funding.

Figure S-2. BLM Projected County Payments Compared To Historic Payments

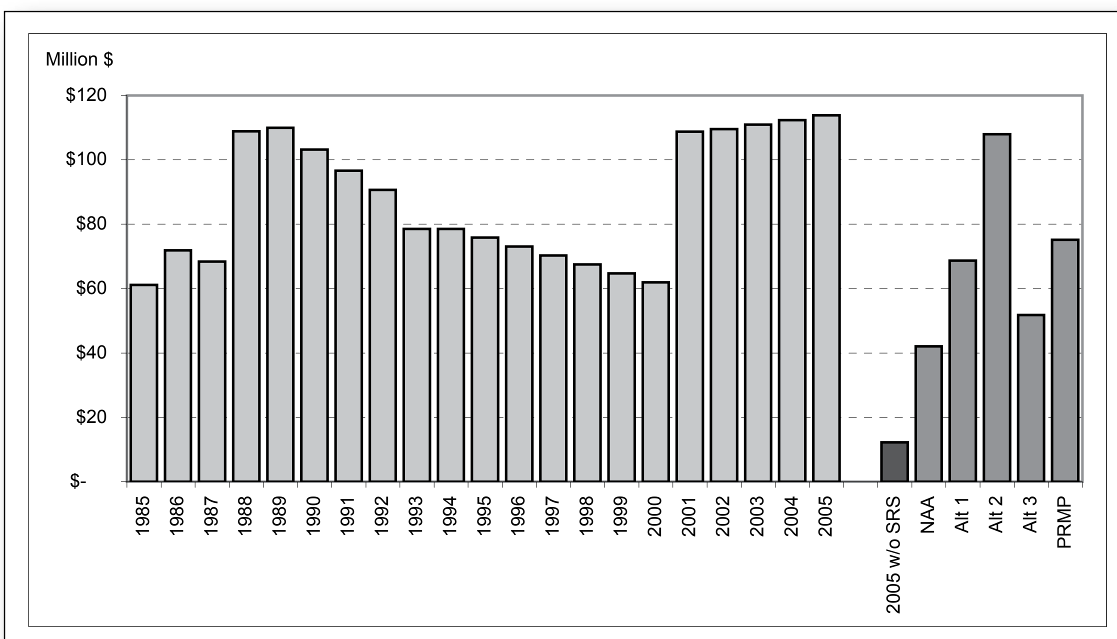


Table S-3. Total Economic Impacts Associated With BLM Timber Harvests By Alternative

Economic Impact	Current	Change in O&C County Totals by Alternative				
		No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Employment (number of jobs)	8,948	(3,768)	(525)	3,442	(1,288)	1,187
Earnings ($ millions)	319.4	(125.5)	(7.3)	136.5	(34.7)	52.1

Environmental Justice

No high or adverse human health or environmental consequences have been identified for any of the alternatives. The consequences of the alternatives are not expected to fall disproportionately on minority or low-income populations.

Timber

As shown in *Figure S-3* (*Percentage of BLM-administered lands in the harvest land base by alternative*), the harvest land base under the PRMP would be 994,000 acres or 45% of the planning area's forested acres compared to a range from a high of 1.4 million acres (65% of the planning area's forested acres) under Alternative 3, to a low of 608,000 acres (27% of the planning area's forested acres) under the No Action Alternative.

Figure S-3. Percentage Of BLM-Administered Lands In The Harvest Land Base By Alternative

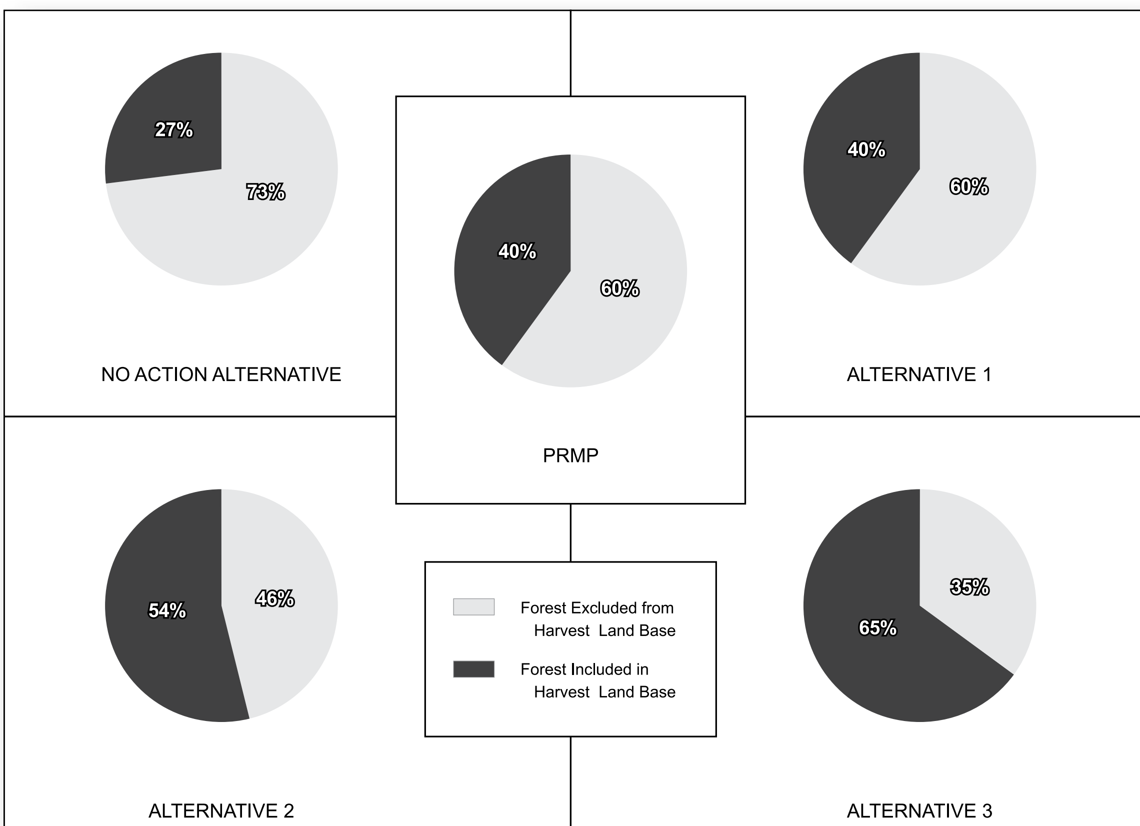


Figure S-4 (*Total allowable sale quantity by alternative for the planning area*) shows that the annual allowable sale quantity would be 502 mmbf under the PRMP, compared to a range from a high of 727 mmbf under Alternative 2, to a low of 268 mmbf under the No Action Alternative.

Figure S-5 (*Nonharvest land base volume over time*) shows that over the next 10 years, volume from thinnings in the nonharvest land base would be 86 mmbf under the PRMP, and range from the No Action Alternative at 87 mmbf per year, to virtually no volume under Alternative 3. Figure S-5 also shows that the volume from thinnings would gradually decrease over time and would cease by the eighth decade.

Figure S-4. Total Allowable Sale Quantity By Alternative For The Planning Area

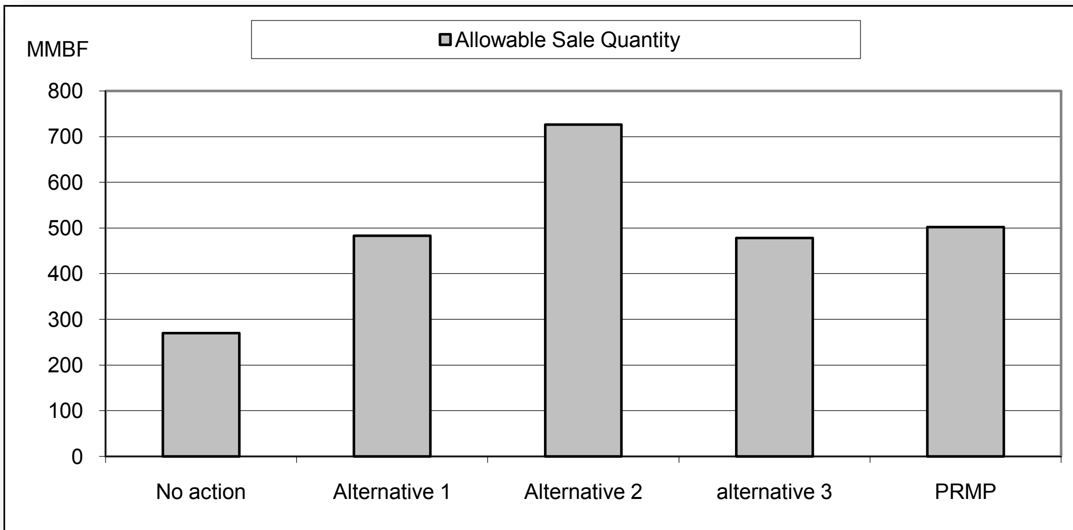
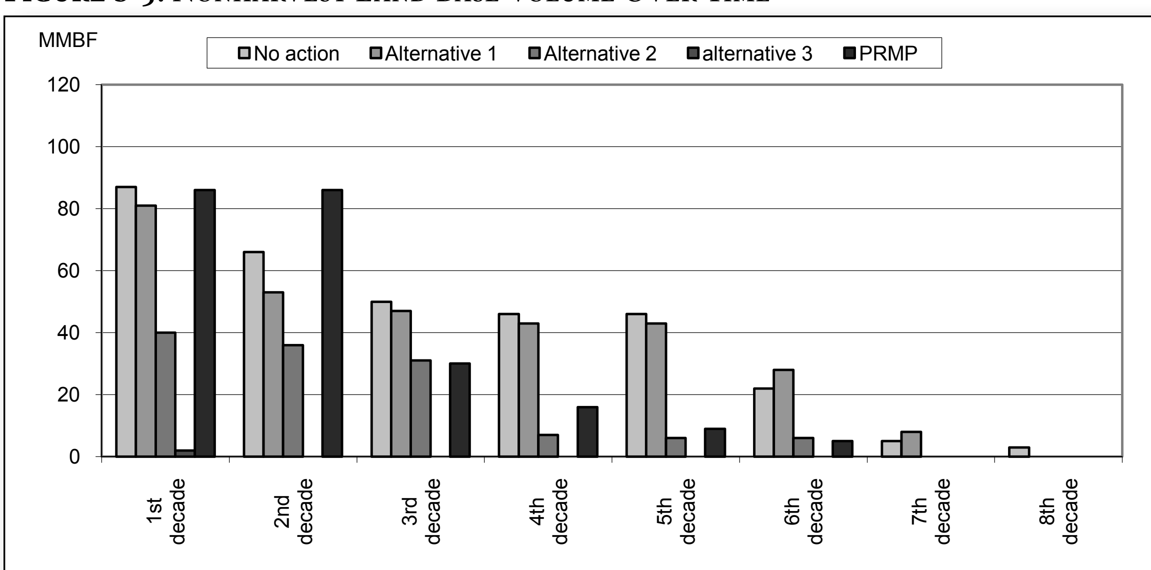


Figure S-5. Nonharvest Land Base Volume Over Time



The different types of harvesting that occur under the alternatives include thinning, partial harvesting, uneven-aged management, and regeneration harvesting. Thinning can occur in both the harvest land base and the nonharvest land base. The annual timber harvest acres of all harvest types would range from approximately 30,400 acres under the PRMP, to approximately 16,000 acres for the No Action Alternative.

Special Forest Products

The location of specific special forest products moves with the location of management activities. As in the past, special forest products would be harvested from common and abundant plant and fungi species. All five alternatives would maintain similar levels of availability and quantity of special forest products. Special forest products would generally be abundant relative to demand over the long term for all five alternatives.

Botany

Under all alternatives, the occurrences and habitats of species listed under the Endangered Species Act would be maintained or increased and recovery activities would be implemented.

Plant and fungi species included on the BLM Sensitive Species List that occur on BLM-administered lands within the planning area are not evenly distributed or predictable across the landscape even when good potential habitat exists.

The risk of population loss is higher where the patch size per population is smaller, where management activity includes regeneration or partial harvesting, where there would be multiple treatments over 10 to 15 years (timber harvest, fuels, and silviculture), and under alternatives where conservation measures under the BLM Special Status Species Policy would not be applied prior to habitat-disturbing activities.

Under the PRMP, risks to BLM sensitive species would be low, but slightly higher than the No Action Alternative due to increased risks from invasive plants, loss of interior habitat, and increased edge effect. Application of conservation measures to all species consistent with the BLM Special Status Species Policy on all BLM-administered lands in the planning area would result in low risk of local extirpation of occurrences for all habitat groups.

Under Alternatives 1, 2, and 3, risks to species in eight of nine habitat groups would be low, but slightly higher than the No Action Alternative because of increased risks from invasive plants, loss of interior habitat, and increased edge effect. Conservation measures would be applied consistent with the BLM Special Status Species Policy since habitat for these groups largely falls outside the harvest land base.

Under Alternatives 1, 2, and 3, risks to species would increase for the conifer habitat group. Some occurrences of BLM sensitive species in the conifer habitat group on O&C lands in the harvest land base would be extirpated. There would be low to moderate risk of local extirpation for some species in the conifer forest habitat group, but a low risk of extirpation or extinction from the planning area because species with 20 or fewer occurrences would receive conservation protection measures.

Invasive Plants

The greatest risk for introduction and spread of invasive plants would be where the plants are abundant, and in areas that would have greater intensity and extent of human activity.

The risk of introducing and spreading invasive plant species over the next 10 years would be lowest under the No Action Alternative, and highest under Alternative 2. The risk of introducing and spreading invasive plant species over the long term would be lowest under the No Action Alternative, and highest under Alternative 3. A relative risk comparison between the alternatives is shown in Table S-4 (*Relative risk of long and short-term introduction and spread of invasive plant species by analysis factor*).

Table S-4. Relative Risk Of Long And Short-Term Introduction And Spread Of Invasive Plant Species By Analysis Factor

Risk Analysis Factor	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Number of highest and high risk fifth-field watersheds from timber harvest activities over the next 10 years.	Low	Moderate	Highest	Lowest	High
Number of highest and high risk fifth-field watersheds for introduction into riparian habitats from timber harvest activities over the next 10 years.	Low	Moderate	Highest	Moderate	Lowest
Number of fifth-field watersheds assigned risk categories from new road construction associated with timber harvest activities over the next 10 years.	Lowest	Low	Highest	High	High
Introduction into fifth-field watersheds associated with off-highway vehicle use (long and short term).	Highest	Low	High	Low	Moderate
Long-term introduction associated with timber harvest and associated activities.	Lowest	Low	High	Highest	Moderately High
Long-term introduction and spread along riparian habitats.	Lowest	Low	High	Highest	Low
Overall potential to introduce and spread invasive plant species.	Lowest	Low	High	Highest	Moderate

Wildlife

BLM Sensitive Species

For sensitive wildlife species that depend on mature and structurally complex forest, the BLM has very little ability to influence the outcome to these species. The principal determining factors on the overall forested landscape are the development of USDA Forest Service reserves into mature and structurally complex forest, and the continued intensive management of nonfederal forests.

The habitat needs of aquatic-associated and riparian-associated species would be met for perennial and fish-bearing streams under all five alternatives. The habitat needs of aquatic-associated and riparian-associated species along intermittent streams would be met under the No Action Alternative, Alternative 1, and the PRMP, but would not be met under Alternatives 2 and 3.

Forest floor associated species would persist on BLM-administered lands under all five alternatives.

Marbled Murrelet

The nesting habitat for the marbled murrelet on BLM-administered lands would increase under all five alternatives within 100 years. Marbled murrelet habitat exists in stands that are classified as mature with multiple canopies forest or structurally complex forest. By the year 2106, the habitat would increase from the current condition of 367,000 acres to:

- 707,000 acres under the No Action Alternative
- 618,000 acres under Alternative 1
- 431,000 acres under Alternative 2
- 489,000 acres under Alternative 3
- 588,000 acres under the PRMP

The mean patch size of mature & structurally complex forest would increase from 111 acres to 338 acres under the No Action Alternative and to 176 acres under the PRMP in the Coast Range; and from 137 acres to 199 and 152 acres under the No Action Alternative and the PRMP, respectively, in the Klamath Province. The increases in patch size and total nesting habitat would be indicative of an increase in overall marbled murrelet nesting habitat condition.

The No Action and PRMP would retain 99% of all marbled murrelet nesting habitat greater than 200 years old on BLM-administered lands through 2026.

Northern Spotted Owl

Following are the four conservation needs of the northern spotted owl and the corresponding environmental consequences of the alternatives.

1. ***Formation of large blocks of suitable habitat distributed across a variety of ecological conditions, spaced to facilitate owl movement between blocks.***
   Under the No Action Alternative, Alternative 1, and the PRMP, habitat development by 2056 on BLM-administered lands would contribute sufficiently to the development, distribution and spacing of large blocks of suitable spotted owl habitat, with the exception of spacing between large habitat blocks on either side of the Klamath-Coast Range provincial boundary. See *Figure S-6* (*Distribution of large and small Habitat Blocks at year 2056)*.

Under Alternative 2, habitat development on BLM-administered lands would not contribute sufficiently to the distribution and spacing of large habitat blocks. Under Alternative 3, habitat development on BLM-administered lands would not contribute sufficiently to the spacing of large habitat blocks.

2. ***Habitat conditions within and surrounding large blocks that facilitate owl movement between blocks and ensure survival of dispersing owls.***

   As shown in *Figure S-7* (*Comparison of alternatives in owl dispersal habitat in year 2056*), habitat conditions that facilitate spotted owl movement and survival would improve by 2056 under all alternatives. In parts of the planning area, the distribution of BLM-administered lands is insufficient to achieve adequate dispersal conditions under any alternative.

3. ***A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire.***

   The acres of spotted owl suitable habitat in the low and mixed fire severity regimes, and the acres of fire-resilient habitat, would both increase under the No Action Alternative, and both decrease under Alternatives 1, 2 and 3 by 2056. Under the PRMP, the acres of spotted owl suitable habitat in the low and mixed fire severity regimes would decrease in the northern portion of the planning area and increase in the southern portion of the planning area; the acres of fire-resilient habitat would increase.

4. ***In areas of significant population decline, application of the full range of survival and recovery options in light of uncertainty.***

   Although the analysis cannot predict how the northern spotted owl populations would respond quantitatively to the alternatives, the analysis does provide an indication of how the species would respond in the form of functional nest territories and the portion of existing spotted owl sites that would remain in the nonharvest land base.

   Based on the large and small blocks of suitable habitat across all land ownerships, the number of functional northern spotted owl nest territories would increase from current conditions under all alternatives over 50 years.

   At least 40% of known and predicted northern spotted owl sites in the nonharvest land base would persist under the No Action Alternative and Alternative 1. At least 37% would persist under the PRMP, 27% would persist under Alternative 2, and 6% would persist under Alternative 3.

   A strategy to address the potential barred owl risk is contained in the *Final Recovery Plan for the Northern Spotted Owl* (USFWS 2008a). The PRMP incorporates the recovery action to retain substantially all high quality suitable habitat outside of managed owl core areas in the short term until additional research can be completed. Additionally, there would be no substantive disturbance effects from BLM management activities to known nesting northern spotted owls under any alternative because the BLM would restrict activities that would disrupt nesting owls.

Figure S-6. Distribution Of Large And Small Habitat Blocks At Year 2056

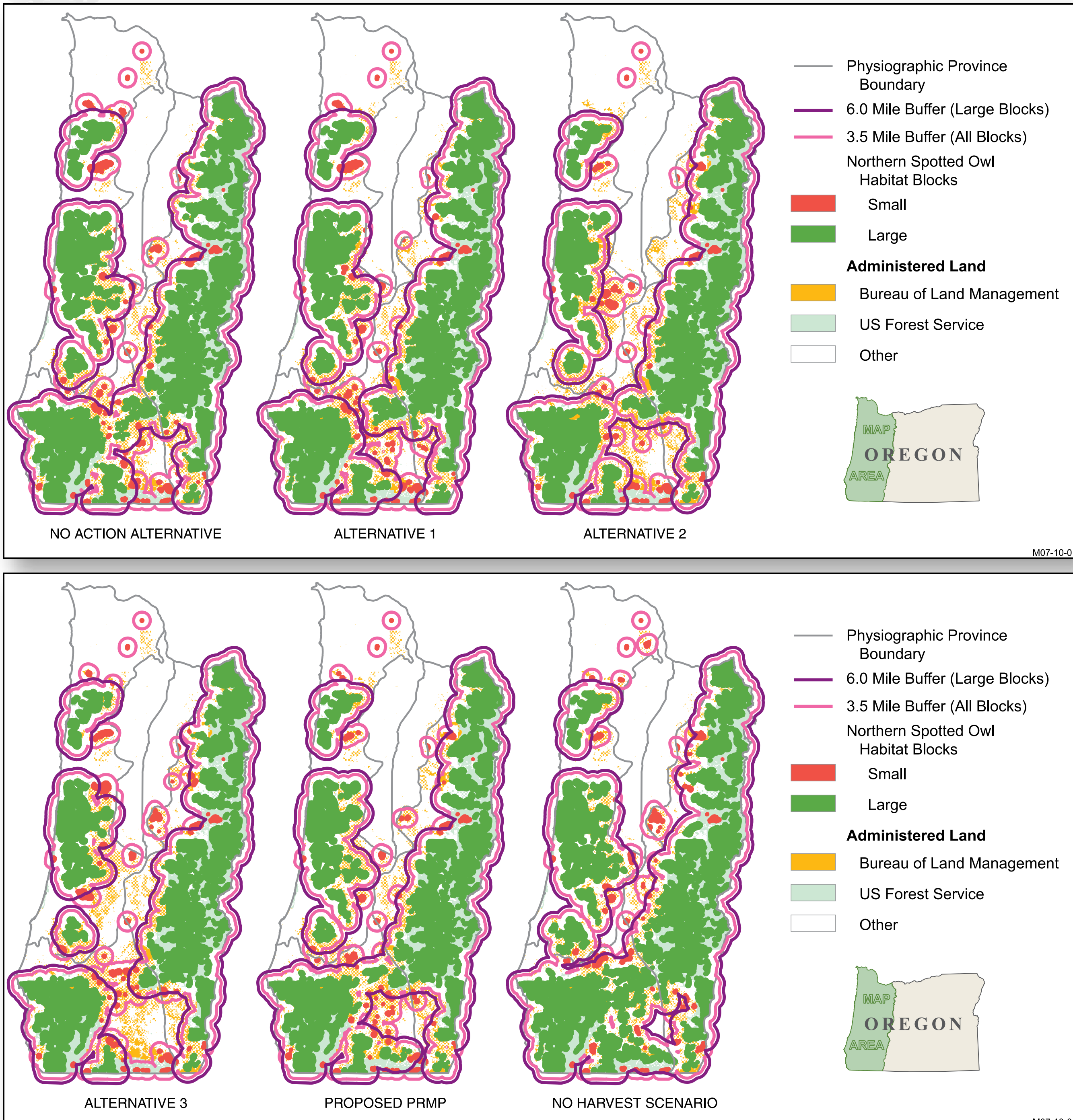
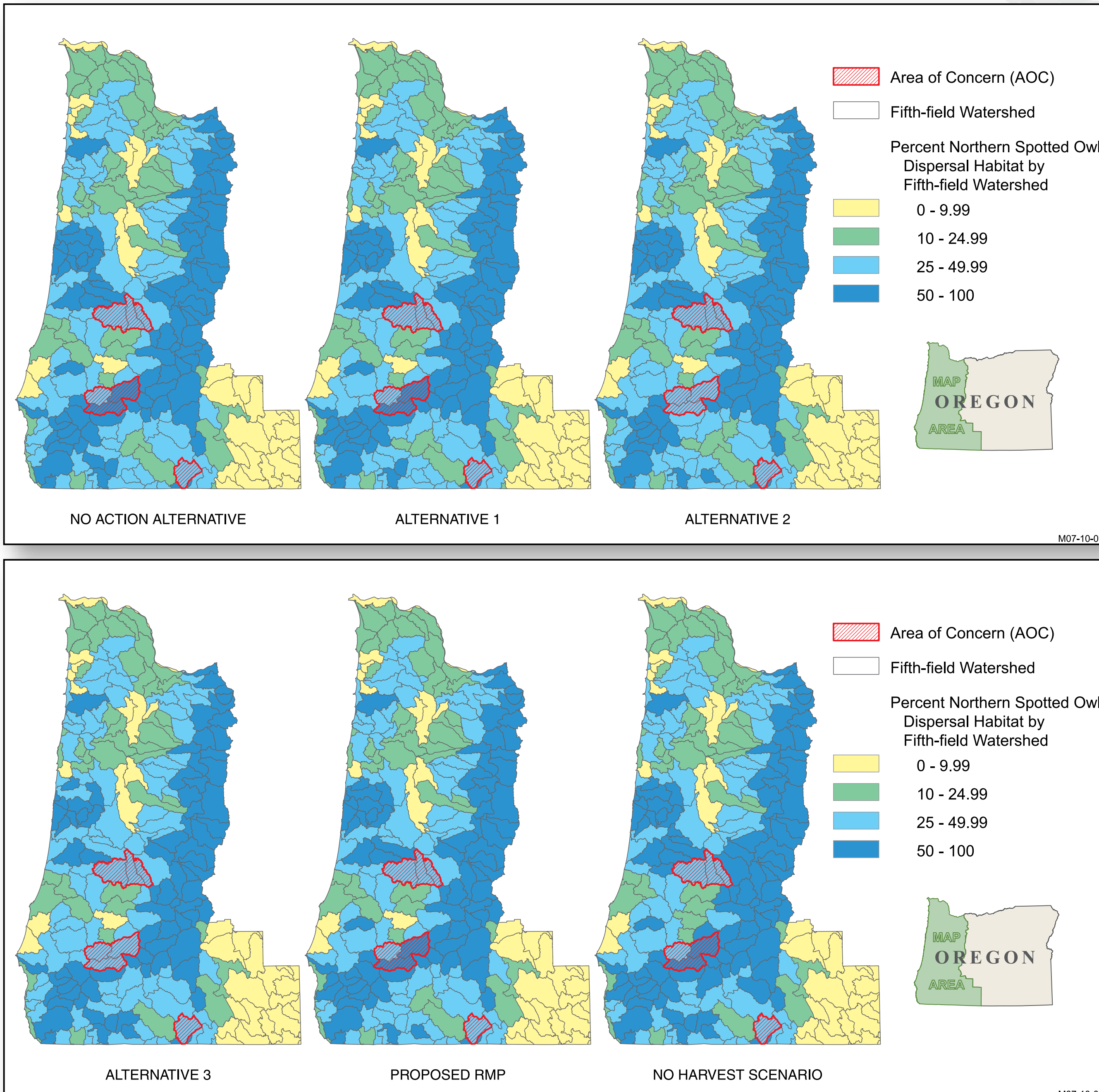


Figure S-7. Comparison Of Alternatives In Owl Dispersal Habitat In Year 2056



Water

Timber harvesting influences peak flows where a large proportion of the timber has been harvested in a watershed. The magnitude of the effect is affected by the type of harvesting (thinning or regeneration harvesting), and the amount and distribution of harvesting within watersheds.

In the rain-dominated hydroregion, the PRMP would have the highest number of subwatersheds susceptible to peak flow increases, and the No Action Alternative would have the fewest. However, the susceptibility to peak flow increases under all alternatives would be more similar to the effects if no harvest were to occur (No Harvest reference analysis) than to the effects if all commercial timber lands were harvested (Intensive Management on the Most Commercial Timber Lands reference analysis).

In the rain-on-snow hydroregion, only three subwatersheds out of 248 would be susceptible to peak flow increases in most time periods under all alternatives, including the No Harvest reference analysis, except for Alternative 2. Under Alternative 2, there would be one additional subwatershed (for a total of 4) susceptible to peak flow increases.

In the rain-on-snow hydroregion, subwatersheds are more sensitive to extremes in environmental conditions than variations of harvest levels under the alternatives. Regeneration harvesting under the alternatives is not great enough to increase susceptibility to increased peak flows.

Effective shade is the total solar radiation blocked from reaching a stream over a 24-hour period. None of the alternatives would affect stream temperature, because effective shade under all alternatives would be near potential natural shade. Under the No Action Alternative, Alternative 1, and the PRMP, the risk of natural tree mortality from blowdown that could affect stream shading would be lower than under Alternatives 2 and 3.

Roads near streams are primary sites where mobilization of chronic fine sediment would take place. Most new roads would be located outside of a stream influence zone where possible, and therefore these miles would most likely not deliver fine sediment to streams channels. New road construction over the next 10 years under all alternatives would increase sediment delivery from roads less than 1% above current levels. Sediment inputs to streams from harvest-related landslides over time under all alternatives would be substantially similar to the amount that would occur under the No Harvest reference analysis.

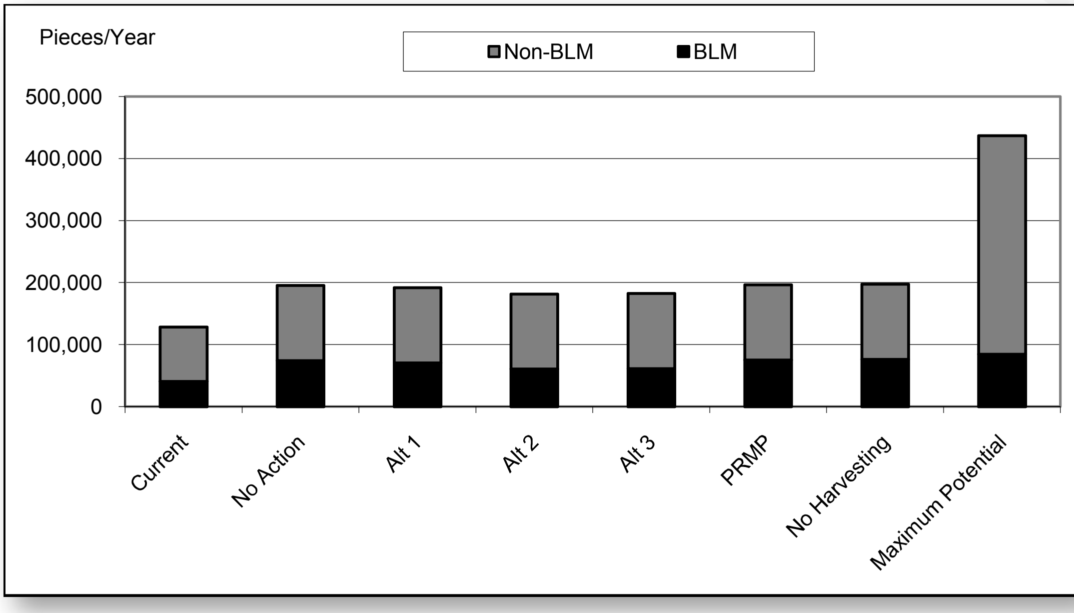
Fish

A variety of anadromous and resident fish species occur throughout the planning area. The habitat requirements and the responses to habitat changes vary by species and among age groups within species. However, the fish species are similar enough in their habitat requirements to permit an analysis of how the alternatives would cause changes to large wood, nutrient input, sediment, flow, and temperature that would affect fish habitat.

As shown in *Figure S-8* (*Potential large wood contribution comparison of all ownerships by 2106 with current and maximum potential),* the potential large wood contribution to streams would increase over time under all alternatives. The greatest increase would occur under the PRMP and the No Action Alternative, and the smallest increase would occur under Alternative 2.

Fine sediment delivery to stream channels would not increase more than 1% above existing rates under any alternative and would not decrease fish survival.

Figure S-8. Potential Large Wood Contribution Comparison Of All Ownerships By 2106 With Current And Maximum Potential



The risk of adverse effects to fish from an increase in peak flow would be very low under all alternatives, because of the small proportion of the planning area identified as susceptible to peak flow increases, the small proportion of the stream types in which streambed scour would occur, and the low likelihood that all factors required for adverse effects on fish would occur simultaneously.

None of the alternatives would contribute to an increase in stream temperature that would affect fish.

Fire and Fuels

The analysis of fire and fuels divides the planning area into two areas:

- Salem, Eugene, Roseburg, and Coos Bay districts (north of Grants Pass), which generally have a low-frequency and high-severity fire regime
- Medford District and Klamath Falls Resource Area of the Lakeview District (south of Grants Pass), which generally have a high-frequency and low-severity fire regime

Fire severity, hazard, and resiliency can generally be equated to broad descriptions of vegetation conditions.

- Under moderate and extreme weather conditions, the primary source of high-severity fire would be in stand establishment and young forests that consist of even-aged stands. Under extreme conditions, structurally complex forest could also burn with high severity.
- Crown fire hazard is based on the amount and types of stand treatments, and the expected stand conditions that would result from treatment based on past experiences with treatments.
- Fire resiliency depends in part on some of the same site-specific factors as crown fire hazard. However, surface fuels and the presence of large trees also affect fire resiliency.

In the Salem, Eugene, Coos Bay, and Roseburg Districts, compared to the current condition, all alternatives would reduce the fire hazard and would reduce the acres of high severity fire when wildfires occur.

In the Medford District, compared to the current condition, all alternatives would reduce the fire hazard and would decrease the acres of high severity fire when wildfires occur. The No Action Alternative would result in the largest decrease and Alternative 2 would result in the smallest decrease.

In the Klamath Falls Resource Area, compared to the current condition, the No Action Alternative and the PRMP would reduce the fire hazard and the acres of high severity fire when wildfires occur. Alternatives 1, 2, and 3 would increase both the fire hazard and the acres of high severity fire when wildfires occur.

In the Medford District and Klamath Falls Resource Area, the No Action Alternative and Alternatives 1 and 2 would create stand establishment and young stands consisting of even-aged plantations, which would be highly susceptible to stand-replacing crown fires. Alternative 3 and the PRMP would reduce crown fire hazard and increase fire resiliency.

Across the planning area, the No Action Alternative and the PRMP would be most effective in reducing fire hazards, decreasing the risk of large wildfires, and reducing the risk of resource damage due to high severity wildfire. Alternative 2 would be the least effective.

Air

Emissions from prescribed burning from all activities in the northern districts would be highest under Alternative 2, and lowest under the No Action Alternative. Emissions from prescribed burning from all activities in the southern districts would be highest under the PRMP, and lowest under the No Action Alternative.

Under all alternatives, compliance with the Oregon Smoke Management Plan would prevent particulate matter from prescribed burning from reaching levels considered a health hazard and would protect Class 1 visibility areas.

Recreation

Under all action alternatives, 2.4 million acres (93%) of BLM-administered lands in the planning area would be designated as "limited to designated roads and trails" for off-highway vehicle use. This is an increase from 1.1 million acres under the No Action Alternative. For all action alternatives, this change would eliminate virtually all off-highway vehicle open areas (330,000 acres) and areas designated as "limited to existing roads and trails" (950,000 acres). These re-designations of off-highway vehicle areas under the PRMP and Alternatives 1, 2, and 3 would improve off-highway vehicle opportunities, public safety, and visitor experiences compared to the No Action Alternative.

In the Medford District, management of 13 off-highway vehicle emphasis areas under Alternative 2 and 7 off-highway vehicle emphasis areas under the PRMP would improve off-highway vehicle opportunities and result in fewer visitor conflicts, thereby improving the quality of experiences for all visitors compared to the other alternatives.

Timber harvesting and associated roads can change the remoteness and naturalness of an area, which in turn can cause changes in the recreational settings used by the public. Remoteness would have little change under all four action alternatives since there are relatively few new permanent roads. The naturalness of BLM areas would also have little change overall. The alternatives would maintain a mix of naturalness settings that provide a variety of opportunities and experiences for visitors. The PRMP and Alternatives 1, 2, and 3 would continue to maintain a mix of recreation settings that provide a variety of opportunities and experiences for visitors.

Wilderness Characteristics

The BLM evaluated 146 public wilderness proposals that were received during scoping. It was determined that nine of these areas (26,123 acres) contained wilderness characteristics. Under the four action alternatives, there would be special management to maintain the wilderness characteristics for five of these areas.

The PRMP would maintain wilderness characteristics on the greatest percentage of BLM-administered lands compared to the other action alternatives. The PRMP would cause the least amount of long-term alteration (17%) of wilderness characteristics from regeneration harvesting. Alternative 3 would have the highest degree of long-term alternation of wilderness characteristics (46%) compared to all other alternatives.

Visual Resources

Visual resource quality is determined through the visual resource inventory process, which is based on a combination of scenic quality, sensitivity levels, and distance zones. The results of this inventory process classified all BLM lands within the planning area as Class I, II, III, or IV. Class I areas are determined to have the highest level of visual resource quality; Class IV areas have the lowest level (see *Chapter 3*).

The BLM also designates visual resource management classes through the land use planning process. These classes also range from Class I through IV. Class I areas are managed to preserve visual resource quality, whereas Class IV areas allow for major modifications. Management classes can vary from the original inventory classes to be consistent with the goals and objectives of resource management plans.
Areas inventoried as Class I and IV would be maintained under all four action alternatives. Regeneration harvests would diminish existing visual resource quality within Class II and III areas. The No Action Alternative would maintain existing visual resource quality on the greatest portion of BLM-administered lands in the planning area, followed by the PRMP, and then by Alternatives 1, 2, and 3.

National Landscape Conservation System

All of the alternatives would continue to protect all National Landscape Conservation System designations.

Soils

The primary measure of soil productivity for this analysis is the ability of the soil to grow vegetation, specifically commercial trees.

The same or improved practices that were used from 1995 to 2006 under the current resource management plans (the No Action Alternative) would be used under all alternatives to provide for soil productivity.

Despite some residual detrimental soil disturbance, overall soil productivity would be maintained or improved under all alternatives. Long-term conservation and the productive capacity of the forest and rangeland soils across the planning area would be maintained.

Grazing

Under the four action alternatives, the acres of livestock grazing authorizations would decrease from 560,000 acres to 418,500 acres. This decrease is largely in the Medford District and Klamath Falls Resource Area of the Lakeview District, where the acres are vacant and not currently grazed.

Forage production is affected by changes to vegetation. Changes to vegetation can occur due to range improvements, fuels treatments, timber harvest, and management of areas of critical environmental concern.

For all alternatives, except the PRMP, there would be an increase in forage production in the Medford District and the western portion of the Klamath Falls Resource Area of the Lakeview District. Under the PRMP, there would be a decrease in forage production.

None of the alternatives would substantially change the quantity of forage production in the eastern portion of the Klamath Falls Resource Area, since little regeneration or partial harvesting would occur there.

Wild Horses

The Pokegama Herd Management Area is located partially within the planning area. Forage production in support of the herd would be affected by changes to vegetation due to management activity. Stand establishment forests, where regeneration or partial harvesting would occur, provides the best forage.

Under all alternatives, except for the PRMP, there would be an increase in forage production in the Pokegama Herd Management Area. Under the PRMP, there would be a decrease in forage production.

Under all alternatives and the PRMP, the appropriate management level of 30-50 head would be maintained.

Areas of Critical Environmental Concern

Areas of critical environmental concern are established to protect the important and relevant values that require special management attention. Some land use allocations may provide for these values, negating the need for designation to protect those values.

Under the four action alternatives, areas of critical environmental concern were analyzed for designation. Areas that were not viable without the inclusion of O&C lands were not designated.

The lack of special management attention in those areas that require protection would result in the eventual degradation or loss of many of those important and relevant values unless those important and relevant values are otherwise protected under law, some other authority, or a resource management plan decision.

Values that would be fully protected under all alternatives (whether or not special management was applied under a designation of an area of critical environmental concern) include any species listed under the Endangered Species Act, bald eagles, fish, migratory birds, raptors, herons, riparian and aquatic resources, and cultural resources. Under the PRMP and the No Action Alternative, special status species would also be fully protected.

Cultural Resources

Impacts to sites would be largely reduced or eliminated due to predisturbance site discovery and avoidance or protection measures. However, there would be some residual incidental or inadvertent loss of sites. Damage to cultural, paleontological, and traditional use sites would vary little among the alternatives. For all five alternatives, 2% or less of the number of sites would be damaged per decade.

Energy and Minerals

Under federal law and BLM policy, all public lands are open for energy development and mineral exploration and development, unless specific lands are closed or withdrawn from mineral entry.

All alternatives would maintain similar levels of availability and quantity of energy and mineral resources on the public lands.

Under all alternatives, almost all lands would remain available for the location of mining claims under the Mining Law. Common varieties of rock would continue to be available from existing sites. A few quarries may be closed, reclaimed, or potentially replaced by new sites.

Chapter 1
Purpose and Need

Chapter 1 describes the purpose and need for the action that is proposed and also identifies factors that will be used when choosing among the alternatives at the time of the decision. Additionally, this chapter describes the boundaries of the planning area, the planning process – including the collaborative effort BLM has made with many agencies and organizations that have an interest in BLM-administered lands in western Oregon – and the relationship of these revised resource management plans to other plans and programs.

In this chapter:

Introduction

The Bureau of Land Management (BLM) is revising the resource management plans (RMPs) for the Coos Bay District, Eugene District, Medford District, Roseburg District, Salem District, and the Klamath Falls Resource Area of the Lakeview District. The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) is the statutory authority that provides primary direction to the BLM for managing most of the land it administers in western Oregon.

O&C Act

The lands managed by the O&C Act include the Oregon and California grant lands that were revested in 1916 and the Coos Bay Wagon Road lands that were reconveyed in 1919.

The current resource management plans for the Coos Bay District, Eugene District, Medford District, Roseburg District, Salem District, and the western portion of the Klamath Falls Resource Area of the Lakeview District are consistent with the 1994 Northwest Forest Plan, which was adopted by the Department of the Interior and the Department of Agriculture for federal forests within the range of the northern spotted owl as an "ecosystem management plan for managing habitat for late-successional and old-growth forest related species." The proposed action is to revise the resource management plans with land use allocations and management direction that best meet the purpose and need.

The BLM is proposing to revise existing plans to replace the Northwest Forest Plan land use allocations and management direction because: (1) the BLM's plan evaluations found that timber harvest levels have not been achieving the levels directed by existing plans, and the BLM now has more detailed and accurate information than was available in 1995 on the effects of sustained yield management on other resources, (2) there is an opportunity to coordinate the BLM resource management plans with new recovery plans and re-designations of critical habitat, and (3) the BLM has re-focused the goal for management of the BLM-administered lands to its statutory mandate of permanent forest production in conformance with the principles of sustained yield on the timber lands covered under the O&C Act.

Purpose and Need for the Plan Revisions

The goals for the Northwest Forest Plan were broader than the specific requirements of the Endangered Species Act, Clean Water Act, and other laws, and sought to provide more consistent management of federally managed lands by applying National Forest Management Act requirements to BLM-administered lands. The selected alternative for the Northwest Forest Plan was chosen because it would "maintain the late-successional and old-growth forest ecosystem and provide a predictable and sustainable supply of timber, recreational opportunities, and other resources at the highest level possible." The purpose and need for this plan revision is focused on specific legal requirements and intended benefits of the BLM's unique mandate under the O&C Act, distinct from the mandate to the U.S. Forest Service under the National Forest Management Act.

The purpose of this proposed action is to manage the BLM-administered lands for permanent forest production in conformity with the principles of sustained yield, consistent with the O&C Act.[1] The plans will also comply with all other applicable laws including, but not limited to, the Endangered Species Act, the Clean Water Act, and (to the extent that it is not in conflict with the O&C Act) the Federal Land Policy and Management Act (FLPMA). In accord with the Endangered Species Act, the plans will use the BLM's authorities for managing the lands it administers in the planning area to conserve habitat needed on these lands for the survival and recovery of species listed as threatened or endangered under the Endangered Species Act.[2]

The Need for Revising the RMPs Now

Plan evaluations showed the BLM's timber harvest levels, as directed by existing plans, were not being achieved. The BLM now has more detailed and accurate information on the effects of sustained yield timber management on other resources.

Resource management plan revisions are necessary where monitoring and evaluation findings, new data, new or revised policy, or changes in circumstances indicate decisions in a plan (an entire plan or a major portion of a plan) no longer serve as a useful guide for resource management (43 CFR 1610.5-6). Failure to meet some plan objectives, and the availability of new information that increases opportunities to improve performance of other plan objectives, necessitate revisions to resource management plans.

The BLM completed evaluations for the six western Oregon resource management plans in 2004 and found departures from objectives, management actions, and assumptions in the timber resources program. The BLM determined the annual productive capacity and declared an allowable sale quantity of 211 million board feet (mmbf) in the 1995 records of decision for the RMPs for western Oregon.[3] Except for the Klamath Falls Resource Area of the Lakeview District, evaluations for the other five districts documented that regeneration harvest ranged between 30 and 60 percent of the levels anticipated by the date of the evaluations. Even when considering thinning volume, except for the Klamath Falls Resource Area of the Lakeview District, plan evaluations showed that the timber offered from the harvest land base was still only between 40 to 70 percent of the anticipated allowable sale quantity. This failure to meet the harvest levels is largely due to unanticipated legal and practical implementation issues involved in managing designated critical habitat for the northern spotted owl that was different from land use allocations in the Northwest Forest Plan, and court decisions regarding the survey and manage mitigation measure and the Aquatic Conservation Strategy.

[1]The Ninth Circuit Court in *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990) confirmed that in the O&C Act Congress mandated timber production as the dominant use of these BLM-administered lands.
[2]This revision process will satisfy a settlement agreement resolving long-standing litigation of the Northwest Forest Plan (*AFRC v. Clarke*, Civil No. 94-1031-TPJ [D.D.C.]) that alleged the current RMPs violate the O&C Act. The settlement agreement requires BLM to consider revisions to the RMPs by the end of the year 2008, and to include at least one alternative that "will provide permanent forest production across the O&C lands without reserves except as required to avoid jeopardy under the Endangered Species Act." See *Appendix A. Legal Authorities* for more discussion.
[3]Currently, due to subsequent adjustments through plan amendments and maintenance, the declared allowable sale quantity for the BLM lands in western Oregon is 203 million board feet (mmbf).

Departures from expectations and assumptions of the RMPs regarding the ability of BLM to supply timber at a predictable and sustained level under the Northwest Forest Plan have created substantial uncertainty as to whether the objective under the O&C Act (managing O&C lands for permanent forest production) can be met in the short or long term. Even though the purpose of the O&C Act in providing a stable source of revenue to the county governments has been supplanted in recent years through temporary Congressional funding, the source of this revenue in the long term is uncertain. To the extent the BLM can provide a substantial stream of revenue to the counties through the revenue sharing provisions of the O&C Act, the ability of county governments dependent on these revenues to provide services will be improved. While the revenue-sharing provision of the O&C Act is primarily in support of the local governments, the expected benefits of sustained yield timber management under the O&C Act also include contributions to the local economies and industries, not just local governments.

These plan evaluations generally found that other resource programs were functioning as anticipated in achieving most goals, but identified potential for improvements. For example, the evaluations indicated opportunities to: update the off-highway vehicle designations for some districts to match new national policy, adjust existing grazing authorizations in some districts to reflect actual use, add a new policy (the National Fire Plan) for some districts, and address the latest science and more recent listings of threatened and endangered species for all of the districts. These items in themselves may not have justified a revision of the current resource management plans, but will be considered in their revision. In addition, this revision will also consider changes in management direction for all programs for clarity or ease of implementation.

The BLM now has more detailed and accurate information on the effects of sustained yield timber management on other resources, because BLM has more data and improved analytical capabilities since the analysis for the existing plans. In 1994, the Northwest Forest Plan analysis used a geographical information database that was limited to a resolution of units of 40 acres in size. The current database has a resolution many times finer than this (10 square meters in resolution rather than 40 acres). Additionally, the hydrological map data, among others, was incomplete at that time and has since been completed and updated. Consequently, the BLM is now able to perform analysis on such resources as aquatic habitat in much finer detail with more precision using analytical models that were unavailable in 1993.

In part due to the limitations of the available information database, the 1995 RMPs erred on the side of caution regarding resources used by species considered rare, threatened, or endangered. That margin of error is no longer justified on the basis of the available information database. Making this adjustment in light of advances in the analytical ability, data, and knowledge of the resources is consistent with the principles of adaptive management articulated in the Northwest Forest Plan in 1994. See the *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* (USDA USFS and USDI BLM 1994b, Volume I, p. 2-12). These principles were elaborated upon in the subsequent 1995 RMPs that constitute the current direction for management of BLM-administered lands in western Oregon that are the subject of this proposed plan revision.

There is an opportunity to coordinate the BLM's management plans with new recovery plans and re-designations of critical habitat currently under development.

Concurrent to this RMP revision, the National Marine Fisheries Service and U.S. Fish and Wildlife Service have been reviewing, revising or drafting recovery plans and critical habitat designations for some listed species in the planning area. This RMP revision will allow the BLM to coordinate its resource management plans with decisions on the recovery plans and designations or re-designations of critical habitat.

Late-successional reserves in the Northwest Forest Plan do not coincide completely with critical habitat that was designated for the northern spotted owl by the U.S. Fish and Wildlife Service in 1992. This resulted in an uncertainty for those lands allocated to the harvest land base that were overlain with the critical habitat designation, because the harvest land base was where timber harvesting to meet the declared allowable sale quantity was expected to occur.

Some U.S. Fish and Wildlife Service biological opinions on timber sales within critical habitat have been litigated and found invalid. In the *Gifford Pinchot Task Force* decision, the Ninth Circuit Court made it clear that effects to critical habitat must be considered, regardless of whether the Northwest Forest Plan would be expected to recover the species.[4] As a result, the ability of the BLM to implement timber sales in the portions of the harvest land base that are within designated critical habitat is more limited than anticipated in the current resource management plans.

The existing management uncertainty resulting from differences between the designated critical habitat and the reserves established in the Northwest Forest Plan could be reduced by harmonizing the BLM resource management plans with designated critical habitat. The U.S. Fish and Wildlife Service has concurrently written a recovery plan and has proposed re-designation of critical habitat for the northern spotted owl. That agency has also proposed re-designation of critical habitat for the marbled murrelet to take into account more recent information on that species' use of habitat. Also, since adoption of the 1995 resource management plans, the National Marine Fisheries Service has listed a number of fish species and designated critical habitat. Thus, the BLM has an opportunity at this time to integrate the recovery plans of the U.S. Fish and Wildlife Service and National Marine Fisheries Service, and any designations or re-designations of critical habitat, into the revision of the BLM resource management plans.

The BLM has re-focused the goal for management of the BLM-administered lands to the statutory mandates specifically applicable to these lands.

The statutory requirements of the O&C Act, which governs most BLM-administered lands in western Oregon include, but are not limited to: managing the O&C lands for permanent forest production by selling, cutting, and removing timber in conformance with the principles of sustained yield; determining the annual productive capacity of the lands managed under the O&C Act; and offering for sale that determined capacity annually under normal market conditions. The statute states that the purpose of sustained yield management of these lands is to provide a permanent source of timber, contribute to the economic stability of local communities and industries, as well as to benefit watersheds, regulate stream flows, and provide recreational use. The BLM interprets this language of the O&C Act as explaining the rationale for sustained yield forest management, rather than enumerating additional objectives for management. The legislative history of the O&C Act and the Ninth Circuit Court ruling in Headwaters v. BLM, 914 F.2d 1174 (9th Cir. 1990) make it clear that management of these lands for sustained yield forest management is expected to result in "… a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." It would be inconsistent with the O&C Act to treat these expected benefits as additional objectives that must be balanced against sustained yield forest management, and thereby might reduce the annual productive capacity that would be offered for sale.

Land Use Allocations

For details about the Northwest Forest Plan and its land use allocation designations, search for the phrase Northwest Forest Plan at htpp://www.blm.gov/search.

The statutory requirements of the O&C Act are limited by other statutes, including: providing for the need to conserve listed species and the habitat they depend on; not jeopardizing listed species and not adversely modifying critical habitat; and protecting the chemical, biological and physical properties of the water of the United States. As long as the requirements of these other statutes are met, increasing the level of timber production consistent with the principles of sustained yield would further the objectives set by Congress for managing these lands under the O&C Act.

[4] *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004)

Selecting a Preferred Alternative

In selecting among the alternatives in this plan revision, the BLM will evaluate which alternative or combination of alternatives best meets the Purpose and Need. In addition, the BLM will consider the environmental consequences related to the issues identified below and the cost of implementation. The proposed resource management plan described in this final environmental impact statement represents the preferred alternative of the BLM.

Background

The following background summarizes the major resource plans and laws that affect management of the BLM-administered lands within the planning area.

Northwest Forest Plan

The management direction in the 1994 Northwest Forest Plan (NWFP) was designed to respond to the need for both forest habitat and forest products (see page 25 of the NWFP's Record of Decision, cited herein as USDA USFS and USDI BLM 1994c). In selecting Alternative 9 (which became the NWFP), the secretaries of the Interior and Agriculture stated that "[t]o balance these sometimes conflicting purposes and plan for management of ecosystems that cross the administrative boundaries … we adopt the alternative that will both maintain the late-successional and old-growth forest ecosystem and provide a predictable and sustainable supply of timber" (USDA USFS and USDI BLM 1994c, p. 26).

Northwest Forest Plan

For documents relating to the Northwest Forest Plan, including the record of decision (ROD), visit http://www.blm.gov/ or/plans/nwfpnepa/index.htm or http://www.reo.gov/library.

The decision to select Alternative 9 was an attempt to balance the two purposes of forest habitat and forest products. The balancing was primarily accomplished through land allocations between lands designated as reserved lands (congressionally reserved areas, administratively withdrawn, late-successional reserves, and riparian reserves) that were declared "incompatible with programmed, sustained timber harvest" (USDA USFS and USDI BLM 1994b, p. 3&4-263) and the lands not reserved for conservation purposes were left as "matrix" or "adaptive management areas" land allocations, on which programmed timber harvest could take place. These remaining unreserved lands constituted 23 percent of the BLM-administered lands. Timber harvesting on the matrix lands and in the adaptive management areas was restricted by the standards and guidelines that were designed to achieve conservation objectives on these lands (USDA USFS and USDI BLM 1994c, p. 1-2).

The conservation strategy of the Northwest Forest Plan addressed not only the Endangered Species Act, but also the National Forest Management Act of 1976 (NFMA) and its requirement that the U.S. Forest Service "provide for diversity of plant and animal communities … to meet overall multiple-use objectives" (16 U.S.C. §1604). The Northwest Forest Plan applied the same criteria for management of habitat on both U.S. Forest Service and BLM-administered lands, even though the NFMA does not apply to the BLM-administered lands. The discussion regarding the legal and regulatory compliance of Alternative 9 (as it relates to the National Forest Management Act) in the 1994 record of decision for the Northwest Forest Plan states that:

National Forest Management Act (NFMA)

The National Forest Management Act of 1976 amended the Forest and Rangeland Renewable Resources Planning Act of 1974 to reorganize and expand the 1974 act. For the complete act and its regulations, search for Title 16 and all sections starting with Section 1600 at http://uscode.house.gov.

"Although NFMA regulations apply to lands administered by the Forest Service, the fish and wildlife regulation was used as a criterion in the development of the alternative we select today, which includes direction for management of BLM lands. Use of the regulation's goals in developing alternatives applicable to BLM lands serves the important policy goal of protecting the long-term health and sustainability of all of the federal forests within the range of the owl and the species that inhabit them." (USDA USFS and USDI BLM 1994c, p. 44)

Major Laws Affecting Management of BLM-Administered Lands in the Planning Area

This section discusses how the various laws affect management of the BLM-administered lands in the planning area. In addition to the laws presented here, many other legal authorities affect management of BLM-administered lands. For those, see *Appendix A – Legal Authorities*.

Most BLM-administered lands in the planning area are managed primarily under the O&C Act and are commonly referred to as the O&C lands. The O&C Act has been the statutory authority for management of the O&C lands since 1937. Subsequent laws affect management of the O&C lands to varying degrees. Laws, such as the Endangered Species Act and Clean Water Act, are directly applicable to how the BLM exercises its statutory authorities in managing the O&C lands, but none of these laws repealed the underlying primary direction and authority for the O&C lands. Thus, the BLM has a duty to find a way to concurrently implement all these laws, in a manner that harmonizes any seeming conflict between them, unless Congress has provided that one law overrides another law. This is the situation in the Federal Land Policy and Management Act, in which Congress provided that in any conflict between that law and the O&C Act, the O&C Act would prevail. Thus, the O&C Act takes precedence over the Federal Land Policy and Management Act with regard to timber management and receipts distribution.

O&C Act

The 1937 act that administers the O&C lands is untitled, but, through the title given to the codified regulations that administer the act, it is now known as the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act).

Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (43 U.S.C. §1181a et seq.)

The 1937 Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) provides the legal authority to the Secretary of the Interior for management of the O&C lands. The O&C Act was intended to provide forest management that would generate revenue to the local counties and halt previous practices of clearcutting without reforestation and the "boom and bust" cycles caused by logging in excess of the forest's sustained yield capacity. The O&C Act limited timber harvest to a level that could be continued without exceeding the amount of forest growth to avoid depletion of timber resources and provide other benefits.[5]

The O&C Act requires that the O&C lands be managed "for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities" (43 U.S.C. §1181a).

O&C Act

For the complete act and its regulations, search for Title 43 and all sections starting with Section 1181a at http://uscode.house.gov

The O&C Act goes on to state that "[t]he annual productive capacity for such lands shall be determined and declared … [p]rovided, [t]hat timber from said lands … not less than the annual sustained yield capacity … shall be sold annually, or so much thereof as can be sold at reasonable prices on a normal market" (43 U.S.C. §1181a).

[5] H.R. Report, No. 1119, 75th Cong., 1st Sess. 2 (1937).

When monetary receipts from the sale of timber from the O&C lands are distributed, 50% is distributed to the counties in which the revested lands are located. That 50% is distributed to the counties according to their proportion of the total assessed value of the revested lands that existed in each of the counties in 1915. Those percentages range from 0.36% to 25.05% for the 18 O&C counties. It does not matter in which counties the timber is harvested. All counties get their assigned percentage of whatever receipts are available each year. When monetary receipts from the sale of timber from the Coos Bay Wagon Road lands are distributed, up to 75% of the receipts derived in any one year are distributed annually to Coos and Douglas Counties according to the ratio of the total assessed valuation of the Coos Bay Wagon Road lands and timber in each county to the total assessed valuation of all lands and timber in those counties.

In meeting the various requirements for managing the O&C lands, the Secretary of the Interior has discretion under the O&C Act to determine how to manage the forest to provide for permanent forest production on a sustained yield basis. While the O&C Act does state that "the timber thereon shall be sold, cut, and removed in conformity with the principal [sic] of sustained yield," it does not specify the harvest methods, rotation length, or silviculture regimes under which these forests would be managed. The O&C Act also does not establish a minimum level of harvest or a minimum level of receipts.

Federal Land Policy and Management Act (43 U.S.C. §1701 et seq.)

The Federal Land Policy and Management Act of 1976 (FLPMA) provides the legal authority to the Secretary of the Interior for the management of public domain lands. The act requires, in part, that "the public lands scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use" (43 U.S.C. §1701 [Sec. 102.a.8]). In addition, the act requires that "the public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands" (43 U.S.C. §1701 [Sec. 102.a.12]).

> ***Federal Land Policy and Management Act (FLPMA)***
>
> For the complete act and its regulations, search for Title 43 and all sections starting with Section 1701 at http://uscode.house.gov.

However, the FLPMA specifically provides that if there is any conflict between its provisions and the O&C Act related to management of timber resources or the disposition of revenues from the O&C lands and resources, the O&C Act prevails (i.e., takes precedence) (43 U.S.C. §1701). Thus, the multiple-use management direction of the FLPMA does not apply to the O&C lands that are suitable for timber production. On the other hand, in contrast to the multiple-use management direction, the planning process established by the FLPMA is applicable to the O&C lands, because it is not in conflict with the O&C Act's management direction for those lands.

Note that the multiple-use management direction of the FLPMA does apply to other BLM-administered lands in the planning area (e.g., the public domain lands).

Endangered Species Act (as amended) (16U.S.C. §1531 et seq.)

Section 7 of the Endangered Species Act (ESA) requires federal agencies to use their legal authorities to promote the conservation purposes of the act. This section also requires federal agencies to consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to ensure that actions they authorize, fund, or carry out will not jeopardize species listed as threatened or endangered under the ESA or cause destruction or adverse modification to designated critical habitat for such species. Critical habitat is defined, in part, as geographic areas

> ***Endangered Species Act***
>
> For the complete act and its regulations, search for Title 16 and all sections starting with Section 1531 at http://uscode.house.gov

occupied by the species that contain the physical or biological features essential to the conservation of a species listed under the act and that may need special management or protection. (USDI USFWS 2005c).

Clean Water Act (as amended) (33 U.S.C. §1251 et seq.)

Clean Water Act

For the complete act and its regulations, search for Title 33 and all sections starting with Section 1251 at http://uscode.house.gov.

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. To accomplish this objective, the statute requires that: water quality standards consistent with the statutory goals of the Clean Water Act be established; water bodies be monitored to determine whether the water quality standards are being met; and, if all of the water quality standards are being met, then antidegradation policies and programs, including ambient monitoring, be employed to keep the water quality at acceptable levels. In accord with this statute, the responsibility for establishing these standards, developing a strategy for meeting these standards, and monitoring their attainment in Oregon has been delegated to the Oregon Department of Environmental Quality.

The policy declaration in the Federal Land Policy and Management Act states that the BLM should manage the public lands in a manner that protects many resources and their values, including the water resource (43 U.S.C. §1701[a][8]). The FLPMA directs that land use plans provide for compliance with applicable State and Federal air, water, noise, or other pollution control laws, standards, or implementation plans (43 U.S.C. §1712[c][8]).

In regard to water resources, Sections 303(d) and 319 of the Clean Water Act are most relevant to management of BLM-administered lands. Section 303(d) (codified as 33 U.S.C. §1313[d]) directs the states and tribes to develop a list of waters that fail to meet water quality standards for various constituents including, among others, sediment, temperature, and bacteria. Section 303(d) requires states and tribes to develop total maximum daily loads (TMDLs) that apportion a load of pollutants that can be discharged into the waters of a state. The TMDLs determine what level of pollutant load would be consistent with meeting the water quality standards and allocate acceptable loads among sources of the relevant pollutants. Necessary reductions in pollutant loading are achieved by implementing strategies authorized by the Clean Water Act, along with other tools available from federal, state, and local governments and nongovernmental organizations. (U.S. Environmental Protection Agency, Watershed Academy Web. *Introduction to the Clean Water Act*. March 13, 2003. URL: *http://www.epa.gov/watertrain/cwa/rightindex.htm* [accessed March 2008]). Section 319 (codified as 33 U.S.C. §1329) established management programs to control water pollution from nonpoint sources, such as sediment.

Healthy Forests Restoration Act (16 U.S.C. § 6501 et seq.)

The Healthy Forests Restoration Act of 2003 directs the BLM and U.S. Forest Service to do thinning and prescribed burns on federal lands to reduce dense undergrowth that fuels catastrophic fires. The Healthy Forests Restoration Act provides improved statutory processes for hazardous-fuel reduction projects on certain types of at-risk federal lands. The Act also provides other authorities and direction to help reduce hazardous fuels and to restore healthy forest and rangeland conditions on lands of all ownerships.

The BLM's Application of the O&C Act

Based on the language of the O&C Act, the O&C Act's legislative history, and the decision by the Ninth Circuit Court in *Headwaters v. BLM,* 914 F.2d 1174 (9th Cir. 1990), it is clear that management of timber (including harvesting) is the dominant use of the O&C lands in western Oregon. That dominant use, however, must be implemented in full compliance with a number of subsequent laws that direct how the BLM accomplishes the statutory direction. See *Appendix A - Legal Authorities* for a discussion of court rulings most relevant to the decisions that must be made in revising the resource management plans for the BLM-administered lands in western Oregon.

The following sections discuss the laws that affect management of areas of critical environmental concern, wilderness study areas, visual resources, and special status species.

Areas of Critical Environmental Concern

The Federal Land and Policy Management Act provides authority for designation of areas of critical environmental concern (43 U.S.C. §1712 [Sec. 202.c.3]). However, the O&C Act prevails over the FLPMA with regard to the management of timber resources on O&C lands. With these two laws, the BLM:

- Would manage areas of critical environmental concern to protect their relevant and important features on O&C lands where management of the area of critical environmental concern would not conflict with sustained yield forest management in areas dedicated to timber production.
- Would manage areas of critical environmental concern to protect their relevant and important features on: public domain lands; on O&C lands for which the Timber Productivity Capability Classification (TPCC) category is not included in the harvest land base (see *Appendix R - Vegetation Modeling*); and on O&C lands within land use allocations removed from the harvest land base.
- Would designate research natural areas, which are a type of area of critical environmental concern, on O&C lands when the scientific value of the research is relevant to sustained yield forest management.
- Would not designate other areas of critical environmental concern on O&C lands where management of the area of critical environmental concern would conflict with sustained yield forest management in areas dedicated to timber production.

Wilderness Study Areas

The Federal Land Policy and Management Act provided the authority for designation of wilderness study areas (43 U.S.C. §1782 [Sec. 603]), but that authority expired in 1993. Moreover, the O&C Act prevails over the FLPMA with regard to management of timber resources on O&C lands. With these two laws, the BLM:

- Cannot designate additional wilderness study areas due to the expiration of that designation authority under the FLPMA.
- Can manage lands outside of the existing wilderness study areas for wilderness characteristics on O&C lands where management for wilderness characteristics would not conflict with sustained yield forest management in areas dedicated to timber production.
- Can manage lands outside of the existing wilderness study areas for wilderness characteristics on public domain lands.

Visual Resources

The Federal Land Policy and Management Act provides authority for protection of scenic values (43 U.S.C. §1701 [Sec. 102.a.8]). However, the O&C Act prevails over the FLPMA with regard to the management of timber resources on O&C lands. With these two laws, the BLM:

- Would protect scenic values as identified through a visual resource management inventory where the protection is required as part of the management specified by Congress in subsequent legislation, such as the Wild and Scenic Rivers Act.
- Can protect scenic values as identified through a visual resource management inventory on O&C lands where protection would not conflict with sustained yield forest management in areas dedicated to timber production.
- Can protect scenic values as identified through a visual resource management inventory on public domain lands.

Special Status Species

Special status species include those species that are listed under the Endangered Species Act as threatened or endangered (including proposed and candidate species); listed by a state as threatened, endangered, or candidate species; and listed by the BLM as sensitive. The *BLM Manual 6840 – Special Status Species Management* provides direction for management of species listed as having special status. The Endangered Species Act provides authority for management of species listed as threatened or endangered. The Sikes Act provides authority for management of state-listed species. The FLPMA provides authority for management of species listed by the BLM as sensitive. The O&C Act prevails over the FLPMA with regard to management of timber resources on O&C lands. However, application of the special status species policy to provide specific protection to species listed by the BLM as sensitive does not conflict with management of timber resources on O&C lands. With these four laws and BLM policy, the BLM:

- Must, as a federal agency, follow certain procedures to assure that the exercise of its authorities would not likely jeopardize a listed species or adversely modify the critical habitat of a listed species on all BLM-administered lands.
- Must utilize its authorities to further the purposes of the Endangered Species Act by managing BLM-administered lands in a manner that aids the recovery of threatened and endangered species.
- Would accord specific protection to a state-listed species under the O&C Act where the state and the BLM have entered into a cooperative management agreement for a species.
- Would accord specific protection to species that are listed by the BLM as sensitive on BLM-administered lands.

Management of the Public Domain Lands in Relation to the O&C Lands

Public Law Order (PLO) 5490

For the complete subject heading and Federal Register citation, search for PLO 5490 at http://www.blm.gov/wo/st/en/prog/more/lands/public_land_orders.html

Of the 2,557,800 acres of BLM-administered lands in the planning area, approximately 394,600 acres are public domain lands. About half of those public domain lands are small parcels that are widely scattered and intermingled with the O&C lands. While the FLPMA requires that public domain lands be managed for a multitude of values, the FLPMA does not require that every parcel be managed for every value. As in previous resource management plans, these public domain parcels will be managed in accordance with the 1975 Public Land Order (PLO) No. 5490, which reserves these intermingled public domain lands for multiple-use management, including the sustained yield of forest resources in connection with the intermingled revested Oregon and California Railroad Grant lands and reconveyed Coos Bay Wagon Road Grant lands.

The alternatives consider a range of uses and management objectives for public domain lands in the planning area. The alternatives vary the strategy for managing land and resources for threatened and endangered species, wildlife, water quality, fish, and timber production. This variation in the range of alternatives permits the BLM to consider multiple uses for the public domain lands and to select the use or combination of uses that will best meet the purpose and need for the proposed action.

These variations in the alternatives with respect to public domain lands directly reflect the difference between the public domain lands, which have a multiple use mandate, and the O&C lands for which timber production is the dominant use. For example, all alternatives include management of lands outside of existing wilderness study areas for wilderness characteristics on public domain lands, but not on O&C lands. All alternatives would manage areas of critical environmental concern to protect their relevant and important features on public domain lands regardless of any conflict with sustained yield timber management, but would only manage areas of critical environmental concern to protect their relevant and important features on O&C lands where it would not conflict with sustained yield timber management. The Proposed RMP would include visual resource management that would conflict with sustained-yield timber management on some public domain lands that is not provided on O&C lands.

Planning Area

The entire planning area includes all lands (private, local, state, and federal) in western Oregon. See *Map 1-1 (Entire planning area of the resource management plan revisions)*. The RMP revisions will affect BLM-administered lands in the BLM districts and counties of western Oregon that are listed in *Table 1-1 (BLM districts and Oregon counties included in the planning area of the resource management plan revisions)*.

The current RMPs provide procedures and requirements for management of approximately 2,557,800 acres of federal land within the planning area. These acres are the orange blocks in *Map 1-1*. These BLM-administered lands are widely scattered and represent only about 11% of the planning area. Of the approximately 2,557,800 acres administered by the BLM, approximately 2,151,200 acres are managed primarily under the O&C Act and are commonly referred to as the O&C lands. The remaining 406,600 acres are public domain lands (394,600 acres) and other lands (12,000 acres) that are managed primarily under the Federal Land Policy and Management Act. See *Table 1-2* for the status of all federal lands in the planning area per district. (*Note*: The RMPs also apply to an additional 69,000 acres that are split-estate lands for which the BLM manages only the subsurface mineral estate.)

Much of the O&C lands have retained the checkerboard character of the original railroad land grants of the 1800s, with the BLM administering the odd-numbered sections. Because of this ownership pattern, activities on adjacent private lands have implications for management of federal lands. The BLM typically administers less than half, and often only a small percentage, of the land in any particular fifth-field watershed.

Checkerboard Ownership

A land ownership pattern in which square-mile sections of federal lands are intermixed with and surrounded by private lands.

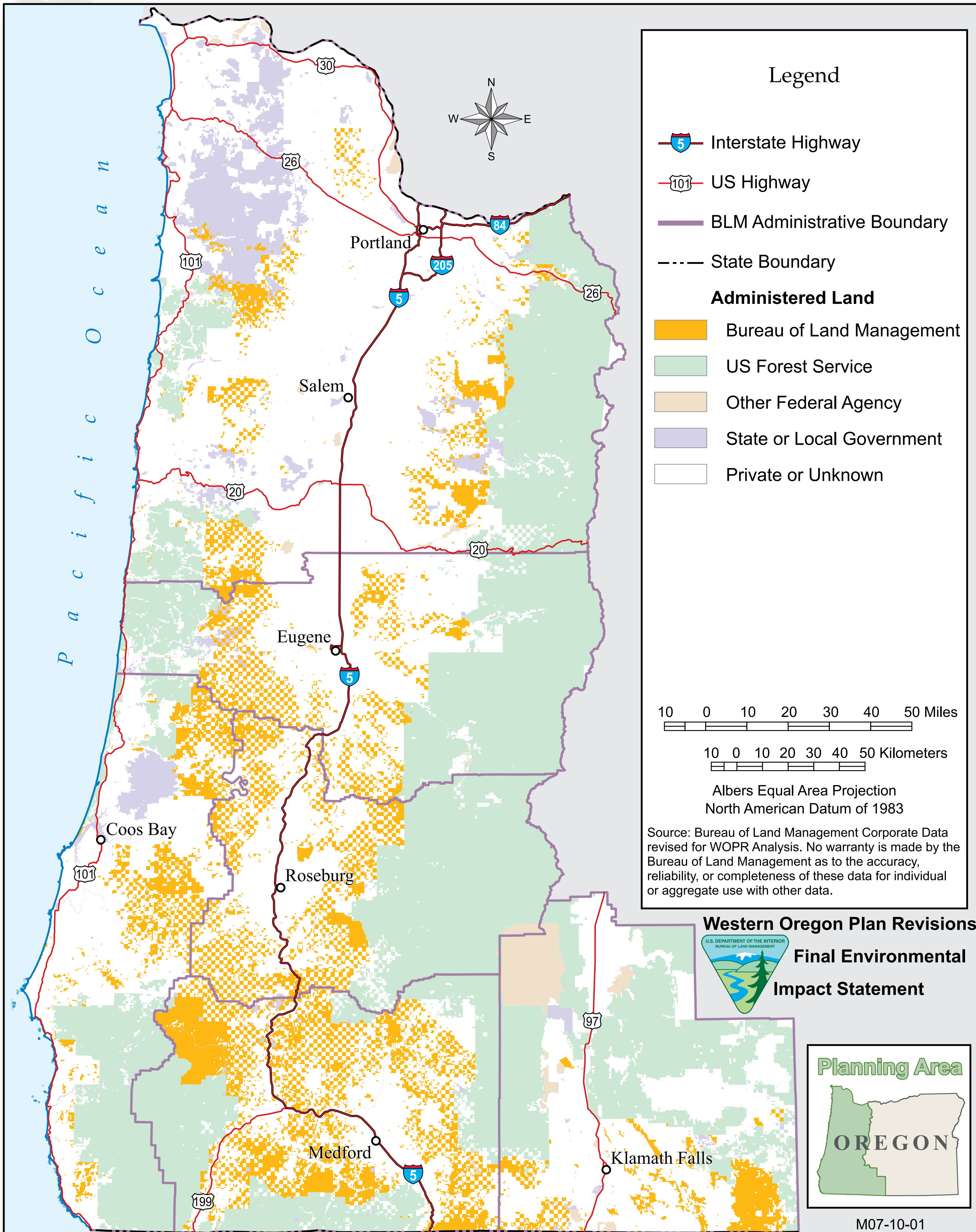
Table 1-1. BLM Districts And Oregon Counties Included In The Planning Area Of The Resource Management Plan Revisions

BLM Districts	Oregon Counties	
Coos Bay	Benton	Lane
Eugene	Clackamas	Lincoln
Lakeview (Klamath Falls Resource Area only)	Columbia	Linn
Medford	Coos	Marion
Roseburg	Curry	Multnomah
Salem	Douglas	Polk
	Jackson	Tillamook
	Josephine	Washington
	Klamath	Yamhill

Table 1-2. Legal Status Of Lands Administered By The BLM In Western Oregon

BLM District	O&C and Coos Bay Wagon Road Lands (acres)	Public Domain (acres)	Other (acres)	Total (acres)
Salem	349,300	51,600	2,100	403,000
Eugene	304,200	10,500	400	315,100
Roseburg	406,500	19,800	0	426,300
Coos Bay	279,400	41,800	1,500	322,700
Medford	764,900	96,100	4,800	865,800
Klamath Falls Resource Area (Lakeview District)	46,900	174,800	3,200	224,900
Total	**2,151,200**	**394,600**	**12,000**	**2,557,800**

Map 1-1. Entire Planning Area Of The Resource Management Plan Revisions



Planning Process

The following tasks were completed prior to release of this final environmental impact statement:

- Scoping was conducted during September and October 2005 to identify issues, concerns and opportunities associated with the proposed action. Additional information about this scoping is provided later in this chapter, under *Formal Scoping*.
- The Analysis of the Management Situation (AMS) was released in October 2005. This analysis determined the BLM's ability to respond to its identified issues and opportunities, and also provided a basis for formulating reasonable alternatives.
- The scoping report and the planning criteria to guide development of the alternatives and the analysis of their effects were released in February 2006.
- The draft environmental impact statement was released in August 2007 and made available for public review and comment until January 2008. Also, the BLM held about 170 meetings with various groups, organizations, and public officials. The BLM received about 29,500 communications with comments.

The Assistant Secretary of Land and Minerals Management in the Department of Interior is the responsible official for this RMP revision. The Federal Land Policy and Management Act and its implementing regulations provide land use planning authority to the Secretary, as delegated to this Assistant Secretary. Because this decision is being made by the Assistant Secretary, Land and Minerals Management, it is the final decision for the Department of the Interior. This decision is not subject to administrative review (protest) under the BLM or Departmental regulations (43 CFR 1610.5-2). Because there is no administrative review, the Record of Decision will not be signed until at least 30 days after the Notice of Availability for the Final EIS appears in the Federal Register (see 40 CFR 1506.10[b]).

Collaboration

The Federal Land Policy and Management Act and the National Environmental Policy Act provide direction regarding the coordination and cooperation of federal agencies with other agencies and also local and state governments. The FLPMA specifically emphasizes the need to ensure coordination and consistency of a federal agency's proposed actions with the plans and policies of other relevant jurisdictions. The Council on Environmental Quality's regulations for implementing the National Environmental Policy Act specifically require cooperative relationships between lead and cooperating agencies. Other plan and program coordination is described in Chapter 5.

National Environmental Policy Act (NEPA)

For the complete act and its regulations, search for Title 42 and all sections starting with Section 4321 at http://uscode.house.gov.

Formal Cooperators

Cooperating agency status provides a formal framework for governmental units (including local, state, and federal) to engage in active collaboration with a lead federal agency to implement requirements of the National Environmental Policy Act. Within constraints of time and resources, cooperating agency staff members are encouraged to participate fully with the BLM as members of the environmental impact statement team.

For these RMP revisions, the BLM has worked with cooperators from many agencies. Cooperators have provided expertise in much of the subject matter being analyzed and have provided advice based on experiences with similar planning efforts. See *Table 1-3 (Formal cooperators)* for a list of the formal cooperators for these RMP revisions.

Table 1-3. Formal Cooperators

Federal Agencies	State Agencies	Oregon Counties	
United States Forest Service	Office of the Governor	Benton[a]	Lane
United States Fish and Wildlife Service	Department of Agriculture	Clackamas	Lincoln
National Marine Fisheries Service	Department of Environmental Quality	Columbia	Linn
Environmental Protection Agency	Department of Fish and Wildlife	Coos	Marion
	Department of Forestry	Curry	Polk
	Department of Geology and Mineral Industries	Douglas	Tillamook
	Department of Parks and Recreation	Jackson	Washington
	Department of State Lands	Josephine	Yamhill
	Department of Transportation	Klamath	
	State Marine Board		
	Water Resources Department		

[a]Not represented by the Association of O&C Counties.

Table 1-4. Federally Recognized Tribes Within, Or With Interests In, The Planning Area

Tribes
Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians of Oregon
Coquille Tribe of Oregon
Cow Creek Band of Umpqua Indians of Oregon
Confederated Tribes of Grand Ronde Community of Oregon
Confederated Tribes of Siletz Reservation, Oregon
Confederated Tribes of the Warm Springs Reservation of Oregon
Klamath Tribes, Oregon
Modoc Tribe of Oklahoma
Quartz Valley Indian Community of the Quartz Valley Reservation of California

Government-to-Government Relationships

There are nine federally recognized tribes within the planning area, or with interests in the planning area. See *Table 1-4 (Federally recognized tribes within or with interests in the planning area)*. The tribes within the planning area have stated that they want government-to-government relationships rather than cooperator relationships.

Coquille Restoration Act
For the complete act and its regulations, search for Title 25 and all sections starting with Section 715 at http://uscode.house.gov.

The Coquille Indian Tribe is directly engaged in the planning process, because the management of the Coquille Forest is subject by law (25 U.S.C. § 715c(d)) to the standards and guidelines of forest plans for adjacent or nearby Federal forest lands. Title V of the Oregon Resource Conservation Act of 1996 (Public Law 104-208) created the Coquille Forest to be held in trust for the benefit of the Coquille Indian Tribe. The Act states that the Coquille Forest shall be managed "under applicable State and Federal forestry and environmental protection laws, and subject to critical habitat designations under the Endangered Species Act, and subject to the standards and guidelines of Federal forest plans on adjacent or nearby Federal lands, now and in the future." The Act also requires the Secretary of the Interior to take the Coquille Forest lands into trust for the benefit of the Coquille Indian Tribe.

The Coquille Indian Tribe desires a management plan for the Coquille Forest that will provide management more specific to the Coquille Forest and the adjacent BLM-administered lands than in either the Proposed RMP or the alternatives considered in this environmental impact statement. Subsequent to this RMP revision, the BLM will cooperate with the Coquille Indian Tribe to develop a specific management plan for the Coquille Forest and the adjacent BLM-administered lands, consistent with the federal government's trust responsibilities to the Coquille Indian Tribe. This future management plan would require an RMP amendment if it involved changes to land use allocations, management objectives, or management direction that would result in different resource uses, terms, conditions, and decisions for the BLM-administered lands adjacent to the Coquille Forest. See *Figure 1-1 (Coquille Forest and adjacent BLM-administered lands)*.

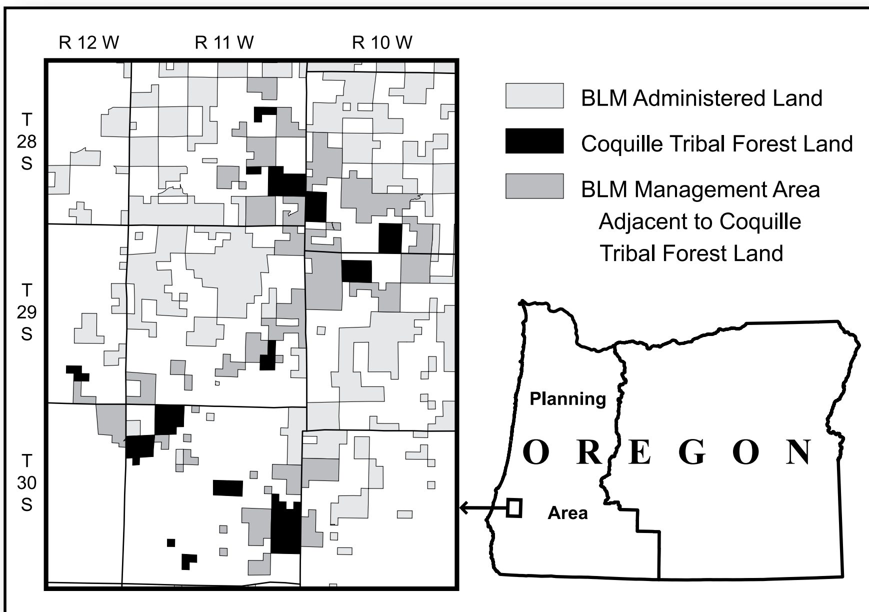


Figure 1-1. Coquille Forest And Adjacent BLM-Administered Lands

Formal Scoping

Scoping is a public involvement process, with the purpose of identifying early in the planning process issues that the environmental impact statement needs to address.

Summary of the Scoping Process

The formal scoping period started with the printing of a notice of intent in the Federal Register on September 7, 2005, and concluded on October 21, 2005. The first edition of the BLM planning newsletter (*Western Oregon Plan Revisions News, Scoping for Issues, Issue No. 1, August 2005*) was mailed in early September 2005 to approximately 11,000 postal addresses. The addresses were collected from interested parties who had contacted the six BLM districts regarding the RMP revisions or the 2004 survey and manage environmental impact statement. Approximately 75 meetings were conducted with interested parties in western Oregon. These public meetings included one-on-one meetings with key stakeholders, presentations to organized groups and agencies, tours, and advertised public meetings. Several newspaper articles reported on the scoping process and advertised the public meetings.

The BLM also requested that an outside organization conduct an independent assessment of the interests and concerns of the stakeholders. The Public Policy Research Institute at the University of Montana was retained to solicit ideas on how to involve the public throughout the planning process. The Institute conducted this assessment with the assistance of RESOLVE and the Consensus Building Institute, which are two nationally recognized public involvement organizations. Their report and recommendations were considered in designing the public involvement activities.

About 3,000 communications were received during the scoping period. Comments included e-mail messages, written correspondence, face-to-face discussions, and meeting notes. The results of the scoping are available in the *Western Oregon Plan Revisions Scoping Report, February 2006*. This public input greatly assisted the BLM in formulating the draft environmental impact statement.

Issues Identified

An issue, in the context of an environmental impact statement, is a point of disagreement, debate, or dispute with a proposed action and is based on some anticipated environmental effect that is well-defined or topically discrete. Identifying issues helps to develop alternatives and provides factors to be considered in choosing among the alternatives. Issues identified during scoping for these RMP revisions are:

- **Vegetation.** How should the BLM provide a sustainable supply of wood and other forest products, as mandated by the O&C Act, while also meeting all applicable laws and regulations?
- **Habitat for species listed under the Endangered Species Act.** How should the BLM manage federal lands in a manner that is consistent with the Endangered Species Act in order to contribute to the conservation of species?
- **Watershed management and water quality.** How should the BLM manage federal lands to contribute to goals of the Clean Water Act and the Safe Drinking Water Act?
- **Wildland fire and fuels.** How should the BLM manage federal lands to reduce the risk of wildfires and integrate fire back into the ecosystem?
- **Off-highway vehicle management (particularly in the Medford District).** How should the BLM administer federal lands to meet the demand for off-highway vehicle use while protecting other resources?

Relationship of the RMPs to Other Plans and Programs

The April 1994 record of decision for the Northwest Forest Plan, signed jointly by the Secretary of the Interior and the Secretary of Agriculture, required the BLM to incorporate the Northwest Forest Plan's land use allocations and its standards and guidelines into the district resource management plans for western Oregon. The RMPs were subsequently amended by the following interagency plan amendments:

- *January 2001, Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl*

  Note: The survey and manage categorizations for the red tree vole were established in this record of decision. The Ninth Circuit Court decision in Klamath-Siskiyou Wildlands Center v. Boody, 468 F.3d 549 (9th Cir., 2006), found that the changes to those survey and manage categorizations for the red tree vole would constitute plan amendments that need to be analyzed with National Environmental Policy Act procedures. The court then invalidated the re-categorizations regarding the red tree vole, because the BLM had not prepared a National Environmental Policy Act document to amend the plans. Whether other re-categorizations made through the annual species review process would constitute plan amendments has not been addressed in litigation.

- *July 2007, Record of Decision to Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans within the Range of the Northern Spotted Owl*

  Note: The United States District Court for the Western District of Washington found a March 2004 interagency record of decision to remove the survey and manage mitigation measure invalid since it relied on a supplemental environmental impact statement that the Court found deficient in certain respects. See Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D. Wash. 2005). The Court issued an order of relief on January 9, 2006. That order was later modified by another order dated October 11, 2006, which allowed the decision to eliminate the survey and manage requirement to take effect for four specified activities. Another interagency supplemental environmental impact statement was prepared to address deficiencies in the 2004 supplemental environmental impact statement found by the Court. The BLM issued a record of decision in July 2007, amending the plans within the Northwest Forest Plan area to remove the survey and manage mitigation measure from the standards and guidelines in those plans.

In addition to the above interagency amendments, the BLM has also amended individual resource management plans. These amendments include the Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg District (May 2004), which was based on an interagency supplemental environmental impact statement. Under all alternatives, Port-Orford-Cedar would be managed in accordance with the record of decision for the "Management of Port-Orford-Cedar in southwest Oregon, Coos Bay, Medford, and Roseburg Districts."

The Northwest Forest Plan is not a statute or regulation. It was a coordinated, multi-agency amendment to then current RMPs of the BLM and forest plans of the U.S. Forest Service. The Secretaries and the agencies retained authority provided by statutes and regulations to revise these plans in the future. The only provision the Northwest Forest Plan made concerning future amendments or modifications to these plans was that they would be "coordinated" through the "Regional Interagency Executive Committee and the Regional Ecosystem Office" (USDA USFS and USDI BLM 1994c, p. 58.). The Northwest Forest Plan did not change the authority provided under the Federal Land Policy and Management Act and its promulgating regulations for revising resource management plans.

The 1994 Northwest Forest Plan was implemented on the BLM-administered lands in western Oregon in 1995 through the completion of its RMPs in the six western Oregon Districts. These plans, consistent with FLPMA planning regulations, anticipated the possibility that periodic plan evaluations could lead to plan revisions. In keeping with the intention of the Northwest Forest Plan to encourage cooperation and coordination of programs among the federal agencies, the BLM has briefed the Regional Interagency Executive Committee on this plan revision. Furthermore, many agencies which were signatories to the Memorandum of Understanding that created the Regional Interagency Executive Committee and the Regional Ecosystem Office are cooperating agencies in this revision. Those cooperating agencies include the U.S. Forest Service, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Environmental Protection Agency.

Endangered Species Act, Section 7, Consultation

Pursuant to the Endangered Species Act (ESA), the BLM, as a federal agency, consults with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (Services) on proposed programs and actions that may affect listed species.

Recovery Planning

For details about the recovery planning for the northern spotted owl and other species that is being led by the U.S. Fish and Wildlife Service, visit http://www. fws.gov/pacific/ ecoservices/ endangered/recovery/ NSORecoveryPlanning.htm.

A resource management plan (RMP) establishes guidance for planning future specific actions to carry out management strategies on the ground. Through the NEPA process, the BLM, in cooperation with the Services, looked broadly at the effect of the management approach of the revised plans on listed species and their designated critical habitat to design the proposed revisions so that future actions carrying out the plans' direction would help conserve listed species. No effects on listed species or critical habitat would take place until future actions are undertaken in accordance with the plans, and additional project-level planning and decision-making would be required before such actions could proceed. Because no specific on-the-ground activity would actually be proposed in the revised RMPs, there is not enough information about the timing, size, location, and design of future actions to identify or authorize a specific level of incidental take in a biological opinion under Section 7(a)(2) of the ESA for the plans. As future actions would be proposed that would be planned in accord with the approved RMPs, those actions would undergo project-level consultation, either formally or informally (as appropriate). Such project-level consultations would provide sufficiently detailed information to allow decisions about what actions would take place on the ground and what levels of potential incidental take would be authorized, if appropriate.

Additionally, species recovery plans and consideration of revisions to critical habitat have concurrently been in progress for several threatened and endangered species. The BLM anticipates that these recovery plans and re-designations of critical habitat will be completed prior to a decision on this RMP revision.

Water and Air Quality Management

As part of this RMP revision, the BLM will concurrently coordinate with various agencies on water and air quality management. The BLM will coordinate with the Environmental Protection Agency and the Oregon Department of Environmental Quality (the federally designated management agency) on water quality standards and other requirements of the federally designated management agency as authorized by the Clean Water Act. Similarly, the BLM will coordinate with the Environmental Protection Agency, the Oregon Department of Environmental Quality, and the U.S. Forest Service to minimize the impacts of emissions from prescribed burns.

Chapter 2 Proposed Resource Management Plan and Other Alternatives

Chapter 2 of this final environmental impact statement defines the four alternatives (the proposed resource management plan [PRMP], and Alternatives 1, 2, and 3) that were developed for the six resource management plans of the planning area that are being revised. Tables and maps for district-specific recreation management directions; National Landscape Conservation System (NLCS) lands; visual resource management (VRM); and habitat management areas for bald eagle, deer, and elk are located at the end of the PRMP section. Tables and maps specific to Alternatives 1, 2, and 3 are located after their descriptions at the end of the chapter.

In this chapter:

Summary of Major Changes Between the Draft and Final EIS/RMP

- For the Final EIS/RMP, the Proposed Resource Management Plan (PRMP) was added. The PRMP is a modification of Alternative 2, which was the preferred alternative in the draft EIS/RMP. The modifications were made as a result of public and agency comments and to avoid adverse effects. See the PRMP section after the introduction for specific changes.
- The lists and acres for Areas of Critical Environmental Concern, Visual Resource Management Classes, wild and scenic rivers, off-highway vehicle areas, and areas open or closed to energy and mineral developments were updated to correct errors and reflect changes in data.

Introduction

This chapter describes the Proposed Resource Management Plan (PRMP), the No Action Alternative, and Alternatives 1, 2, and 3. The No Action Alternative would continue management under the six districts' existing resource management plans that were approved in 1995 and subsequently amended. The PRMP describes the action proposed to be taken. The PRMP and Final EIS build on the Draft EIS/RMP to include responses to public comments. It also corrects errors in the Draft EIS/RMP that were identified through the public comment process and internal BLM review. Alternatives 1, 2, and 3 describe a range of alternative management strategies that were designed to also meet the purpose and need discussed in *Chapter 1*. These three alternatives were carried forward from the Draft EIS/RMP without modification. The alternatives examine proposed and potential alternative management strategies through utilization of management objectives, land use allocations, and management directions.

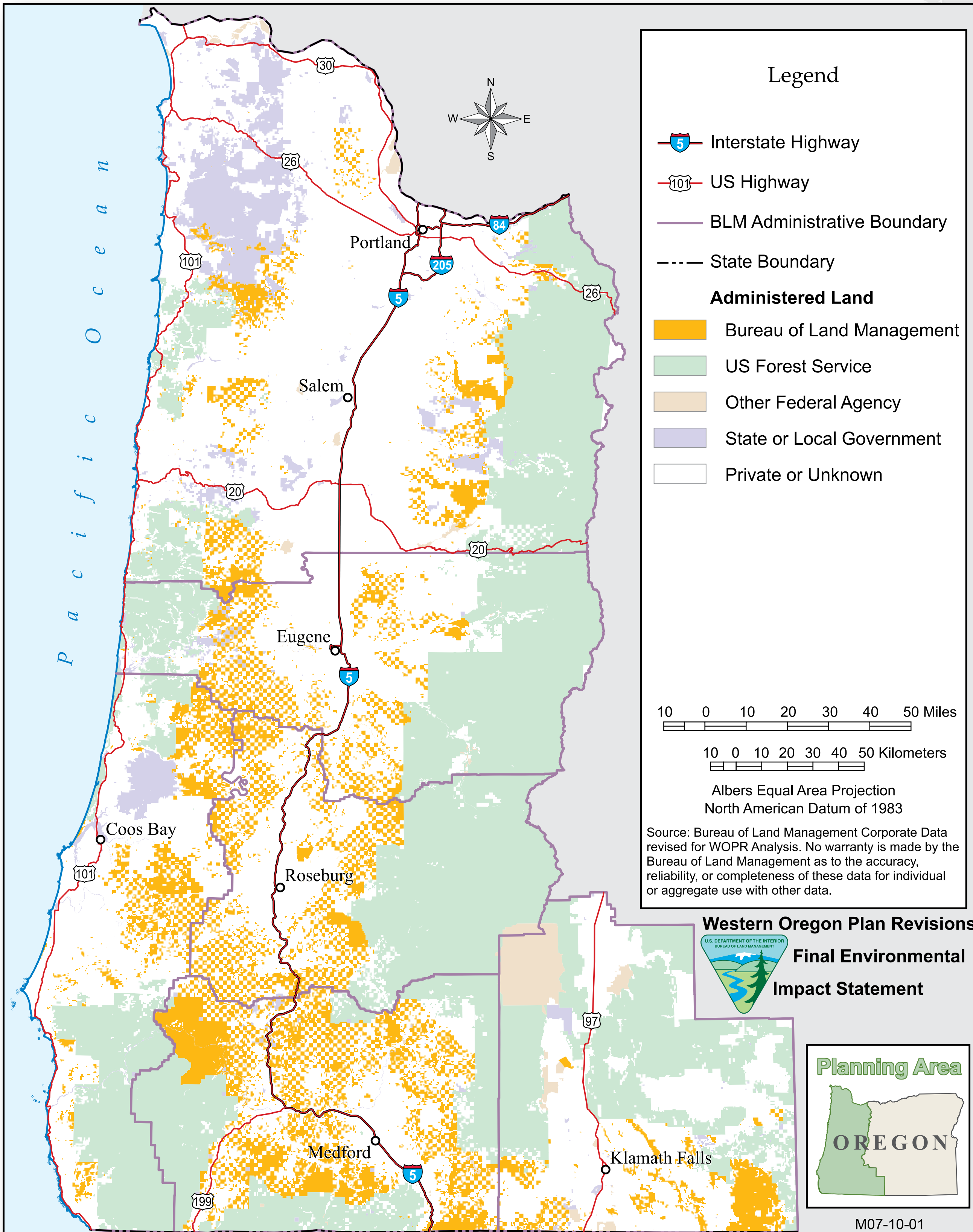
- **Management objectives.** Describe desired outcomes from management of particular resources.
- **Land use allocations.** Areas where specific activities are allowed, restricted, or excluded in all or part of a planning area.
- **Management directions.** Provide measures that will be applied to planning activities to achieve management objectives for resources.

Management directions would be used where and when necessary and practical to achieve management objectives. However, the BLM may decide not to apply a management direction when:

- Site-specific circumstances would make application of the management direction unnecessary to achieve resource management plan objectives.
- Site-specific circumstances would make application of the management direction impractical.
- Application of the management direction would be inconsistent with other resource management plan decisions.

For a map of the entire planning area of the RMP plan revision, see *Map 2-1*. Tables for district-specific recreation management directions (*Table 2-18 through Table 2-38*) that are referenced in the PRMP description are located at the end of the PRMP section. *Map 2-*7 through *Map 2-1*8 referenced in the PRMP description are also located at the end of the PRMP section. Tables and maps specific to the other alternatives are located at the end of *Chapter 2.*

Map 2-1. Entire Planning Area Of The Resource Management Plan Revision



Proposed Resource Management Plan

The following explains how the Proposed Resource Management Plan (PRMP) was developed, using Alternative 2 as the basis:

- Incorporated the Riparian Management Area land use allocation from Alternative 1. Added an exclusion of thinning and silvicultural treatments within 60 feet of perennial and intermittent fish-bearing streams, and within 35 feet of intermittent streams.
- Refined the boundaries of several Late-Successional Management Areas and added stands within boundaries of the new proposed marbled murrelet critical habitat units that contain one or more primary constituent elements.
- Added the Eastside Forest Management Area land use allocation for forested lands east of Highway 97 in the Klamath Falls Resource Area of the Lakeview District.
- Added the Uneven-Age Timber Management Area land use allocation in a part of the Medford District and Klamath Falls Resource Area.
- In the Timber Management Areas, deferred harvest of substantially all stands that are currently older and more structurally complex multi-layered conifer forests through the year 2023.
- Extended application of the BLM Special Status Species policy to all land use allocations.
- Applied Visual Resource Management (VRM) II to certain public domain lands in the Molalla Block of the Salem District.
- Added a requirement to include marbled murrelet nest sites found in the future to the Late-Successional Management Area land use allocation and to survey prior to habitat-disturbing activities.
- Dropped the Management Area Adjacent to the Coquille Forest land use allocation.
- Provided for the Medford District to manage seven new Special Recreation Management Areas (OHV emphasis areas) to accommodate focused off-highway vehicle management.

Land Use Allocations

The BLM-administered lands within the planning area would be allocated to one of the following eight land use allocations:

1. National Landscape Conservation Area/Congressionally Designated/Acquired Lands
2. Administratively Withdrawn Area
3. Late-Successional Management Area
4. Riparian Management Area
5. Eastside Forest Management Land
6. Deferred Timber Management Area
7. Uneven-Age Timber Management Area
8. Timber Management Area

Some land use allocations (such as Late-Successional Management Area and Riparian Management Area) overlap. For consistency and acreage display purposes, such overlaps are displayed in only one category according to the above hierarchy.

Riparian Management Area management objectives and actions would be applied to streams, lakes, wetlands, etc. (as defined in *Table 2-5* in the Riparian Management Area section below) within the Late-Successional Management Area, Eastside Forest Management Land, Deferred Timber Management Area, Uneven-Age Timber Management Area, and Timber Management Area.

National Landscape Conservation System, Congressionally Designated Lands, and Acquired Lands

The National Landscape Conservation System designations on BLM-administered lands in western Oregon include:

- Wild and scenic rivers
- Wilderness, wilderness study, and wilderness instant study areas
- Cascade-Siskiyou National Monument
- Pacific Crest National Scenic Trail
- Yaquina Head Outstanding Natural Area

Congressionally designated lands on BLM-administered lands in western Oregon include:

- Mt. Hood Scenic Corridor
- Bull Run Watershed Management Unit

Acquired lands for which BLM has separate management plans include:

- West Eugene Wetlands (Eugene District)
- Wood River Wetland (Klamath Falls Resource Area of the Lakeview District)

Management Objective

Conserve, protect, and restore the identified outstanding cultural, ecological, and scientific values of the National Landscape Conservation System and congressionally designated lands.

Manage acquired lands consistent with the purpose for which they were acquired.

Management Directions

Wild and Scenic Rivers

Designated wild and scenic river corridors (including those classified as wild, scenic, or recreational) would be managed to protect their outstandingly remarkable values. Refer to *Table 2-33 (District-specific designated wild and scenic rivers and river segments)*.

Interim protection would be provided to wild and scenic river corridors (including those classified as wild, scenic, or recreational) that are suitable for inclusion as components of the National Wild and Scenic Rivers System until Congress makes a decision to designate them.

Refer to *Table 2-34 (District-specific suitable wild and scenic rivers and river segments)*.

Interim protection would be provided to wild and scenic river corridors (including those classified as wild, scenic, or recreational) that are eligible but have not yet been studied for suitability as components of the National Wild and Scenic Rivers System pending suitability evaluations.

See *Table 2-35 (District-specific eligible wild and scenic rivers and river segments)*.

Wilderness Areas

Wilderness Areas would be managed to preserve the undisturbed natural integrity of these areas.

See *Table 2-36 (District-specific wilderness areas)*.

Wilderness Study Areas and Wilderness Instant Study Areas

Wilderness study areas and wilderness instant study areas would be managed to maintain wilderness suitability.

See *Table 2-37 (District-specific wilderness study areas and wilderness instant study areas).*

Cascade-Siskiyou National Monument

The Cascade-Siskiyou National Monument (located in the Medford District) would be managed under the Cascade-Siskiyou National Monument Resource Management Plan.

See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands).*

Pacific Crest National Scenic Trail

The portion of the Pacific Crest National Scenic Trail that is located in the Medford District and the Klamath Falls Resource Area of the Lakeview District would be managed for outdoor recreational opportunities while conserving its scenic, historic, natural, and cultural values.

See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands).*

Yaquina Head Outstanding Natural Area

The Yaquina Head Outstanding Natural Area (located in the Salem District) would be managed to promote the conservation of scenic, historic, natural, and cultural values, and for educational, scientific, and recreational opportunities.

See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands).*

Mt. Hood Corridor

The BLM-administered lands within the Mt. Hood Corridor (located in the Salem District) would be managed to protect and enhance scenic quality. Timber harvesting would be excluded except to maintain safe conditions for the visiting public and control the continued spread of wildfires, and for activities related to administration of the corridor.

See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands).*

<u>Note:</u> The Oregon Parks and Recreation Department (Oregon State Parks), Oregon Department of State Lands, Portland General Electric (PGE), and a mixture of county, local, and private owners administer the remaining lands in the Mt. Hood Corridor.

Bull Run Watershed Management Unit

The BLM-administered lands within the Bull Run Watershed Management Unit (located in the Salem District) would be managed to protect and enhance water quality. Timber harvesting would be excluded, except as necessary to protect or enhance water quality; or except as necessary for the construction, expansion, protection, or maintenance of facilities for either a municipal water supply or energy transmission.

Bull Run Watershed

This watershed is the source of the Portland metropolitan area's domestic water supply and is congressionally designated and separate from other watersheds that are administratively designated. Also note that the U. S. Forest Service and the Portland Water Bureau administer the greater portion of the lands in this unit.

See *Table 2-38 (District-specific miscellaneous Nationnal Landscape Conservation System designated lands).*

West Eugene Wetlands

The BLM-administered lands within the West Eugene Wetlands will be managed under the West Eugene Wetlands Plan, which is incorporated by reference. See *Appendix S – Summaries of Wood River and West Eugene Wetlands Management Plans*.

Wood River Wetland

The BLM-administered lands within the Wood River Wetland will be managed in accordance with the Wood River Wetland Resource Management Plan as described in the upper Klamath Basin and Wood River Wetland Resource Management Plan and Final EIS (1995). See *Appendix S – Summaries of Wood River and West Eugene Wetlands Management Plans*.

Administratively Withdrawn Area

The administratively withdrawn land use allocation includes lands withdrawn from timber harvest for a variety of reasons, including:

- Areas of Critical Environmental Concern including Research Natural Areas
- Areas dedicated to specific purposes such as roads, buildings, maintenance yards, quarries, and other facilities and infrastructure
- Recreation sites (such as campgrounds, trails, and day-use areas)
- Sites managed for Special Status Species
- Areas identified through the timber production capability classification (TPCC) system as withdrawn from sustained yield timber production (woodlands) or identified as nonforest

See *Table 2-1 (Major Components of the Administratively Withdrawn Land Use Allocation)*.

Management Objectives and Management Directions

The management objectives and management directions for areas of critical environmental concern and recreation sites/facilities are addressed in the resource programs section of this chapter.

Areas identified as withdrawn from the harvest land base through the timber production capability classification system do not have specific management objectives or management directions. They may be managed similarly to the adjacent or surrounding land use allocations, if those uses are not incompatible with the reason for which the lands were withdrawn (as identified by the timber production capability

Table 2-1. Major Components Of The Administratively Withdrawn Land Use Allocation Under The PRMP

Component	Acres by BLM District					
	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls
Roads	12,493	10,405	14,985	10,152	23,897	3,476
Developed and Planned Recreation Sites	1,197	3,860	633	2,536	4,811	3,891
Areas of Critical Environmental Concern	19,527	2,773	9,460	13,767	22,091	10,775
Special Status Species	7,802	8,674	5,651	2,064	7,097	2,116
Non-forest	21,430	5,819	9,427	9,304	36,344	79,980
Woodlands	35,921	11,463	27,760	32,545	136,529	82,391

classification codes). Areas would be periodically added to or deleted from those withdrawn from sustained yield timber production through updates to the timber production capability classification system when on-the-ground examinations indicate the existing classification is in error.

Roads, maintenance yards, buildings, quarries, and other facilities also do not have specific management objectives or management directions but would be managed for the purpose for which the facilities were constructed.

Late-Successional Management Area

Under the PRMP, the Late-Successional Management Area land use allocation would be established as follows:

- In the areas shown on *Map 2-2 (Land use allocations under the PRMP)*. Also see the map packet (*Maps 2-2A, 2-2B*, and *2-2C*) for detailed views of the land use allocations.
- In the areas of contiguous marbled murrelet suitable habitat and recruitment habitat (stands capable of becoming habitat for the marbled murrelet within 25 years) within the range of the marbled murrelet that are within 0.5 mile of occupied sites (Mack et al. 2003). Occupation would be determined by the presence of an active nest, a fecal ring, eggshell fragments, or birds demonstrating occupying behavior. Sites found during future project implementation would be added to the Late-Successional Management Area.

Management Objectives

Maintain habitat for the northern spotted owl and the marbled murrelet.

Promote development of habitat for the northern spotted owl in stands that do not currently meet suitable habitat criteria.

Promote development of nesting habitat for the marbled murrelet in stands that do not currently meet nesting habitat criteria.

Recover economic value from timber harvested after a stand-replacement disturbance, such as a fire, windstorm, disease, or insect infestation.

Management Directions

Thinning harvest and other silvicultural treatments would be applied to: promote development of mature or structurally complex forests, promote development of suitable habitat for the northern spotted owl nesting habitat for the marbled murrelet, and reduce the potential for uncharacteristic wildfire.

Snags and coarse woody debris would be retained during thinning harvest of stands, except for safety or operational reasons. Stands where the quadratic mean diameter is greater than 14 inches before stand treatment are considered stands of large trees. Stands where the quadratic mean diameter is less than 14 inches before stand treatment are considered stands of small trees. New snags and coarse woody debris would be created when existing levels of snags and coarse wood debris do not meet the levels defined in *Table 2-2 (Snag and coarse woody debris [CWD] levels for stands of larger trees)* and *Table 2-3 (Snag and coarse woody debris [CWD] levels for stands of smaller trees*). See *Figure 2-1* for depiction of forest vegetation series. The requirement to create new snags and coarse woody debris would not apply to thinning and other silviculture treatments that do not remove cut trees from the stand.

Trees would be felled and removed as needed for safety or operational reasons, including, but not limited to, danger tree removal, creation of yarding corridors adjacent to nearby harvest units, and road construction or maintenance.

Table 2-2. Snag And Coarse Woody Debris Levels For Stands Of Larger Trees In The Late-Successional Management Area Under The PRMP

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total Trees Per Acre	Component Diameter[a]	Total	Component Diameter[a]	Component Length
Western hemlock	6	> 14 inches dbh	240 feet/acre	> 14 inches	> 20 feet
Douglas fir and true firs	3	> 14 inches dbh	120 feet/acre	> 14 inches	> 16 feet
Tanoak	4	> 14 inches dbh	120 feet/acre	> 14 inches	> 16 feet

[a]Diameter measured at the small end of the log
dbh - diameter breast height.

Table 2-3. Snag And Coarse Woody Debris (CWD) Levels For Stands Of Smaller Trees In The Late-Successional Management Area Under The PRMP

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total Trees Per Acre	Comp onent Diameter[a]	Total	Component Diameter[a]	Component Length
Western hemlock	3	> 12 inches dbh	120 feet/acre	> 12 inches	> 20 feet
Douglas fir and true firs	2	> 10 inches dbh	60 feet/acre	> 10 inches	> 16 feet
Tanoak	2	> 10 inches dbh	60 feet/acre	> 10 inches	> 16 feet

[a]Diameter measured at the small end of the log
dbh - diameter breast height

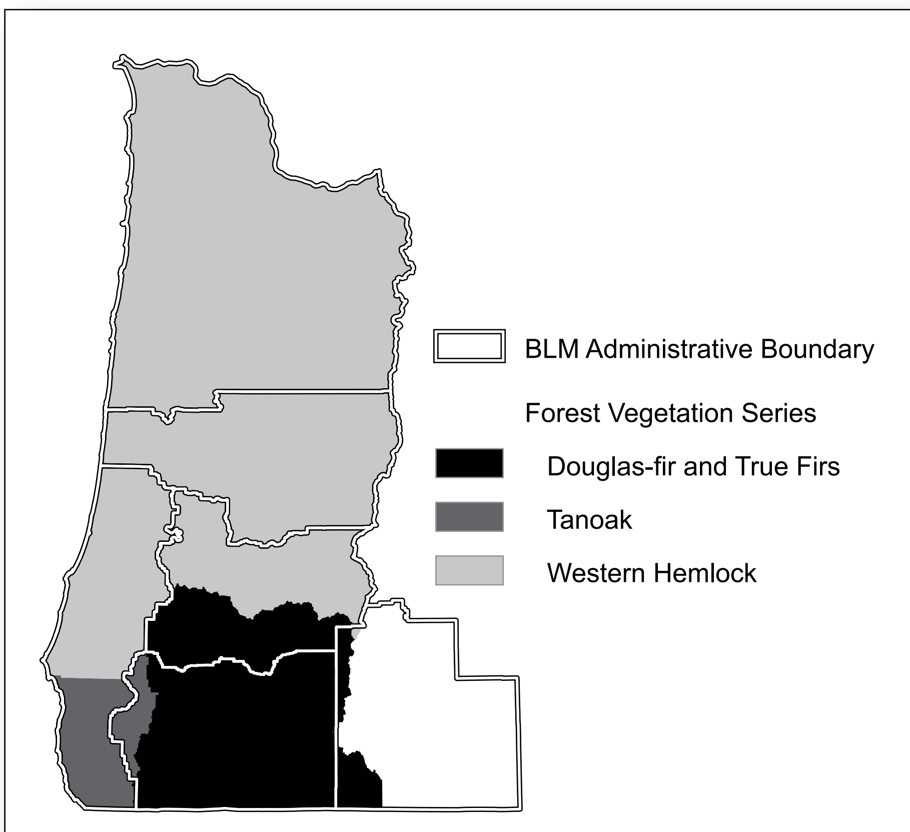


Figure 2-1.
Forest Vegetation Series

Map 2-2. Land Use Allocations Under The PRMP

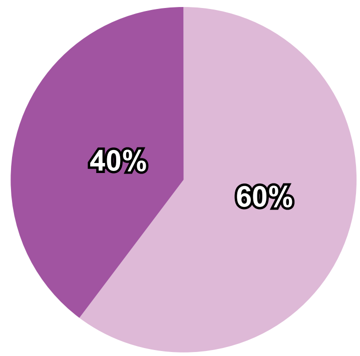
Western Oregon Plan Revisions
Final Environmental Impact Statement

Source: Bureau of Land Management Corporate Data revised for WOPR Analysis. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Township 20 South, Range 8 West, Section 23

0.25 0 0.25 0.5 0.75 1 Mile

BLM Administered Lands Planning Area

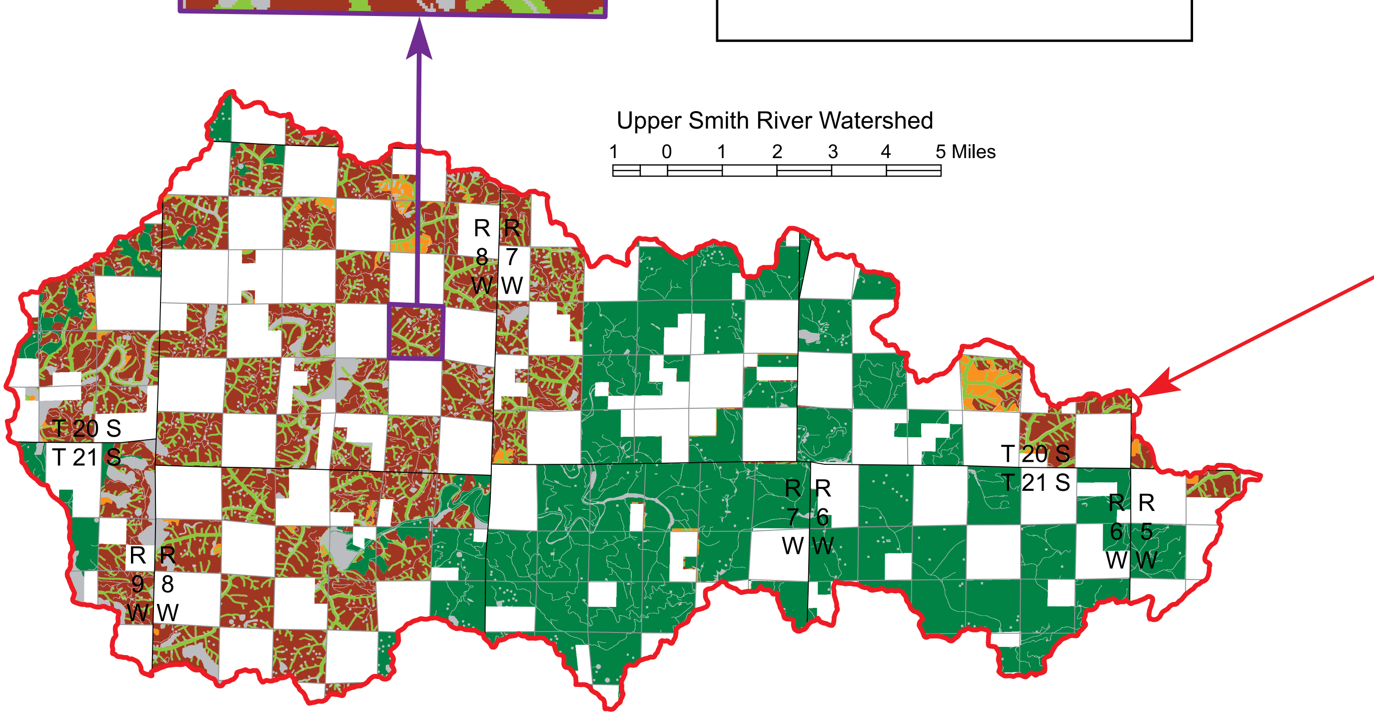


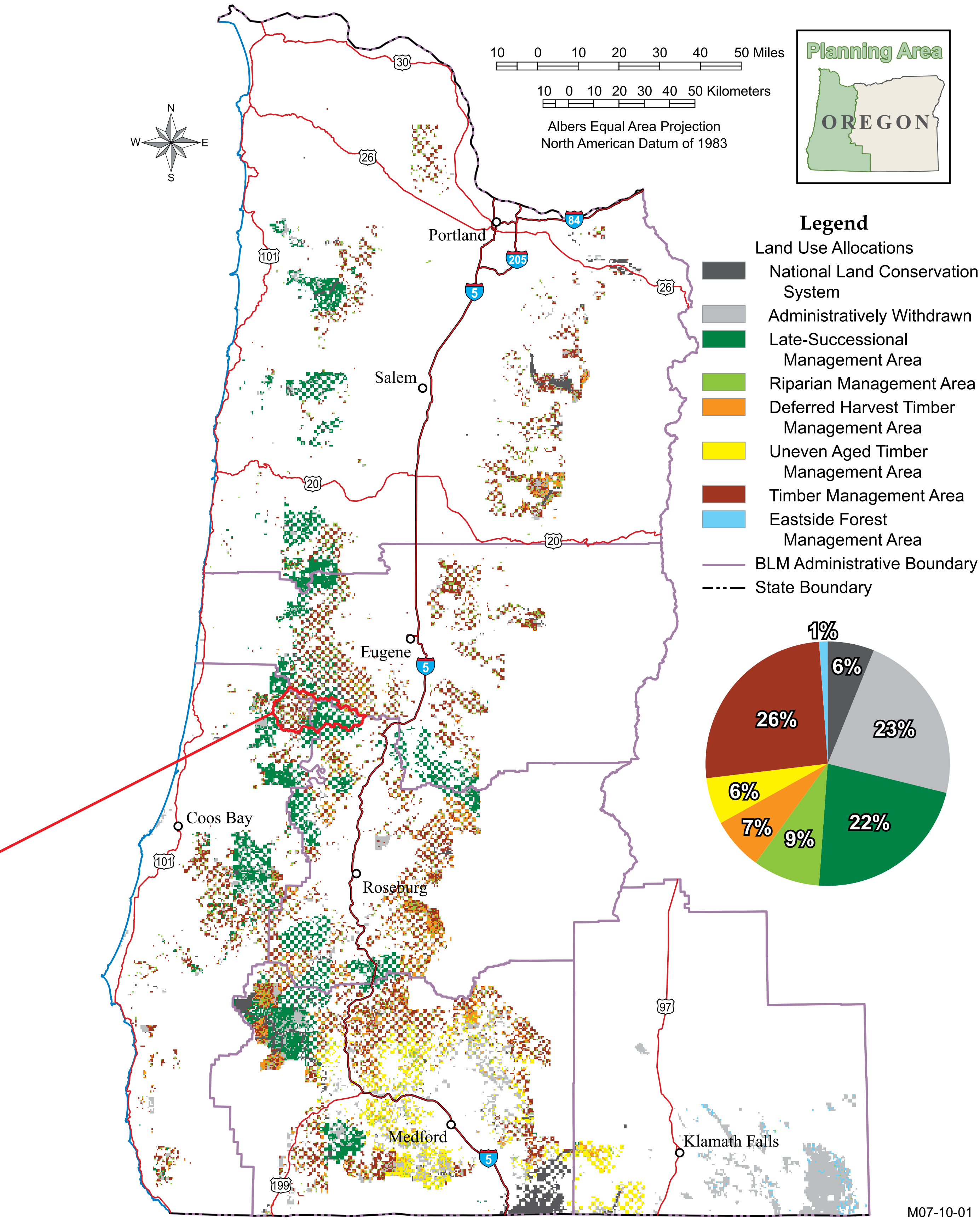
BLM Land Excluded from Harvest Land Base

BLM Land Included in Harvest Land Base

Upper Smith River Watershed

1 0 1 2 3 4 5 Miles




10 0 10 20 30 40 50 Miles
10 0 10 20 30 40 50 Kilometers
Albers Equal Area Projection
North American Datum of 1983
Planning Area
OREGON
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Legend
Land Use Allocations
National Land Conservation System
Administratively Withdrawn
Late-Successional Management Area
Riparian Management Area
Deferred Harvest Timber Management Area
Uneven Aged Timber Management Area
Timber Management Area
Eastside Forest Management Area
BLM Administrative Boundary
State Boundary
1%
6%
23%
22%
9%
7%
6%
26%
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
30
26
84
205
5
101
20
199
97
M07-10-01

Snag and coarse woody debris retention or creation requirements would be met by any combination of new snags and coarse woody debris from live conifer trees and the retention of existing levels of snags (Class I and Class II) and coarse woody debris (Class I and Class II). If existing levels of snags and coarse woody debris are insufficient to meet these requirements in a thinning project, the requirement can be satisfied by including in the project decision the creation of snags and coarse woody debris to meet these standards using the trees remaining within 5 years after completion of the thinning harvest. Snag and coarse woody debris retention or creation levels would be met at the scale of the harvest unit and is not intended to be attained on every acre. Snag and coarse woody debris retention would be variable per acre throughout the area being treated. If sufficient snags or coarse woody debris of the minimum sizes are not available, an equivalent number of smaller snags or coarse woody debris would be retained. Noncommercial snags and coarse woody debris would be retained, except for safety or operational reasons.

Salvage harvest of timber after a stand-replacing disturbance would occur to recover economic value of the stand, so long as the salvage harvest would meet retention standards for snags and coarse woody debris described in *Table 2-4 (Snag and coarse woody debris [CWD] retention for salvaging of timber after a stand-replacement disturbance)*. Snags and coarse woody debris retention standards would be met as an average at the scale of the salvage harvest unit, and is not intended to be attained on every acre.

Timber from thinning, tree-falling, and salvage operations would be available for sale.

Table 2-4. Snag And Coarse Woody Debris (CWD) Retention For Salvaging Timber After A Stand-Replacement Disturbance In The Late-Successional Management Area Under The PRMP

Vegetation Series	Snag Retention		CWD Retention		
	Total Trees Per Acre	Component Diameter[a]	Total	Component Diameter[a]	Component Length
Western hemlock	8	> 20 inches dbh	480 feet/acre	> 20 inches	> 20 feet
Douglas fir and true firs	4	> 16 inches dbh	240 feet/acre	> 16 inches	> 16 feet
Tanoak	4	> 20 inches dbh	240 feet/acre	> 20 inches	> 20 feet

[a]Diameter measured at the small end of the log
dbh - diameter breast height

Riparian Management Area

The Riparian Management Area land use allocation would be established according to *Table 2-5 (Criteria established for the Riparian Management Area land use allocation under the PRMP)*. For a representation of those areas, see *Map 2-2 (Land use allocations under the PRMP)*. Also see the map packet (*Maps 2-2A, 2-2B, and 2-2C*) for detailed views of the land use allocations.

Management Objectives (except for eastside non-forest lands of the Klamath Falls Resource Area)

Provide for conservation of special status fish species.

Provide for riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and streambank stability.

Maintain and restore water quality.

Maintain and restore access to stream channels for all life stages of fish species.

Management Directions (except for eastside non-forest lands of the Klamath Falls Resource Area)

For Perennial and Intermittent Fish-Bearing Streams and Perennial Non-Fish-Bearing Streams:

- Thinning and other silvicultural treatments, including fuels treatments, would be applied to speed development of large trees to provide an eventual source of large woody debris to stream channels and to reduce the potential for uncharacteristic wildfire. Thinning and other silvicultural treatments:
  - — would retain a minimum of 50 percent canopy closure; and
  - — would not be applied within 60 feet on either side of the edge of the stream channel, as measured from the ordinary high water line.
- In thinning operations, all snags and coarse woody debris would be retained, except for safety or operational reasons (e.g., maintaining access to roads and facilities).
- Timber to be cut in thinning, tree-falling, and salvage operations would be available for sale.

For Intermittent Non-Fish-Bearing Streams:

- Thinning and other silvicultural treatments, including fuels treatments, would be applied to speed the development of large trees to provide an eventual source of large woody debris to stream channels and to reduce the potential for uncharacteristic wildfire. Thinning and other silvicultural treatments would not be applied within 35 feet on either side of the edge of the stream channel, as measured from the ordinary high water line.
- In thinning operations, all snags and coarse woody debris would be retained, except for safety or operational reasons (e.g., maintaining access to roads and facilities).
- Timber to be cut in thinning, tree-falling, and salvage operations would be available for sale.

For Natural Lakes and Ponds:

- Trees would only be felled and removed as needed for safety or operational reasons, including, but not limited to, danger tree removal, creation of yarding corridors, and road construction.

Table 2-5. Criteria Established For The Riparian Management Area Land Use Allocation Under The PRMP

Riparian Management Areas	Distance[a]
Perennial and intermittent fish-bearing streams and perennial non-fish-bearing streams	One site-potential tree height[b] on each side of a stream channel as measured from the ordinary high water line.
Intermittent non-fish-bearing streams	Half of one site-potential tree height on each side of a stream channel as measured from the ordinary high water line.
Natural lakes and ponds	One site-potential tree height extending from the edge of the water body as measured from the ordinary high water line.
Natural wetlands, springs, seeps, constructed reservoirs, ditches, and canals	The edge of a body of water or wetland to the outer edge of its riparian vegetation, or to the extent of seasonally saturated soil, whichever is greatest.
Eastside non-forest areas of the Klamath Falls Resource Area	The extent of the water influence zone as indicated by hydrophilic vegetation.

[a] Riparian Management Areas are measured by slope (not horizontal) distance from the ordinary high water line.

[b] The *site-potential tree height* for the purposes of determining riparian management areas would be based on district averages measured at a scale no finer than the fifth-field watershed.

For Natural Wetlands, Springs, Seeps, Constructed Reservoirs, Ditches, and Canals:

- Thinning and other silvicultural treatments, including fuels treatments, would not be applied within the area of riparian vegetation or seasonally saturated soils (whichever is greatest).

Note: The management directions below would occur within the entirety of the Riparian Management Area, including the 60-feet and 35-feet zones. See *Table 2-5 (Criteria established for the riparian management area land use allocation under the PRMP*) for a description of Riparian Management Areas.

Salvage harvest of timber after a stand-replacing disturbance would occur as needed to reduce hazards to public health and safety in the Wildland Urban Interface.

Trees would be felled and/or removed as needed for safety or operational reasons, including but not limited to: danger tree removal, creation of yarding corridors adjacent to nearby harvest units, and road construction and improvement.

Trees would be felled as needed for riparian restoration projects, including but not limited to alder or brush field conversions, or for treatment of diseases including but not limited to Port-Orford-cedar root rot and sudden oak death outbreaks.

Road improvement, storm-proofing, maintenance, or decommissioning would be implemented to reduce chronic sediment inputs along stream channels and waterbodies.

Instream and riparian restoration activities, such as placement of boulders and large wood in streams including tree lining from adjacent riparian areas, would be allowed for all streams. An emphasis would be placed on streams that have high intrinsic potential for fish, high priority fish populations (such as those defined in recovery plans), or high levels of chronic sediment inputs.

Constructed fish passage barriers would be removed or modified to restore access to stream channels for all life stages of fish species.

Prescribed burns would be applied in Riparian Management Areas as needed to reduce the potential for uncharacteristic wildfires.

Best Management Practices (see *Appendix I - Water*) would be applied as needed to maintain or restore water quality.

For streams with ESA-listed or anadromous fish species, livestock would be restricted from riparian areas until 30 days following the emergence of salmonids from spawning beds.

Livestock grazing in Riparian Management Areas would be managed at a level that allows maintenance or development of the proper functioning condition of riparian and wetland plant communities. Practices that would be used to attain this condition would include, but not be limited to: installing and maintaining livestock exclosures, managing season of use and intensity, developing off-stream watering facilities, and other appropriate techniques.

Management Objective (for eastside non-forest lands of the Klamath Falls Resource Area)

Note: Eastside lands are those lands east of Highway 97.

Provide for conservation of special status fish species.

Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and streambank stabilization.

Maintain and restore water quality.

Maintain and restore access to stream channels for all life stages of fish species.

Maintain and restore the proper functioning condition and ecological site potential of riparian and wetland areas.

Management Directions (for eastside non-forest lands of the Klamath Falls Resource Area)

Livestock grazing in riparian management areas would be managed at a level that allows maintenance or development of the proper functioning condition of riparian and wetland plant communities. Methods for attaining this condition would include, but not be limited to, installing and maintaining livestock exclosures, managing season of use and intensity, developing off-stream watering facilities, and implementing other appropriate techniques.

Conifer encroachment would be removed in Riparian Management Areas where interfering with the natural vegetation community-type, or where excessive erosion may occur.

Trees would be felled and removed as needed for safety or operational reasons, including but not limited to: danger tree removal, creation of yarding corridors adjacent to nearby harvest units, and road construction.

Road improvement, storm-proofing, maintenance, or decommissioning would be implemented to reduce chronic sediment inputs along stream channels and waterbodies.

Prescribed burns would be applied in Riparian Management Areas as needed to reduce the potential for uncharacteristic wildfires.

Instream and riparian restoration activities, such as placement of large wood and boulders in streams, would be allowed for all streams. An emphasis would be placed on streams that have high intrinsic potential for fish, high priority fish populations (such as those defined in recovery plans), or high levels of chronic sediment inputs.

Constructed fish passage barriers would be removed or modified to restore access to stream channels for all life stages of fish species.

Best Management Practices (see *Appendix I - Water*) would be applied as needed to maintain or restore water quality.

For streams with ESA-listed fish species, livestock would be restricted from riparian areas until 30 days following the emergence of salmonids from spawning beds.

Eastside Forest Management Area

Under the PRMP, an Eastside Forest Management Area land use allocation in the Klamath Falls Resource Area would be established to consist of those public domain lands shown on Map 2-2C.

<u>Note:</u> Eastside lands are those lands east of Highway 97. This land use allocation applies only to forested lands on the eastside.

Management Objectives

Manage the Eastside Forest Management Area on a sustainable basis for multiple uses including: wildlife habitat, recreational needs, riparian habitat, cultural resources, community stability, and commodity production including commercial timber and other forest products.

Promote development of fire-resilient forests.

Management Directions

Uneven-age management would be used in managing forest stands. This would include use of a combination of harvesting methods including thinning, single tree selection harvest, and group selection harvest.

Uneven-age management harvests would be conducted for the removal and sale of timber and biomass and applied to stands of any age for any one or more of the following purposes: to maintain growth and vigor of the stand; to adjust stand composition or dominance; to recover anticipated mortality; to reduce stand susceptibility to natural disturbance such as fire, windstorm, disease, or insect infestation; to improve merchantability and value; and to promote multi-structural conditions in forest stands.

In uneven-age management harvest units, an overstory component of trees would be retained to provide shade, reduce wind speed, and promote overall fire resiliency in the stand. Generally, relative density (Curtis 1982) will be maintained between 15 and 55, but will vary outside this range based on vegetative type, site productivity, and fire risk factors such as slope, aspect, and elevation.

Group selection harvest of up to 4 acres in size individually, and an aggregate level of up to 25% of the area of the treated stand, would be included within uneven-age management harvest units when needed to: maintain or develop desired species composition; achieve desired diameter distribution; or address natural disturbances.

Regeneration harvest may be used to respond to natural disturbances, or to develop a more desirable mix of commercial species.

Overstory trees would be retained as needed within regeneration harvest areas to provide for shade, frost protection, seeding, or other silvicultural needs.

Salvage harvest would be conducted after natural disturbances to recover economic value and to minimize commercial loss or deterioration of damaged trees. Either uneven-age management or regeneration harvest would be used.

Lands historically supporting conifer species that are currently growing primarily brush or hardwoods due to restocking failure would be converted to conifer species suitable to the site, unless the hardwoods would produce a higher net monetary return.

Precommercial thinning would be applied to forest stands to achieve long-term stocking objectives.

Pruning would be applied to enhance timber value and for fuels and disease management.

Snags and coarse woody debris would be retained during harvest of stands, except for safety or operational reasons. When the existing level of snags, on the average per acre over the stand to be treated, is either: (1) less than two snags over 16 inches dbh, or (2) the existing coarse woody debris over 12 inches in diameter and 12 feet in length totals less than 40 feet, new snags and coarse woody debris would be created to meet these levels.

- Snag and coarse woody debris retention or creation requirements would be met by any combination of new snags and coarse woody debris from live conifer trees and the retention of existing levels of snags (Class I and Class II) and coarse woody debris (Class I and Class II).
- The requirements could be satisfied by including in the project decision the creation of snags and coarse woody debris to meet these standards using the trees remaining within 5 years after completion of the thinning harvest or associated fuel reduction treatment.
- Snag and coarse woody debris retention or creation levels would be met at the scale of the harvest unit and is not intended to be attained on every acre. Snag and coarse woody debris retention would be variable per acre throughout the area being treated.

Deferred Timber Management Area

Under the PRMP, a Deferred Timber Management Area land use allocation would be established as shown on *Map 2-2 (Land use allocations under the PRMP)*. The acres included in the deferred areas are taken from the underlying land use allocations of Uneven-Age Timber Management Area and Timber Management Area. After year 2023, the deferred acres would revert back to their underlying land use allocation and associated management objectives and actions.

Management Objectives

Maintain substantially all of the existing levels of older and more structurally complex multi-layered conifer forests through the year 2023.

Management Directions

Defer timber harvest of stands (as mapped) until after the year 2023.

Fire and fuels treatments would be applied, except for those that reduce crown bulk density or remove trees over 8 inches dbh.

Trees would be felled and removed as needed for safety or operational reasons, including but not limited to: danger tree removal, creation of yarding corridors adjacent to nearby harvest units, and road construction or maintenance.

After a stand-replacement disturbance, deferred areas would revert back to their underlying land use allocation of either Uneven-age Timber Management Area or Timber Management Area.

Uneven-Age Timber Management Area

Under the PRMP, an Uneven-Age Timber Management Area would be established on portions of the Medford District and the Klamath Falls Resource area as shown on *Map 2-2B* and *Map 2-2C* in the map packet.

Notes About Timber Management Areas

The *Deferred Timber Management Area*, *Uneven-Age Timber Management Area*, and *Timber Management Area* land use allocations are those lands that are dedicated to permanent forest production and are managed under the principles of sustained yield. The intensity of management as prescribed by these allocations is the basis for determining the annual productive capacity for each sustained yield unit, also known as Allowable Sale Quantity (ASQ). Timber sales will not be offered from the Deferred Timber Management Area until after the year 2023.

The following management direction applies to both the *Uneven-Age Timber Management Area* and the *Timber Management Area* land use allocations:

- The annual offering of timber volume would potentially vary up to 10% from the declared annual productive capacity of the lands included in the harvest land base or the allowable sale quantity (ASQ). Variations are the result of many factors including preparation and sale of logical, operationally feasible, and economically viable sale areas.
- Cumulative annual offering of the allowable sale quantity would be maintained within 5% of the allowable sale quantity over two or more years by adjusting annual offerings within the allowed 10% variation.

Management Objectives

Manage forests to achieve continuous timber production that could be sustained through a balance of growth and harvest.

Offer for sale annually the declared annual productive capacity of the lands included in the harvest base (also referred to as allowable sale quantity or ASQ).

Promote development of fire-resilient forests.

Management Directions

Uneven-age management would be used in managing forest stands. This would include use of a combination of harvesting methods including thinning, single tree selection harvest, and group selection harvest.

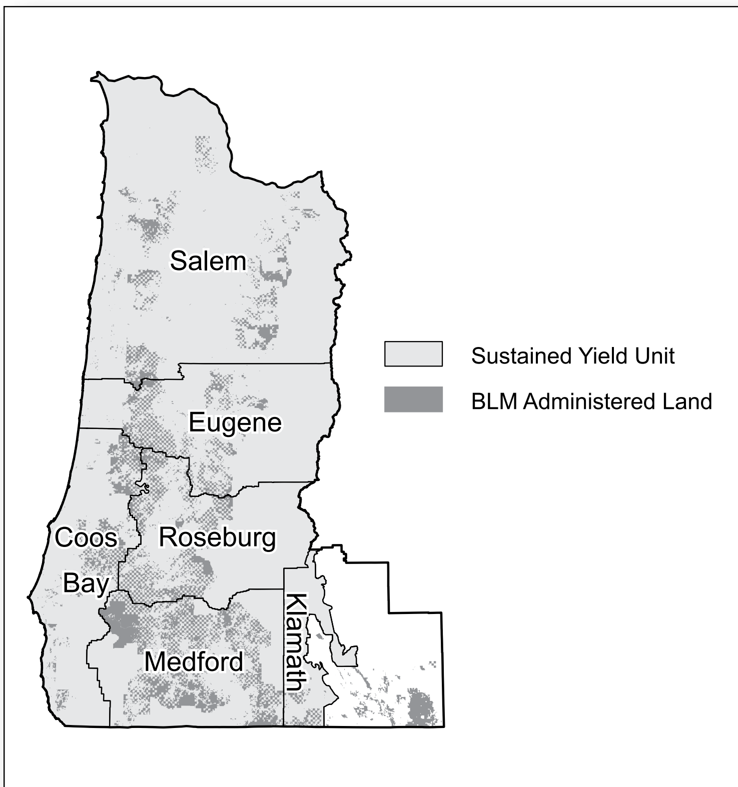


Figure 2-2. Sustained yield units

Timber would be offered for sale from harvest units.

See *Table 2-6 (Estimated portion of the decadal allowable sale quantity offered for sale from the Uneven-Age Management Area under the PRMP)* and *Figure 2-2 (Sustained yield units)*.

Uneven-age management would be conducted for the removal and sale of timber and biomass and applied to stands of any age for any one or more of the following purposes: to maintain the growth and vigor of the stand; to adjust stand composition or dominance; to recover anticipated mortality; to reduce stand susceptibility to natural disturbance such as fire, windstorm, disease, or insect infestation; to improve merchantability and value; and to promote multi-structural conditions in forest stands.

In Uneven-Age Timber Management Areas, an overstory component would be retained to provide shade, reduce wind speed, and promote overall fire resiliency in the stand. Generally, relative density (Curtis 1982) will be maintained between 25 and 55, but will vary outside this range based on vegetative type, site productivity, and fire risk factors such as slope, aspect, and elevation. (See *Appendix R – Vegetation Modeling* for modeled Relative Density [Curtis 1982] assumptions.)

Table 2-6. Estimated Portion Of The Decadal ASQ Offered For Sale From The Uneven-Age Timber Management Area Under The PRMP

BLM District	10-Year Volume (mmbf)
Medford District	222
Klamath Falls Resource Area (of the Lakeview District)	57

Group selection harvest of up to 4 acres in size individually, and an aggregate level of up to 25% of the area of the treated stand, would be included within uneven age management harvest units when needed to: maintain or develop desired species composition; achieve desired diameter distribution; or address natural disturbances.

Regeneration harvest may be used to respond to natural disturbances, or to develop a more desirable mix of commercial species.

Either even-age or two-aged regeneration harvest, or an uneven-age management silvicultural system, may be used depending on site-specific conditions to promote fire resiliency in a zone that is 1 mile on either side of the boundary between the Timber Management Area and the Uneven-Age Management Area shown on *Map 2-2B* and *Map 2-2C* in the map packet. Within this zone, the choice of which harvest system to use would be at the discretion of the BLM field manager.

Overstory trees would be retained as needed within regeneration harvest areas for shade, frost protection, natural seeding, or other silvicultural needs. These trees would be subsequently harvested when no longer needed for these purposes.

Salvage harvest would be conducted in a timely manner after natural disturbances to recover economic value and to minimize commercial loss or deterioration of damaged trees. Either uneven-age management or regeneration harvest would be used.

Lands historically supporting conifer species that are currently growing primarily brush or hardwoods due to restocking failure would be converted to conifer species suitable to the site, unless the hardwoods would produce a higher net monetary return.

Precommercial thinning would be applied to forest stands to achieve long-term stocking objectives.

Pruning would be applied to enhance timber value and for fuels and disease management.

Timber Management Area

Under the PRMP, the Timber Management Area land use allocation would consist of commercial forest lands that are not included in the following land use allocations:

- Lands of the National Landscape Conservation System
- Administratively Withdrawn Area
- Late-successional Management Area
- Riparian Management Area
- Eastside Forest Management Area
- Deferred Timber Management Area
- Uneven-age Timber Management Area

See *Map 2-2 (Land use allocations under the PRMP)*. Also see the map packet (*Maps 2-2A, 2-2B,* and *2-2C*) for detailed views of the land use allocations.

Management Objectives

Manage forests to achieve continuous timber production that could be sustained through a balance of growth and harvest.

Offer for sale annually the declared annual productive capacity of the lands included in the harvest base (also referred to as the allowable sale quantity or ASQ).

Management Directions

Timber would be offered for sale from regeneration harvest units.

See *Table 2-7 (Estimated portion of the decadal allowable sale quantity offered for sale from regeneration harvest units in the Timber Management Area under the PRMP)* and *Figure 2-2 (Sustained yield units)*.

Table 2-7. Estimated Portion Of The Decadal ASQ Offered For Sale From Regeneration Harvest Units In The Timber Management Area Under The PRMP

BLM District	10-Year Volume (mmbf)
Salem	800
Eugene	1050
Roseburg	530
Coos Bay	480
Medford	700

Timber would be offered for sale from commercial thinning harvest units. See *Table 2-8 (Estimated portion of the decadal allowable sale quantity offered for sale from commercial thinning harvest units in the Timber Management Area a under the PRMP)*.

Table 2-8. Estimated Portion Of The Decadal ASQ Offered For Sale From Commercial Thinning Harvest Units In The Timber Management Area Under The PRMP

BLM District	10-Year Volume (mmbf)
Salem	370
Eugene	340
Roseburg	160
Coos Bay	270
Medford	48

Regeneration harvests would be conducted to remove volume and replace slower-growing stands with young, rapidly growing stands. Generally, regeneration harvests would be scheduled for stands to maximize potential growth and yield. However, regeneration harvests would also be applied to younger stands for purposes that include management of:

- age class distribution
- diseased stands
- a change in species composition to a more commercially desirable species
- overstocked stands with poor vigor and low crown ratio
- areas affected by natural disturbance

The minimum age of stands that would be considered suitable for regeneration harvesting would be the 40-year age class. Generally, stands would be harvested above the minimum age.

All merchantable material would be removed from regeneration harvest units. Noncommercial trees, snags, and coarse woody debris would be retained except for safety or operational reasons, including but not limited to: danger tree and log removal, creation of yarding corridors, and road construction. Such noncommercial trees, snags, and coarse woody debris may also be removed as part of a biomass recovery project.

Commercial thinning would be applied to recover anticipated mortality; to adjust stand composition or dominance; to reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation; and to improve merchantability and value.

Commercial thinning would maintain stand densities at levels above that needed to occupy the site, but below densities that would result in loss of stand vigor and health.

Stands with a composition of commercially undesirable tree species or an inadequate stocking of commercially desirable tree species would be converted to stands that are fully stocked by desirable tree species. Treatment projects designed to convert stands to desirable tree species would not be subject to the minimum age requirements of regeneration harvests.

Salvage harvest would be conducted in a timely manner after natural disturbances to recover volume and economic value, and to minimize commercial loss or deterioration of damaged trees.

In the Medford District, overstory trees would be retained within regeneration harvest areas when needed to provide protection to the regenerating understory and to provide for shade, frost protection, or other silvicultural needs. These trees would be subsequently harvested after such protection is no longer needed.

Management Objective

In harvested or disturbed areas, assure the establishment and survival of commercially desirable trees and enhance their growth.

Management Directions

Newly harvested and inadequately stocked areas would be prepared for the regeneration of commercially desirable tree species as determined by the BLM.

Site preparation methods would include mechanical or manual procedures, and prescribed burns.

Adequate reforestation would be achieved as promptly as practical following timber harvests, as follows:

- Harvested areas would be reforested with indigenous tree species.
- Identified root disease centers would be managed for indigenous disease-resistant tree species.
- Genetically improved indigenous trees would be used in reforestation to the extent available.

The establishment and survival of commercially desirable coniferous seedlings and saplings would be promoted through stand maintenance and protective treatments.

Port-Orford-Cedar would be managed in accordance with the May 2004 record of decision for the *Management of Port-Orford-Cedar in southwest Oregon, Coos Bay, Medford, and Roseburg Districts*.

Management Objective

Enhance the health, stability, growth, vigor, and economic value of forest stands.

Management Directions

Lands historically supporting conifer species that are currently growing primarily brush or hardwoods would be converted to conifer species suitable to the site, unless the hardwoods would produce a higher net monetary return.

Precommercial thinning would be applied to forest stands to achieve long-term stocking objectives.

Fertilizer would be applied to forest stands that are at suitable density levels and where treatment is expected to increase stand growth and timber yields.

Pruning would be applied to enhance timber value and for fuels and disease management.

Resource Programs

The management directions listed in this section by individual resource programs, as well as the administrative actions listed below, would be applied in any land use allocation.

Administrative actions are routine transactions and activities that are required to serve the public and to provide optimum management of resources.

Administrative actions include, but are not limited to, the following:

- recreation site maintenance
- recreation site improvement
- competitive and commercial recreation activities
- lands and realty actions (including the issuance and administration of grants, leases, and permits issued under the Federal Land Policy and Management Act)
- resolution of trespasses
- facility maintenance
- improvements to existing facilities
- road maintenance
- issuance and administration of O&C unilateral and reciprocal rights-of-way agreements
- hazardous and solid waste materials removal
- law enforcement
- surveys to determine legal land or mineral estate ownership
- engineering support to assist in mapping
- design of projects including any needed surveys
- sampling (e.g., 3-P fall, buck, and scale sampling method)
- incidental removal of trees, snags, or logs for safety or operational reasons

Air

Management Objective

Prevent impacts to air quality in areas designated as Class I for air quality and nonattainment areas.

Management Directions

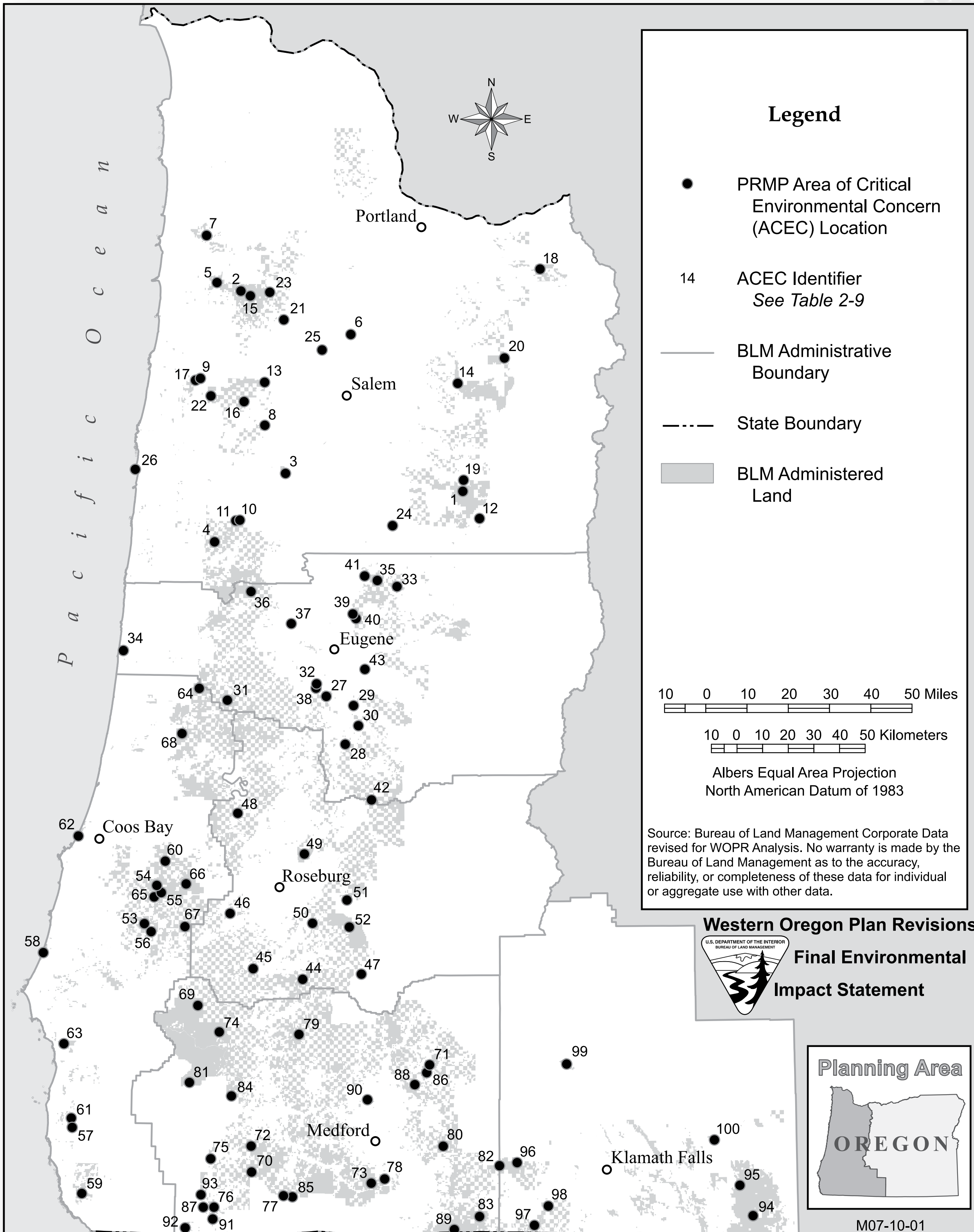
Prescribed burns would be implemented in accordance with the Oregon Smoke Management Plan to reduce emissions, to avoid smoke intrusions into designated areas, and to avoid degrading the visibility in Class I areas.

Dust palliatives would be used where needed to reduce dust during timber hauling operations and other management activities that utilize native, cinder, or crushed rock surfaced roads.

Areas of Critical Environmental Concern including Research Natural Areas

Under the PRMP, 100 areas of critical environmental concern including research natural areas would be designated. See *Table 2-9 (Areas of critical environmental concern under the PRMP).* Also see *Map 2-3 (Areas of critical environmental concern within the planning area)*.

Map 2-3. Areas Of Critical Environmental Concern Within The Planning Area



Management Objective

Maintain or restore important and relevant values in areas of critical environmental concern, including research natural areas and outstanding natural areas.

Management Direction

Activities would be implemented as necessary to maintain or restore important and relevant values (see *Appendix N - Areas of Critical Environmental Concern*).

Table 2-9. Areas Of Critical Environmental Concern Under The PRMP

Location # on Map 2-3	ACEC Name	Total Area (acres)
Salem District		
1	Crabtree Complex RNA/ONA	1,231
2	Elk Creek	783
3	Forest Peak RNA	155
4	Grass Mountain RNA	930
5	High Peak - Moon Creek RNA	1,489
6	Jackson Bend	15
7	Little North Fork Wilson River	1,821
8	Little Sink RNA	81
9	Lost Prairie	60
10	Marys Peak ONA	75
11	Marys Peak B	353
12	Middle Santiam Terrace	182
13	Mill Creek Ridge	114
14	Molalla Meadows	197
15	Nestucca River	1,162
16	Rickreall Ridge	368
17	Saddlebag Mountain RNA	300
18	Sandy River Gorge ONA	8,423
19	Silt Creek	110
20	Soosap Meadows	205
21	The Butte RNA	39
22	Valley of the Giants ONA	1,311
23	Walker Flat	10
24	Waterloo	9
25	Yampo	13
26	Yaquina Head ONA	91
Eugene District		
27	Camas Swale RNA	308
28	Cottage Grove Lake RFI	15
29	Cougar Mountain Yew Grove	8

Table 2-9. Areas Of Critical Environmental Concern Under The PRMP (cont.)

Location # on Map 2-3	ACEC Name	Total Area (acres)
30	Dorena Prairie	8
31	Esmond Lake	85
32	Fox Hollow RNA	159
33	Grassy Mountain	29
34	Heceta Sand Dunes ONA	210
35	Horse Rock Ridge RNA	378
36	Hult Marsh	177
37	Long Tom[a]	8
38	Lorane Ponderosa Pine	26
39	McGowan Meadow	38
40	Mohawk RNA	290
41	Oak Basin Prairies	37
42	Upper Elk Meadows RNA	217
43	Willamette Valley Prairie/Oak and Pine Area	780
Roseburg District		
44	Bear Gulch RNA	351
45	Beatty Creek RNA	864
46	Bushnell-Irwin Rocks RNA	1,085
47	Callahan Meadows	82
48	Myrtle Island RNA	19
49	North Bank	6,162
50	North Myrtle Creek RNA	453
51	Red Pond RNA	141
52	Tater Hill RNA	303
Coos Bay District		
53	Brownson Ridge	369
54	Cherry Creek RNA	592
55	China Wall	302
56	Euphoria Ridge	239
57	Hunter Creek Bog	721
58	New River	1,133
59	North Fork Chetco	603
60	North Fork Coquille River	310
61	North Fork Hunter Creek	1,757
62	North Spit	682
63	Rocky Peak	1,827
64	Roman Nose	205
65	Steel Creek	1,204
66	Tioga Creek	42
67	Upper Rock Creek	387
68	Wassen Creek	3,394

Table 2-9. Areas Of Critical Environmental Concern Under The PRMP (cont.)

Location # on Map 2-3	ACEC Name	Total Area (acres)
Medford District		
69	Bobby Creek RNA	1,914
70	Brewer Spruce RNA	1,707
71	Cobleigh Road	244
72	Crooks Creek	147
73	Dakubetede Wildland	1,530
74	East Fork Whiskey Creek	3,188
75	Eight Dollar Mountain	1,249
76	French Flat	505
77	Grayback Glades RNA	1,021
78	Holton Creek RNA	421
79	King Mountain Rock Garden	49
80	Lost Lake RNA	387
81	North Fork Silver Creek RNA	499
82	Old Baldy RNA	115
83	Oregon Gulch RNA	1,051
84	Pickett Creek	32
85	Pipe Fork RNA	516
86	Poverty Flat	29
87	Rough and Ready	1,181
88	Round Top Butte RNA	605
89	Scotch Creek RNA	1,799
90	Table Rocks ONA	1,244
91	Waldo-Takilma	1,760
92	Whiskey Creek[b]	633
93	Woodcock Bog RNA	265
Klamath Falls Resource Area of the Lakeview District		
94	Bumpheads	112
95	Miller Creek	939
-[c]	Old Baldy RNA	355
96	Tunnel Creek	72
97	Upper Klamath River	4,670
98	Upper Klamath River Addition	695
99	Wood River Wetland	3,225
100	Yainax Butte	707

[a]This ACEC was carried over from the current RMP. It was inadvertently left off tables in the Draft EIS.

[b]This potential ACEC was not analyzed in the Draft EIS, and therefore cannot be designated as an ACEC at this time. It will receive interim management until it is evaluated during a future plan amendment or revision.

[c]Also in Medford District (#82 on Map 2-3).

Botany

Special Status Plant and Fungi Species

Management Objective

Provide for conservation of BLM special status species.

Management Direction

Management of plant and fungi species that are listed under the Endangered Species Act would be consistent with recovery plans and designated critical habitat. Plant species with currently approved recovery plans include: McDonald's rockcress, Applegate's milk-vetch, Golden paintbrush, Gentner's fritillary, Western lily, Bradshaw's desert parsley, Rough popcorn flower, and Nelson's checker-mallow. See *Appendix F - Botany (Digest of Actions Contained in Individual Recovery Plans and Conservation agreements for Plant Species).*

The BLM special status plant and fungi species would be managed to maintain or restore populations and habitat consistent with species conservation needs. Protection measures include altering the type, timing, extent, and intensity of actions; and other strategies designed to maintain populations of species. Restorative measures would include establishing new populations or augmenting existing populations.

Conservation and cooperative plans, strategies, and agreements would be implemented for special status species. Plants and fungi that currently have such plans, strategies, or agreements are listed in *Appendix F - Botany (Digest of conservation plans for special status plant species).*

Plant Communities on Nonforest and Noncommercial Forest Lands

Management Objective

Maintain or restore natural plant communities on nonforest and noncommercial forest lands.

Management Directions

Activities to maintain or restore natural plant communities would include the use of disturbances (such as prescribed burning and cutting of vegetation), retention of legacy components, and removal of invading vegetation (such as conifers in meadows, grasslands, juniper, or oak woodlands).

Degraded or disturbed areas would be revegetated with native seed to maintain the native plant community.

Road construction, road maintenance, and culvert replacement would be designed to retain or reconnect the hydrologic flows to streams, wetlands, springs, fens, ponds, and vernal pools.

Invasive Plants

Management Objective

Avoid the introduction of invasive plants and the spread of existing invasive plant infestations on BLM-administered lands.

Management Directions

Measures would be implemented to prevent, detect, and rapidly control new invasive plant infestations.

Manual, mechanical, cultural, chemical, and biological treatments would be used to manage invasive plant infestations.

Invasive plants would be treated in accordance with the Records of Decision (RODs) for the Northwest Area Noxious Weed Control Program EIS and the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement. These documents are incorporated by reference.

Cultural and Paleontological Resources, including American Indian Traditional Uses

Management Objective

Conserve scientific, traditional use, heritage, educational, public, and recreational values of cultural and paleontological resource sites.

Management Directions

Ground-disturbing actions would avoid sites that are listed (or eligible for listing) on the National Register of Historic Places. If avoidance would not be practical, sites with scientific value would be salvaged prior to disturbance through practices such as data recovery, which include excavation, relocation, or documentation.

Cultural properties would be assigned to the following use categories:

- Cultural properties that are determined to be available for consideration as the subject of scientific or historical study would be classified as *scientific use sites* or *experimental use sites*.
- Unusual cultural properties that are not currently available for scientific or historical study, because of scarcity, a research potential that surpasses the current state-of-the-art, singular historic importance, cultural importance, tribal importance, architectural interest, or comparable reasons would be classified as *conservation for future use sites*. Sites would be selected for the purpose of retaining a representative sample of site types from those available in areas where conflicts with other resource management activities are not anticipated. These sites would be preserved.
- Cultural properties known to be important in maintaining the cultural identity, heritage, or well being of a specified and recognized tribes would be classified as *traditional use sites*. These sites would be managed to accommodate their continuing traditional use.
- Cultural properties found to be appropriate for use as interpretive exhibits at their original location (i.e., in place), or found to be appropriate for related educational and recreational uses, would be classified as *public use sites*. Priority locations for these interpretive exhibits would include developed recreation sites, recreation corridors, and locations where recreation is being promoted. These sites would be preserved.
- Cultural properties that are only important for their scientific values and where their research potential is effectively exhausted (ones where the salient information has been collected and preserved, or has been destroyed by natural or human activity), would receive no special management.

The use categories for existing sites and new sites may be assigned or changed by comparing the site's characteristics to these use category descriptions.

Significant cultural resource properties would be acquired for public, cultural heritage, and scientific purposes when such properties are adjacent to or are inholdings of BLM-administered land.

Cultural and paleontological resources threatened by natural processes or human activity would be excavated, and the data would be recovered where warranted by the scientific importance of the site.

Energy and Minerals

Management Objective

Maintain existing opportunities and develop new opportunities for the exploration and development of locatable, leasable, and saleable energy and mineral resources, wind development, and casual mineral prospecting.

Management Directions

Areas would be available for energy and mineral resource exploration and development.

Biomass would be available from harvesting actions, silvicultural treatments, and forest health and fuels treatments for use as combustible fuel or other forest products.

New and existing quarry and pit sites would be used to provide economical sources of rock and aggregate. Existing quarry and pit sites, along with the areas involved in their incremental expansion, would be managed as existing facilities and would not be available for other management uses.

See *Table 2-10 (Areas open or closed to energy and mineral developments)* for the areas that would be open or closed to energy and mineral developments. See *Appendix Q - Energy and Minerals* for a reasonably foreseeable development scenario for the BLM units within the planning area and the stipulation that would be applied to the developments.

Table 2-10. Areas Open Or Closed To Energy And Mineral Developments Under The PRMP

Categories and Subcategories		Acres by BLM District					
		Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls
Federal Surface and Mineral Estate		398,100	318,000	425,600	329,600	866,300	212,000
Federal Minerals/Private Surface		27,800	1,300	1,700	12,200	4,700	21,000
Locatable (e.g., metallics and gemstones)							
Closed	Nondiscretionary	5,900	400	300	1,000	16,800	4,700
Closed	Discretionary	16,200	15,300	4,800	11,500	20,800	700
Open	Standard Restrictions and/or Stipulations	49,200	290,600	366,200	99,500	536,500	191,600
Open	Additional Restrictions	326,800	10,000	20,800	217,600	293,400	37,900
Salable (e.g., sand, gravel, stone, clays, pumice)							
Closed	Nondiscretionary	5,900	100	30	600	24,600	300
Closed	Discretionary	220,400	9,100	8,400	14,700	20,800	14,500
Open	Standard Restrictions/ Stipulations	49,200	200	381,700	84,600	17,200	0
Open	Additional Restrictions	122,600	307,000	29,200	229,700	803,700	197400
Leasable (e.g., oil, gas, geothermal, coal, chemical minerals[a])							
Closed	Nondiscretionary	100	100	30	0	80	300
Open	Standard Restrictions/ Stipulations	108,600	140,000	98,300	94,300	250,200	75,900
Open	Additional Restrictions	266,200	169,500	315,700	212,000	562,100	139,400
Open	No Surface Occupancy	27,700	2,800	9,700	15,000	55,000	8,700

[a]Chemical minerals include phosphate, sodium, potassium, sulphur, etc. that may or may not be present in the planning area. These minerals are commonly used by industry to prepare brines or acids, or to serve as chemical bases in the manufacture of other products.

Fire and Fuels Management

Management Objectives

Reduce the fire hazards to communities that are at risk from uncharacteristic wildfires.

Decrease the risk of large wildfires, and reduce the cost and associated hazard of fire suppression.

Reduce the risk of resource damage due to uncharacteristic wildfires.

Management Directions

Hazardous fuels generated by management activity would be treated, particularly in wildland urban interface areas. See *Map 2-4 (Wildland urban interface)*.

Fuels treatment would be applied to stands of any age in order to reduce the fuel hazards. Fuel treatments would include such activities as tree cutting, brush cutting, pruning, reducing crown bulk density, treating of activity fuels, removing of biomass, and prescribed burning.

Fuels treatments would occur in various combinations of Fire Regimes and Fire Regime Condition Classes, with an emphasis on those combinations identified as high priority in *Table 2-11* (*Fuel treatment emphasis areas using Fire Regime and Fire Regime Condition Class*).

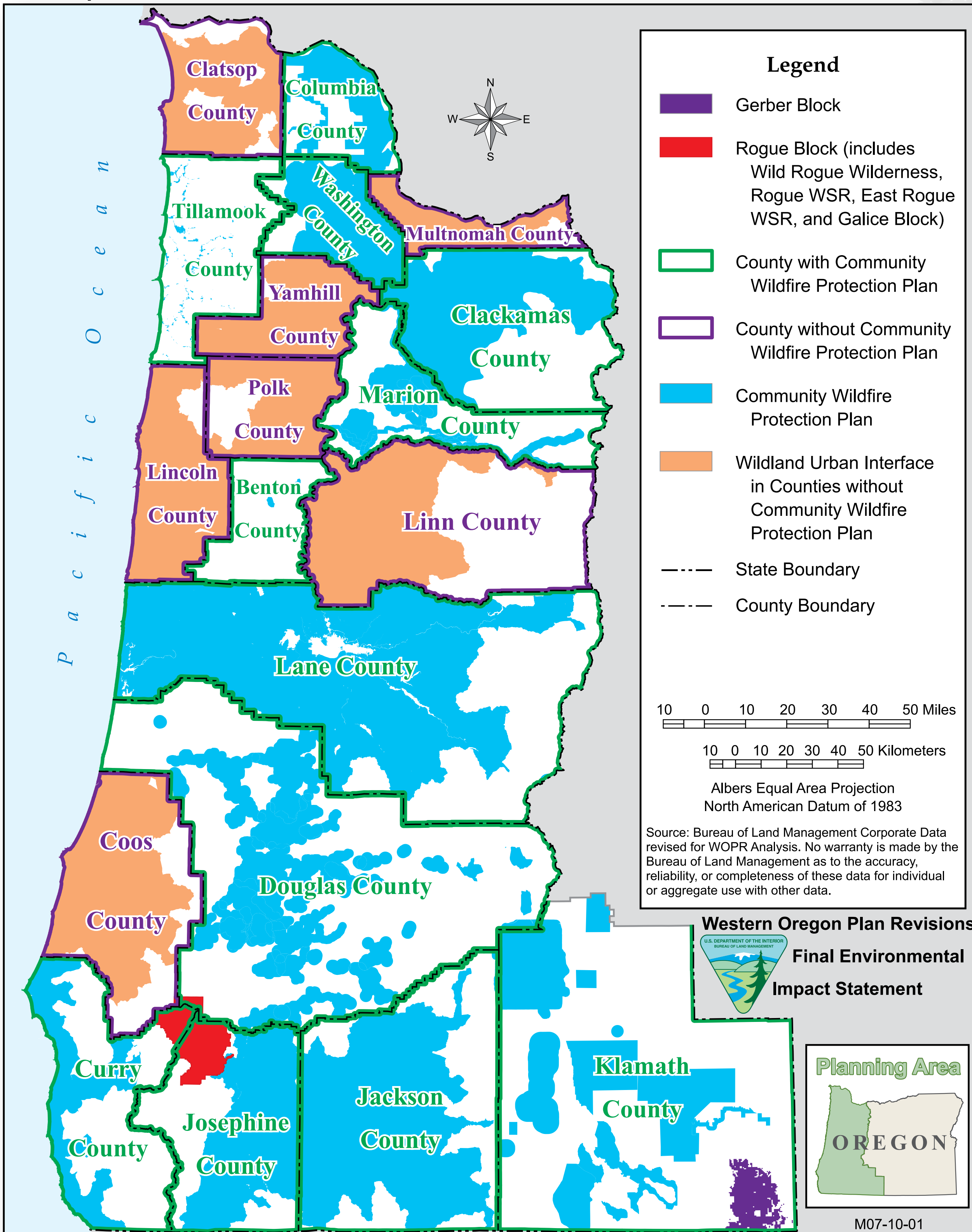
Vegetation treatments would be applied in noncommercial oak woodlands to create open conditions with large fire-resistant oaks.

Prescribed burns would be used in low intensity, high frequency fire regimes to emulate natural fire occurrences.

Table 2- 11. Fuel Treatment Emphasis Areas Using Fire Regime And Fire Regime Condition Class

Fire Regime	Fire Regime Condition Class	Priority
1	3	HIGH
1	2	HIGH
1	1	HIGH
2	3	HIGH
2	2	HIGH
2	1	MODERATE
3	3	HIGH
3	2	HIGH
3	1	MODERATE
4	3	LOW
4	2	LOW
4	1	LOW
5	3	LOW
5	2	LOW
5	1	LOW

Map 2-4. Wildland Urban Interface



Immediate action to suppress and control wildfire using direct control would occur in all areas. In large contiguous blocks of BLM-administered lands, such as the Gerber Block in the Klamath Falls Resource Area, other options such as perimeter control and prescription control would also be used.

Vegetation removal and other associated maintenance activities would occur to maintain access around ponds and water sources that have been constructed as fire suppression water sources.

Fish

Management objectives and actions are included under the Riparian Management Area land use allocation.

Grazing

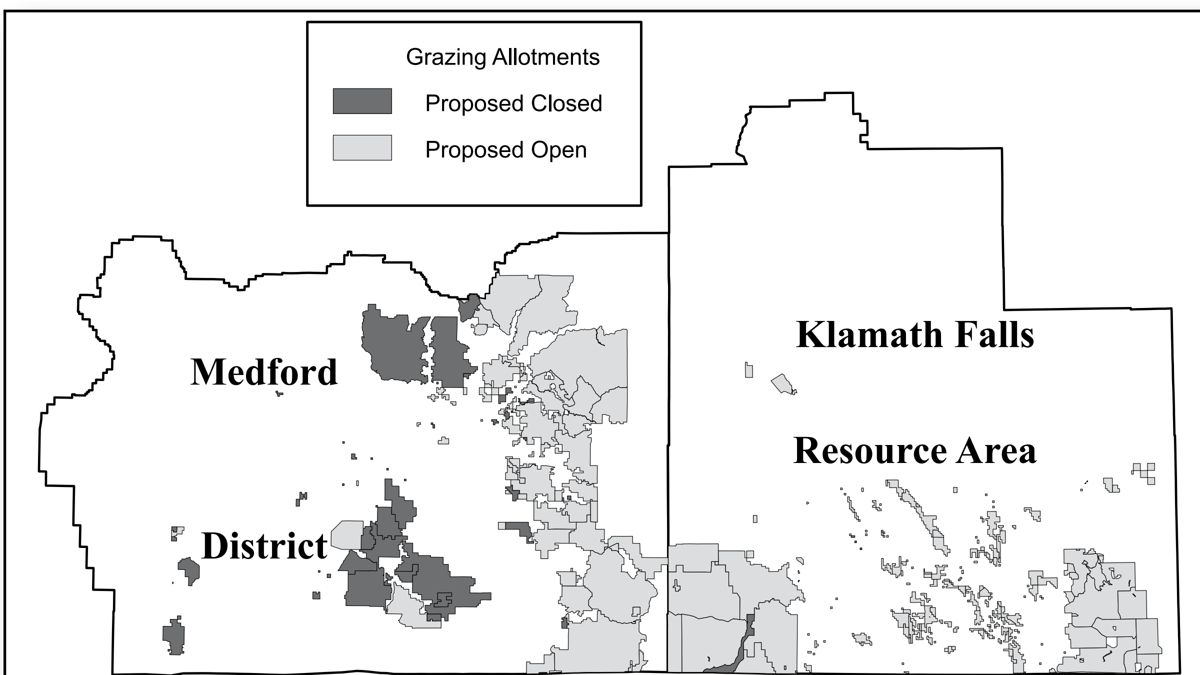
Management Objective Pertinent Only to the Coos Bay District, Medford District, and the Klamath Falls Resource Area of the Lakeview District

Provide livestock grazing permits and leases while maintaining or improving public rangelands.

Management Direction Pertinent Only to the Coos Bay District

The authorization of livestock grazing through the issuance of grazing leases would be discontinued. However, grazing would be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits in a manner that is consistent with the grazing regulations.

Figure 2-3. Lands Available For Livestock Grazing



Management Directions Pertinent Only to the Medford District and the Klamath Falls Resource Area of the Lakeview District

Livestock grazing would be managed in accordance with the *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington*. See:

- *Figure 2-3* (Lands available for livestock grazing)
- *Appendix M* - Grazing (Grazing Allotments in the Klamath Falls Resource Area and the Medford District)
- *Appendix M* - Grazing (Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Oregon and Washington)

Grazing levels and management practices would be maintained for the allotments as listed in *Appendix M - Grazing*. Adjustments would be made when needed to meet or make progress toward meeting the Standards for Rangeland Health for Oregon and Washington. See *Appendix M - Grazing (Grazing Allotments in the Klamath Falls Resource Area and the Medford District)*

Areas disturbed by natural and human-induced events (including wildfire, prescribed burns, timber-management treatments, and juniper cutting) would be rested from livestock grazing, except where grazing would either not impede site recovery or where grazing could be used as a tool to aid in achieving recovery objectives. Livestock grazing would be resumed after soil and vegetation had sufficiently recovered to support livestock grazing.

Livestock grazing would be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits on lands that are not available through the issuance of a grazing lease or permit.

Prescribed livestock grazing would be used where appropriate to control invasive plants, reduce fire danger, or accomplish other management objectives.

Management Directions Pertinent Only to the Klamath Falls Resource Area of the Lakeview District

The authorization of livestock grazing through the issuance of grazing leases would be discontinued, in whole or in part, for the grazing allotments identified in *Table 2-12 (Allotments not available for livestock grazing under the Taylor Grazing Act in the Klamath Falls Resource Area)*.

Grazing would not continue to be authorized under Section 15 of the Taylor Grazing Act (43 U.S.C. §315 et seq.) for the allotments listed in *Table 2-12*. However, grazing would be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits in a manner that is consistent with the grazing regulations.

Table 2-12. Allotments Not Available For Livestock Grazing Under The Taylor Grazing Act In The Klamath Falls Resource Area Under The PRMP

Allotment Name	Allotment Number	Acres	Forage Allocation (AUMs)[a]
Edge Creek[b]	00102	5,950	---
Plum Hills	00813	160	20
Total Acres and AUMs		6,110	20

[a]AUM (Animal Unit Month) - Amount of forage necessary to sustain one cow (or its equivalent) for one month.

[b]The portion of the Upper Klamath Scenic River within the Edge Creek Allotment would be closed to grazing. This portion of the allotment was not allocated any AUMs. The remainder of the allotment would be available for grazing as described in *Appendix M - Grazing (Grazing Allotments in the Klamath Falls Resource Area and the Medford District)*.

Table 2-13. Exclosures Or Other Areas Closed To Grazing In The Klamath Falls Resource Area Under The PRMP

Allotment Name	Allotment Number	Areas Closed Within Allotments
Edge Creek	00102	Hayden Creek Exclosures (2) Fox Lake Exclosure
Buck Lake	00104	Tunnel Creek Exclosure Surveyor Campground Exclosure
Dixie	00107	Dixie (Long Prairie Creek) Exclosure
Stukel-O'Neil	00822	Aspen Exclosure
Rodgers	00852	Van Meter Flat Reservoir Exclosure
Yainax	00861	Bull Spring Exclosure Timothy Spring Exclosure
Bear Valley	00876	Holbrook Spring Exclosure
Bumpheads	00877	Bumpheads Reservoir Outlet Exclosure Antelope Creek Exclosure
Horsefly	00882	Long Branch Exclosure Caseview Spring Exclosure Norcross Spring Exclosure (area within the spring exclosure fence) Boundary Spring Exclosure Barnes Valley Riparian Pasture (except as scheduled)
Pankey Basin	00884	Pankey Creek Riparian Exclosure
Dry Prairie	00885	Ben Hall Creek Riparian Pasture (except as scheduled)
Horse Camp Rim	00886	21 Reservoir Exclosure
Pitchlog	00887	Pitchlog Creek Exclosure Willow Spring Exclosure CCC Spring Exclosure
Willow Valley	00890	East Fork Lost River Exclosure Duncan Spring/Antelope Creek Exclosures (2) Antelope Riparian Pasture (except as scheduled)
Wood River	30855	Entire area excluded from regular grazing use, except as a tool to support wetland restoration

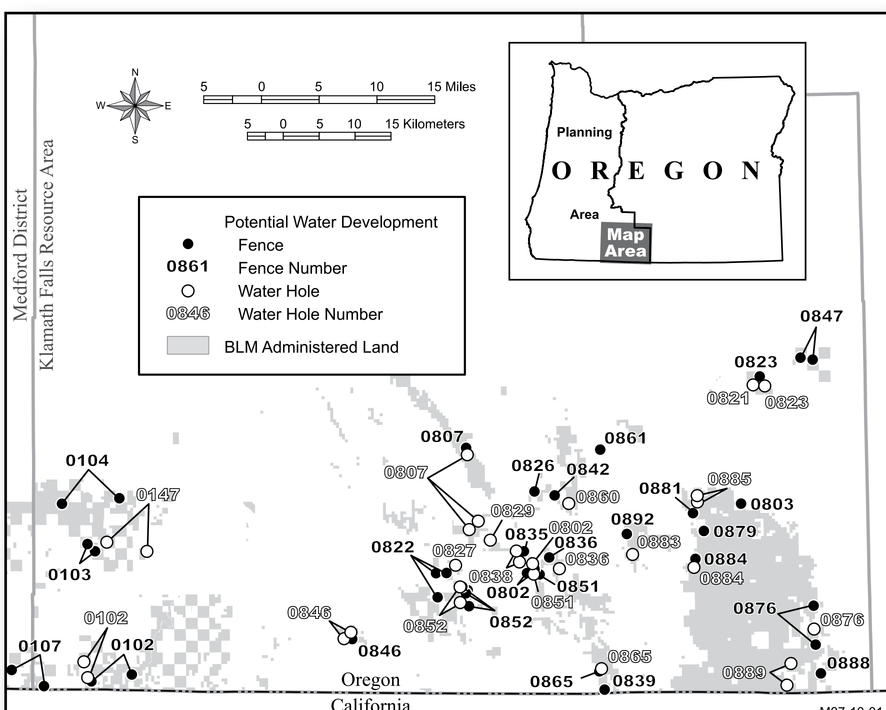


Figure 2-4. Location Of Proposed Range Improvements In The Klamath Falls Resource Area

Exclosures or other areas, as identified on *Table 2-13 (Exclosures or other areas closed to grazing in the Klamath Falls Resource Area)*, would be closed to grazing, except as scheduled.

Range improvements would be developed in the Klamath Falls Resource Area as described in *Appendix M - Grazing (Standards Procedures and Design Elements for Range Improvements within the Klamath Falls Resource Area and Medford District)* and *Figure 2-4 (Location of proposed range improvements in the Klamath Falls Resource Area)*.

Management Directions Pertinent Only to the Medford District

The authorization of livestock grazing through the issuance of grazing leases would be discontinued, in whole or in part, for the grazing allotments identified in *Table 2-14 (Allotments not available for livestock grazing under the Taylor Grazing Act in the Medford District)*.

Grazing would not be authorized under Section 15 of the Taylor Grazing Act (43 U.S.C. §315 et seq.) for the allotments listed in *Table 2-14*. However, grazing could be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits in a manner that is consistent with the grazing regulations.

Range improvements would be implemented to achieve the Oregon standards for rangeland health or other allotment-specific objectives. See *Appendix M - Grazing (Standards Procedures and Design Elements for Range Improvements within the Klamath Falls Resource Area and Medford District)*.

Hazardous Materials

Management Objectives

Limit the use of hazardous materials.

Eliminate hazardous wastes.

Management Directions

Response to hazardous material incidents would include cleanup, proper notifications, criminal investigations, and site assessments.

Hazardous materials would be stored, treated, and disposed of in accordance with applicable laws and regulations.

Employees and the public would be protected from known hazardous materials on BLM-administered lands.

Lands, Realty, Access, and Transportation

Management Objectives

Make land tenure adjustments to facilitate the management of resources.

Provide legal access to BLM-administered lands and facilities to support resource management programs.

Provide needed rights-of-way, permits, leases, and easements over BLM-administered lands in a manner that is consistent with federal and state laws.

Provide a road transportation system that serves resource management needs.

Protect lands that have important resource values or substantial levels of investment by withdrawing them, where necessary, from the implementation of nondiscretionary public land and mineral laws.

Table 2-14. Allotments Not Available For Livestock Grazing Under The Taylor Grazing Act In The Medford District Under The PRMP

Allotment Name	Allotment Number	Acres	Forage Allocation (AUMs)[a]
Trail Creek	10003	12,868	113
Longbranch[b]	10004	10,844	71
Antioch Road	10005	40	4
Roundtop Evans	10006	27,086	110
West Perry Road	10010	75	10
East Perry Road	10011	40	7
Obenchain Mountain	10014	120	12
Nichols Gap	10018	280	18
Eagle Point Canal	10020	465	55
Shady Branch	10025	320	32
Derby Station	10030	540	36
West Derby	10034	1,120	89
Emigrant Creek	10111	40	7
Baldy	10120	798	87
Lost Creek	10123	80	6
Cartwright	10127	40	4
Bybee Peak	10144	321	36
Stiehl	10210	175	18
Fielder Creek	10211	40	5
Del Rio	10216	40	5
Sugarloaf/Greensprings	20158	2,926	210
Applegate	20201	25,518	294
Tunnel Ridge	20202	2,183	14
Timber Mountain	20204	1,720	70
Sardine and Galls Creek	20205	3,765	158
Sterling Creek	20207	29,209	190
Spencer Gulch	20208	1,935	150
Quartz Gulch	20209	680	9
Burton Butte	20212	5	2
Chapman Creek	20213	3,309	81
Ecker	20217	40	6
Stage Road	20218	40	4
Lomas Road	20222	635	50
Star	20223	118	24
Pickett Mountain	20302	820	30
Jump Off Joe	20303	80	8
Deer Creek[b]	20308	278	0
Reeves Creek	20309	1,672	95
Q Bar X	20310	15	3
Esterly Lake	20312	4,457	152
Glade Creek	20315	560	17
Cherry Gulch	20316	40	6
Totals		**135,337**	**2,298**

[a] AUM (Animal Unit Month) - Amount of forage necessary to sustain one cow (or its equivalent) for one month.

[b] These portions of the Longbranch and Deer Creek Allotments would be closed to grazing. The remainder of the allotments would be available for grazing as described in Appendix M - Grazing.

Management Directions

Lands in Zone 1 would be retained under BLM administration. Lands in Zone 1 include:

- National Landscape Conservation System designated lands
- Areas of critical environmental concern
- Research natural areas
- Outstanding natural areas
- Developed recreation sites
- Critical habitat for threatened or endangered species

Lands in Zone 2 would be available for exchange to enhance public resource values, improve management capabilities, or reduce the potential for land use conflict. Zone 2 lands consist of all lands not listed in the descriptions of either Zone 1 lands and Zone 3 lands (see *Appendix P – Lands)*.

Lands in Zone 3 would be available for disposal using appropriate disposal mechanisms. These lands would include:

- lands that are either not practical to manage, or are uneconomical to manage (because of their intermingled location and nonsuitability for management by another federal agency)
- survey hiatuses
- encroachments

Survey hiatuses and encroachments that are discovered in the future would be assigned to Zone 3. See *Map 2-5 (Location of land tenure Zone 3)*.

See *Table 2-15* below for acres of land tenure zones under the PRMP.

Lands in Zones 2 and 3 that are included in future designations of critical habitat by the U.S. Fish and Wildlife Service would automatically be added to Zone 1.

As required by the Oregon Public Lands Transfer and Protection Act (Public Law 105-321), the acres of O&C lands of all classifications, and the acres of O&C and public domain lands that are available for harvesting, would not be reduced through disposal, exchange, or sale. The total net change in land tenure in the planning area would be evaluated at 10-year intervals.

Lands would be acquired or disposed of to facilitate resource management objectives as opportunities occur. See the Land Tenure Adjustment Criteria section in *Appendix P - Lands*.

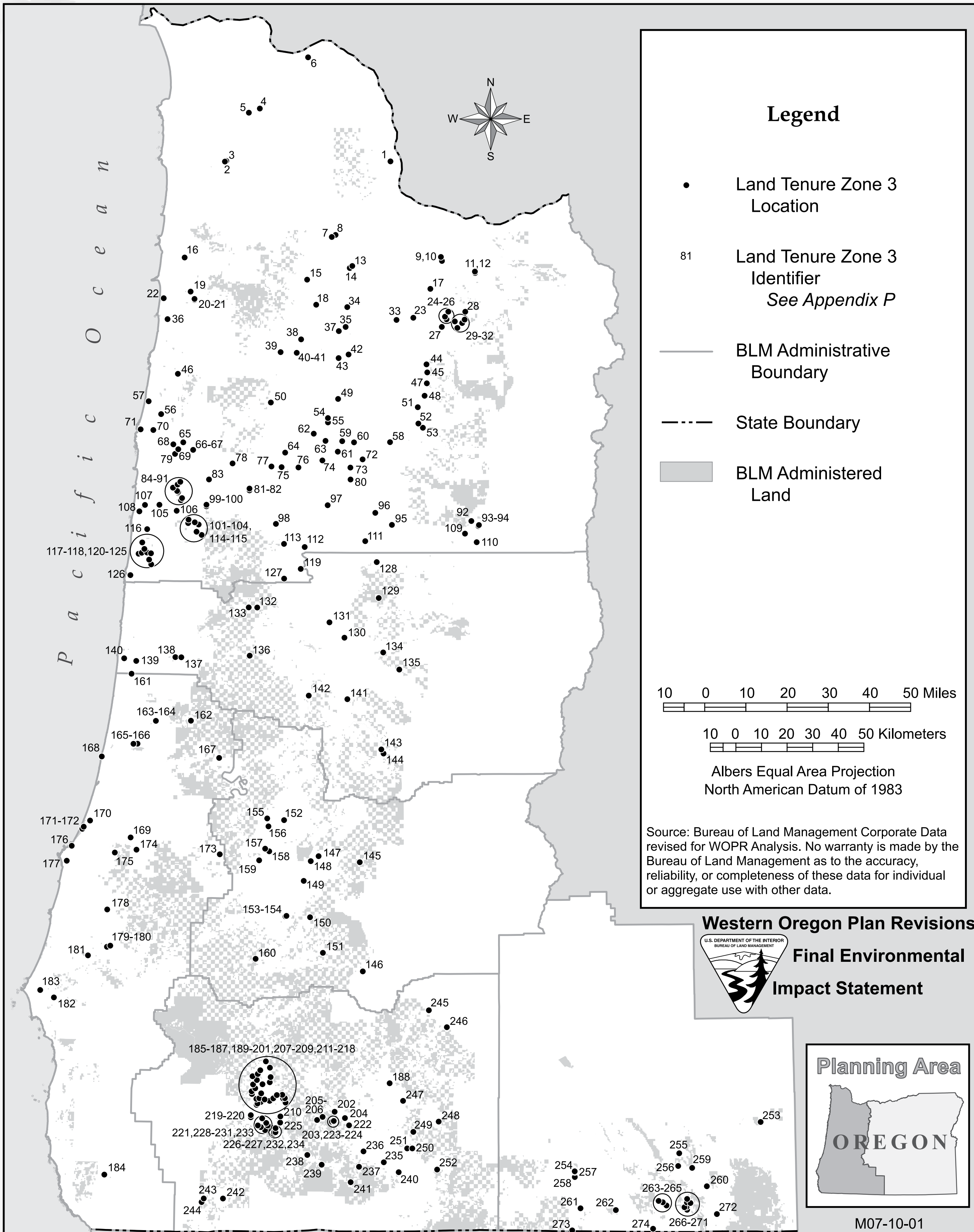
The public domain lands in Zones 2 and 3 have been classified under Section 7 of the Taylor Grazing Act and would be available for disposal.

Table 2-15. Acres Of Land Tenure Zones Under The PRMP By District

BLM District	Zone 1	Zone 2	Zone 3
Salem	237,700	160,000	4,600
Eugene	170,500	141,600	200
Roseburg	237,700	184,900	1,000
Coos Bay	169,000	151,300	800
Medford	414,300	445,400	7,000
Klamath Falls Resource Area (Lakeview District)	29,700	192,300	2,200

Note: Zone 1 (Retention and Acquisition), Zone 2 (Suitable for Exchange and Consolidation), and Zone 3 (Suitable for Disposal)

Map 2-5. Location Of Land Tenure Zone 3



Newly acquired lands would be managed for the purpose for which they were acquired or in a manner that is consistent with management objectives for adjacent BLM-administered lands or other BLM-administered lands having similar resource values.

Temporary-use permits, as identified under the Federal Land Policy and Management Act (Section 302), would be issued for a variety of uses, such as, but not limited to, stockpile and storage sites and as tools to authorize unintentional trespass situations pending final resolution.

No leases or permits would be issued for landfills or other waste disposal facilities.

Land-use authorizations would be used to resolve agricultural or occupancy trespasses, where appropriate.

Existing rights-of-way, permits, leases and easements would be recognized as valid uses.

Withdrawals would be limited to the area needed and would restrict only those activities needed to accomplish the purposes of the withdrawal.

Class I visual resource management areas would be *right-of-way exclusion areas* where future rights-of-way would be granted only on a case-by-case basis or when mandated by law.

Recreation sites, areas of critical environmental concern, research natural areas, wild and scenic rivers that are classified as scenic and recreational rivers, and Class II visual resource management areas would be *right-of-way avoidance areas* (i.e., rights-of-way would be granted only where no practical alternative is available).

Utility corridors would be the preferred location for energy transmission or distribution facilities. Corridors would generally be 1,000 feet on each side of the centerline. The rights-of-way granted would be the minimum necessary to accommodate a specific request. No development or management activities would be permitted that would conflict with construction, operation, or maintenance of facilities corresponding to the purpose of the utility corridor. See *Map 2-6 (Utility corridors)*.

Communication facilities would be allowed on existing developed communication sites where they do not conflict with other management objectives. Applications for communication facilities on undeveloped communication sites would require a site plan. See *Map 2-6 (Utility corridors)* and *Appendix P - Lands*.

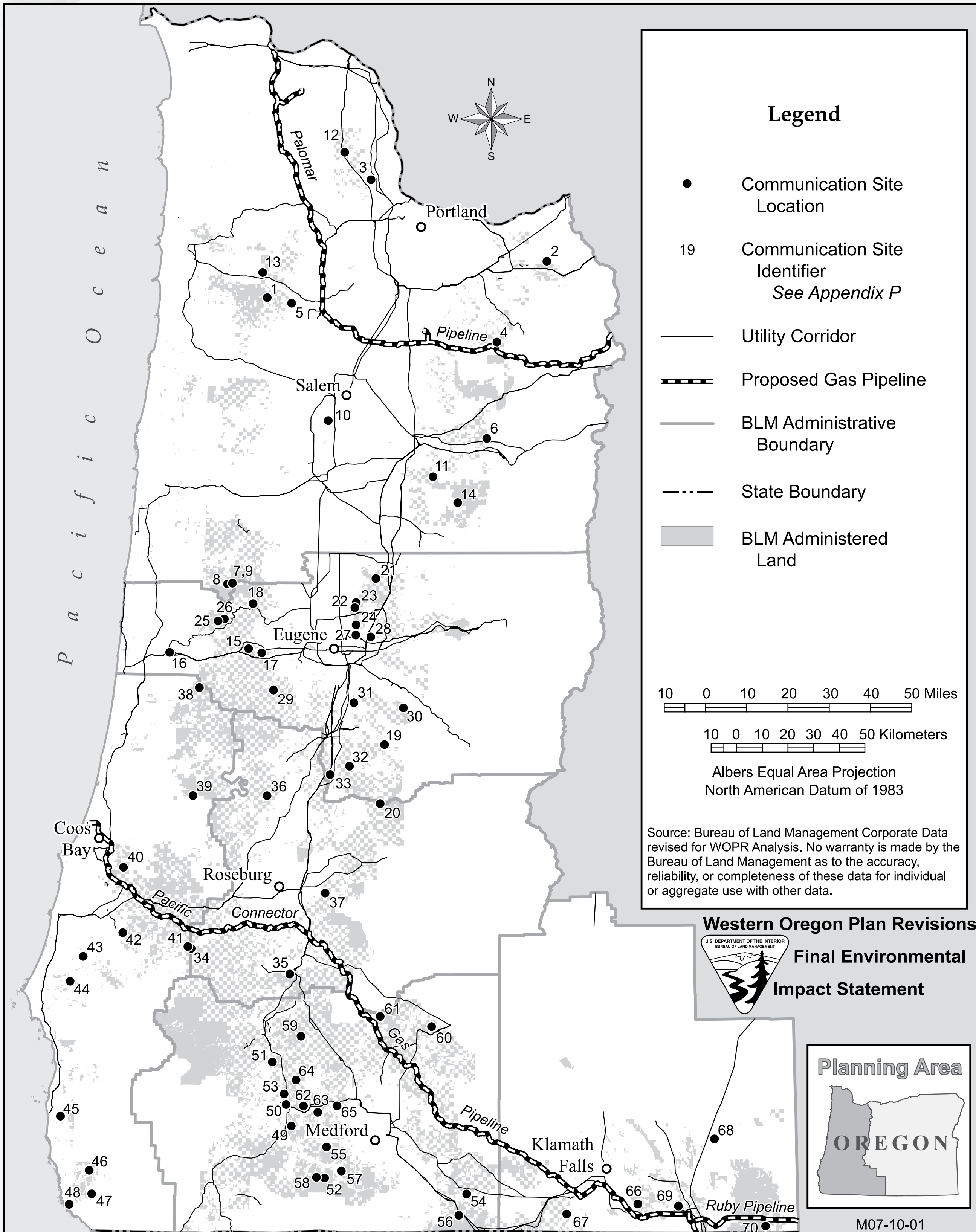
Expansion of existing communication sites and the development of new sites would be allowed. The priority for accommodating the need for additional capacity would be the use of existing sites and facilities.

Existing roads would be managed to protect resource values, provide for safety, protect facility investment, and provide access for management activities. Hazard trees and downed trees would be removed along roads for safety or operational reasons.

New permanent or temporary roads, and stream-crossing structures, would be constructed where needed for the implementation of management directions.

Roads that are not needed for long-term resource management would be decommissioned.

Map 2-6. Utility Corridors



Recreation

See *Table 2-18* through *Table 2-38* and *Map 2-7* through *Map 2-16* at the end of the PRMP section for district-specific recreation information.

Management Objective

Provide a diversity of developed and dispersed outdoor recreational opportunities that contribute to meeting recreational demand and quality visitor experiences.

Management Directions

Public access would be sought to BLM-administered lands that have high recreational potential.

Special recreation management areas would be managed in accordance with their planning frameworks. See *Appendix K - Recreation* and *Map 2-7 (Recreation management areas)*. These frameworks describe implementation-level actions that would achieve recreational management objectives for those areas.

Lands not designated as special recreation management areas would be managed as extensive recreation management areas for developed and dispersed recreational opportunities.

Recreational developments (including sites, trails, and backcountry byways) would be maintained.

Potential recreational developments (including sites, trails, and backcountry byways) would be developed in the future depending on recreational demand and feasibility.

Locatable mineral withdrawals would be obtained for recreational developments that contain mineral development potential.

Closed or abandoned roads would be developed where feasible to provide additional trail opportunities subject to valid existing rights.

Service-oriented and outreach programs, including interpretation and education, would be provided to visitors.

Environmental education areas would be managed to provide educational opportunities for the public.

Recreation sites authorized under the Recreation and Public Purposes Act would be managed according to their lease agreements.

Areas not designated as closed to off-highway vehicle use would be designated as limited to designated roads and trails. See *Table 2-28 (District-specific off-highway vehicle area designations)*.

Areas listed in *Table 2-29 (District-specific areas closed to off-highway vehicle use)* would be designated as closed to off-highway vehicle use.

Areas listed in *Table 2-30 (District-specific off-highway vehicle emphasis areas)* would be managed as off-highway vehicle emphasis areas. These are areas where off-highway use is more concentrated and intensively managed but are still located within the off-highway vehicle designation of limited to designated roads and trails.

Potential off-highway vehicle emphasis areas listed in *Table 2-31 (District- specific potential off-highway vehicle emphasis areas)* would be developed in the future depending on recreational demand and feasibility.

See *Map 2-8 (Off-highway vehicle designations - PRMP) and Map 2-9 (Off-highway vehicle emphasis areas - PRMP).*

Off-highway vehicle areas and off-highway vehicle emphasis areas would be managed according to interim management guidelines until subsequent comprehensive travel management plans are completed. See *Appendix K - Recreation*. Detailed maps are available at each district office that show proposed off-highway vehicle area designations and a preliminary road and trail network.

Lands within state scenic waterway corridors (see *Table 2-32* for a list of Oregon State Scenic Waterways, by district), excluding portions that occur on O&C lands that are suitable for permanent timber production, would be managed to protect and enhance identified scenic, aesthetic, recreation, scientific, research, fish, and wildlife qualities.

Research

Management Objective

Provide for research to support the management of lands and resources administered by the BLM in western Oregon.

Management Direction

Ongoing research projects would be continued according to current or updated study plans. New research projects would require study plans. Management directions on study sites that conflict with research objectives would be deferred until the research is complete.

Soils

Management Objective

Provide for long-term soil productivity.

Management Direction

Management activities that affect soil productivity (such as prescribed burns, wildfire suppression, silviculture, timber harvesting, biomass removal, and grazing) would be designed to provide for long-term soil productivity.

Special Forest Products

Management Objective

Provide for the harvest and collection of special forest products.

Management Directions

The collection of special forest products would be implemented in a manner that limits adverse impacts to other resources. This would be accomplished by restricting collection amounts and collection activities.

Permits issued for collection of special forest products would include stipulations to limit adverse impacts to the plant community, individual plants, soil, and water.

Areas for the collection of individual special forest products would be rotated as needed to maintain the availability of special forest products.

Timber

Management objectives and actions for timber are included earlier in this chapter under the Eastside Forest Management Area, Deferred Timber Management Area, Uneven-Age Timber Management Area, and Timber Management Area land use allocations.

Visual Resource Management

See *Map 2-17 (Visual resource management classes),* located in the Table/Map section at the end of the PRMP description, and *Table 2-16 (Acres of visual resource management classes by district under the PRMP).*

Management Objective

Preserve the existing character of the landscape in Class I visual resource management areas.

Management Direction

Designated, suitable, and eligible wild and scenic rivers that are classified as wild, wilderness areas, wilderness study areas, and wilderness instant study areas would be managed as Class I visual resource management areas.

These areas would be managed in accordance with natural ecological changes. Some very limited management activities would occur in these areas. The level of change to the characteristic landscape would be very low and would not attract attention. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Management Objective

Retain the existing character of the landscape in Class II visual resource management areas.

Management Direction

Designated, suitable, and eligible wild and scenic rivers that are classified as scenic, the Cascade-Siskiyou National Monument, the Pacific Crest National Scenic Trail, the Mt. Hood Corridor, the Bull Run Watershed Management Unit, and the Yaquina Outstanding Natural Area would be managed as Class II visual resource management areas. See *Table 2-38 (District Specific Miscellaneous National Landscape Conservation System designated lands*).

In the Salem District, public domain lands in the Molalla River visual corridor in Township 6 South, Range 3 East, Willamette Meridian would be managed as VRM Class II. See *Figure 2-5* (*Molalla River visual corridor)* for a depiction of the VRM classes in this corridor.

These areas would be managed for low levels of change to the characteristic landscape. Management activities would be seen but would not attract the attention of the casual observer. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

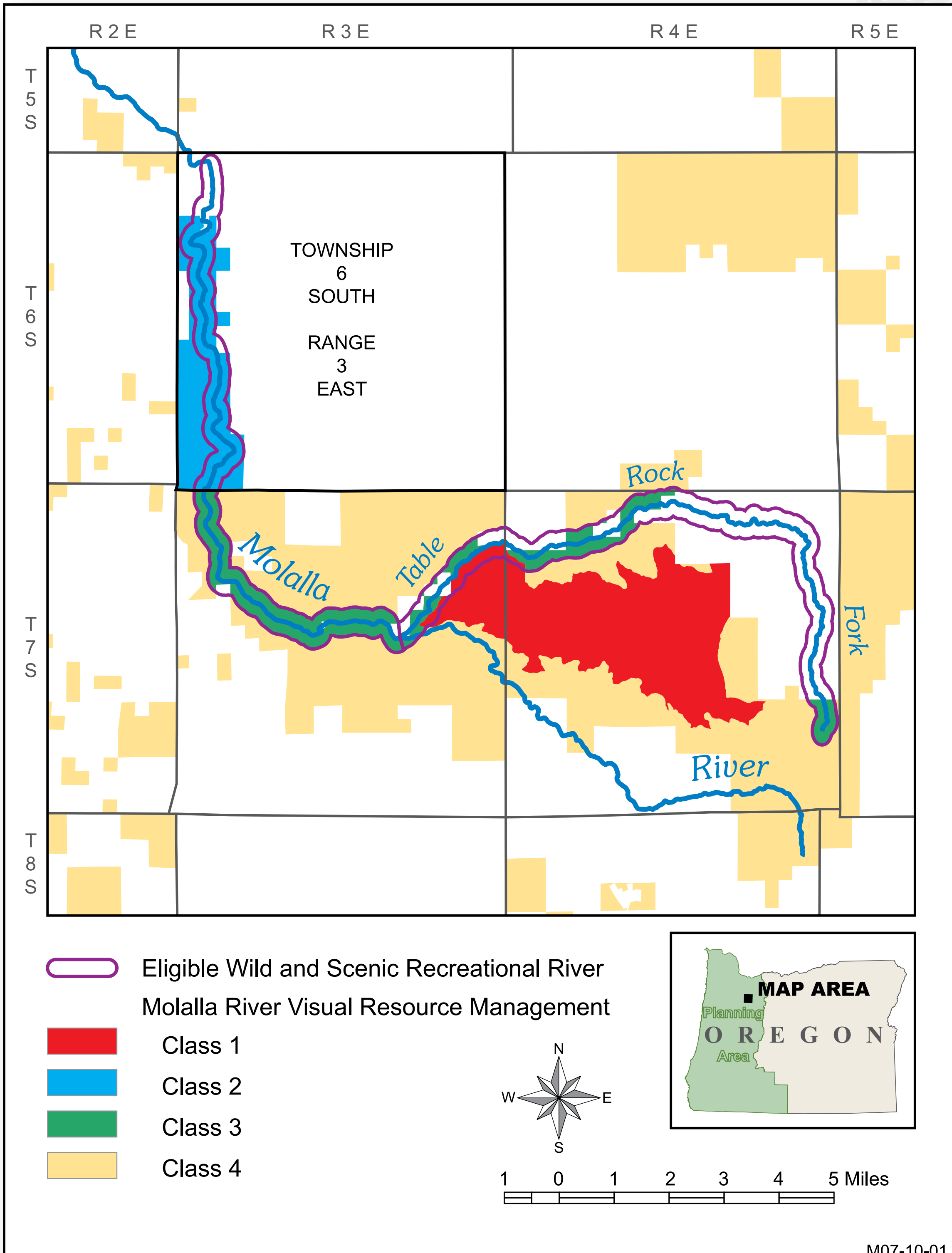
Public domain lands in the Eastside Forest Management Area of the Klamath Falls Resource Area inventoried as Class II would be managed as Class II visual resource management areas.

Table 2-16. Acres Of Visual Resource Management (VRM) Classes By District Under The PRMP

Visual Resource Management (VRM) Classes	Proposed RMP (acres)
Salem District	
VRM Class I	7,545
VRM Class II	10,345
VRM Class III	14,729
VRM Class IV	369,566
Eugene District	
VRM Class I	0
VRM Class II	0
VRM Class III	8,294
VRM Class IV	303,967
Roseburg District	
VRM Class I	0
VRM Class II	0
VRM Class III	6,323
VRM Class IV	417,265
Coos Bay District	
VRM Class I	592
VRM Class II	0
VRM Class III	1,903
VRM Class IV	318,672
Medford District[a]	
VRM Class I	29,136
VRM Class II	51,288
VRM Class III	14,787
VRM Class IV	771,483
Klamath Falls Resource Area (of the Lakeview District)	
VRM Class I	340
VRM Class II	37,949
VRM Class III	49,498
VRM Class IV	136,423
Totals for all western Oregon BLM lands	
VRM Class I	37,613
VRM Class II	99,582
VRM Class III	95,534
VRM Class IV	2,317,376

[a]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Figure 2-5. Molalla River Visual Corridor



Management Objective

Partially retain the existing character of the landscape in Class III visual resource management areas.

Management Direction

Designated, suitable, and eligible wild and scenic rivers that are classified as recreational would be managed as Class III visual resource management areas.

These areas would be managed for moderate levels of change to the characteristic landscape. Management activities would attract attention but would not dominate the view of the casual observer. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Public domain lands on the Eastside Forest Management Area of the Klamath Falls Resource Area inventoried as Class III would be managed as Class III visual resource management areas.

Management Objective

Allow for major modification of the existing character of the landscape in Class IV visual resource management areas.

Management Direction

All lands that are not designated as Class I, Class II, or Class III would be managed as Class IV visual resource management areas.

These lands would be managed for high levels of change to the characteristic landscape. Management activities would dominate the view and would be the major focus of viewer attention.

Public domain lands in the Eastside Forest Management Area of the Klamath Falls Resource Area inventoried as Class IV would be managed as Class IV visual resource management areas.

Water

Management objectives and actions for water are included earlier in this chapter under the Riparian Management Area land use allocation.

Wilderness Characteristics

Management Objective

Maintain wilderness characteristics on those BLM-administered lands designated in *Table 2-17 (Lands with wilderness characteristics maintained under special management under the PRMP)*.

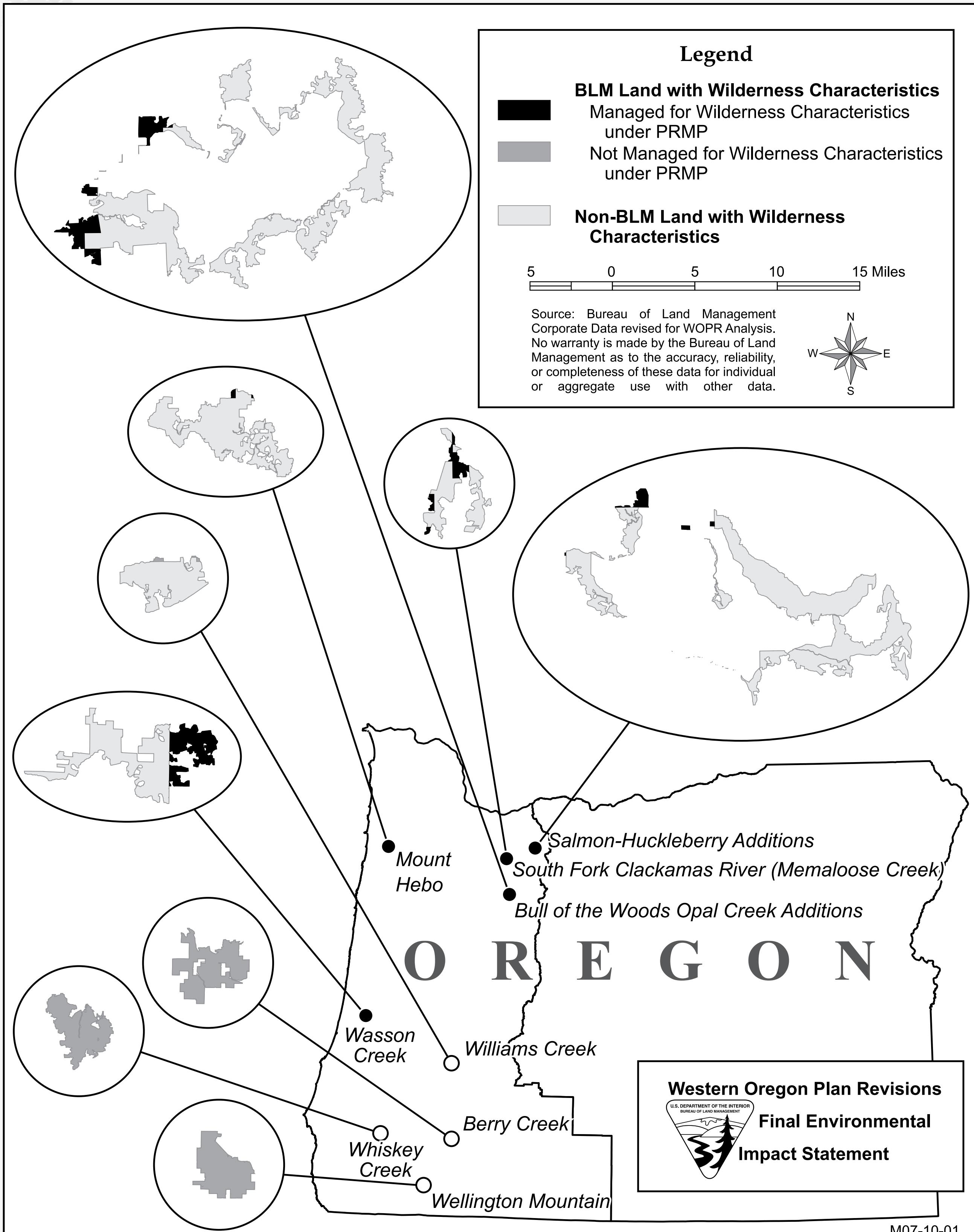
Management Direction

Wilderness characteristics would be maintained on the BLM-administered lands that are listed in *Table 2-17* (*Lands with wilderness characteristics maintained under special management)* and shown in *Figure 2-6 (Lands with wilderness characteristics)*, excluding the portions of those areas that occur on O&C lands that are suitable for permanent timber production.

Table 2-17. Lands With Wilderness Characteristics Maintained Under Special Management Under The PRMP

BLM-administered Lands	Total (acres)	Identified Wilderness Characteristics		
		Naturalness	Outstanding Opportunities for Solitude	Outstanding Opportunities for Primitive, Unconfined Recreation
Salem District				
Bull of the Woods/Opal Creek Additions	3,203	X	X	X
South Fork Clackamas River	919	X	X	
Salmon Huckleberry Additions	637	X	X	X
Mount Hebo	81	X	X	X
Eugene District				
No lands were identified with wilderness characteristics.				
Roseburg District				
Special management would not apply to lands with wilderness characteristics.				
Coos Bay District				
Wasson Creek	3,408	X	X	X
Medford District				
Special management would not apply to lands with wilderness characteristics.				
Klamath Falls Resource Area (of the Lakeview District)				
No lands were identified with wilderness characteristics.				
Total Acres – All Districts	**8,248**			

Figure 2-6. Lands With Wilderness Characteristics



Wild Horses

Management Objective

Maintain a healthy population of wild and free-roaming horses in the Pokegama Herd Management Area of the Klamath Falls Resource Area of the Lakeview District. See *Figure 2-7 (Location of Pokegama Herd Management Area)*.

Management Directions

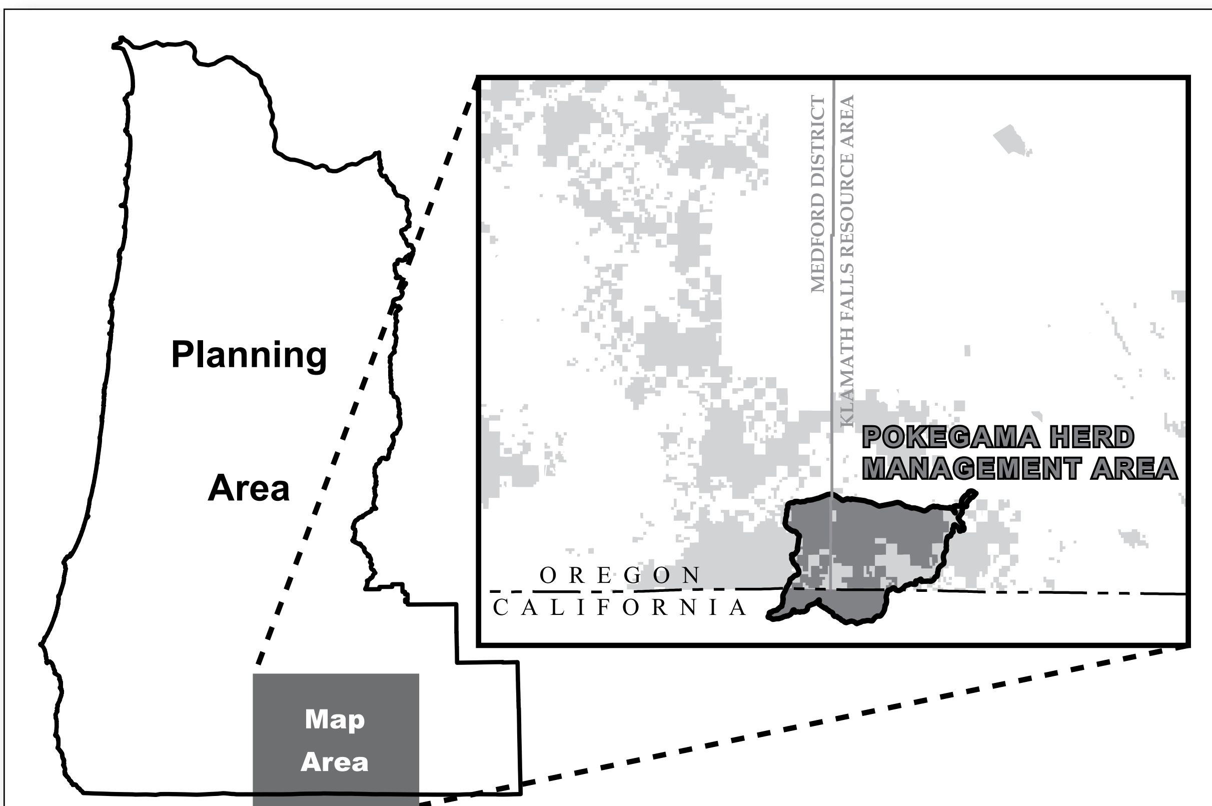
Wild horses would be gathered to maintain the appropriate management level of 30 to 50 head, as follows:

- During gathers, the number of horses would normally be reduced to the low end of the appropriate management level, and then allowed to increase to the top end of the appropriate management level before another gather occurred.
- Wild horses would be removed from private land at private landowner request.
- Any wild horses straying outside the herd management area would be removed or returned to the herd management area.

Wild horses from other herd areas would be periodically introduced to the Pokegama herd to maintain the viable genetic diversity of the herd.

Water developments would be maintained or established to provide season-long water for wild horses within the herd management area. See *Appendix M - Grazing* and *Figure 2-4 (Location of proposed range improvements in the Klamath Falls Resource Area)*.

Figure 2-7. Location Of Pokegama Herd Management Area



The appropriate herd management level would be adjusted when:

- Monitoring data identifies a change in long-term forage availability.
- Health assessments and evaluations determine that wild horse numbers, or patterns of grazing use, are a contributing factor toward not meeting one or more of the Oregon standards for rangeland health.

Wildlife

Management Objective

Provide for the conservation of BLM special status species.

Management Direction

Management of species that are listed under the Endangered Species Act would be consistent with recovery plans and designated critical habitat. Wildlife species with currently approved recovery plans include the marbled murrelet, northern spotted owl, and the Columbia River population of the Columbia white-tailed deer. See *Appendix H - Wildlife*. For the Columbia white-tailed deer, the record of decision for the North Bank Habitat Management Area would continue to be implemented. The final environmental impact statement and record of decision for the North Bank Habitat Management Area are incorporated by reference.

The BLM special status animal species would be managed to maintain or restore populations and habitat consistent with species conservation requirements. Protection measures include altering the type, timing, extent, and intensity of actions; and other strategies designed to maintain populations of species. Restorative measures would include establishing new populations or augmenting existing populations.

Conservation and cooperative plans, strategies, and agreements would be implemented for special status animal species. For the greater sage grouse, the Greater Sage Grouse Conservation Assessment and Strategy for Oregon would continue to be implemented and is incorporated by reference.

For the western snowy plover, the BLM's contribution to recovery would consist of the following actions:

- Activities that disrupt nesting would be restricted during nesting season where snowy plover have been found to be currently nesting.
- Public use of nesting areas would be managed during the nesting season to reduce activities that would substantially reduce nesting success.
- Predator controls would be employed when data demonstrates that loss of nests due to predators substantially reduces overall nesting success.
- Control measures would be implemented if invasive plant species are creating a loss of suitable nesting habitat.
- Measures would be implemented for supporting coastal dune processes to sustain suitable western snowy plover nesting habitat.

Activities that disrupt nesting would be restricted during nesting season where northern spotted owls have been found to be currently nesting.

Projects within the range of the marbled murrelet that could degrade or remove suitable marbled murrelet habitat would be surveyed, to approved protocol standards, prior to implementation. The Pacific Seabird Groups' *Method for surveying marbled murrelets in forests: a revised protocol for land management and research* (Mack et al. 2003) is the currently approved protocol. If surveys indicate that habitat is occupied, all contiguous suitable habitat and recruitment habitat (i.e., stands that are capable of becoming marbled murrelet habitat within 25 years) within a 0.5-mile radius would be protected.

Activities that disrupt nesting would be restricted during nesting season where marbled murrelets have been found to be currently nesting.

Bald eagle management areas would be established and managed to protect bald eagle nest sites and winter roosting areas, and to develop replacement habitat for nesting and roosting. Bald eagle management areas would be established at a minimum of 20 acres to protect newly detected nest trees and adjacent roost areas. Management activities would include prescribed burns and other treatments (such as commercial thinning and density management) to reduce fuel loading and to accelerate growth and improve tree vigor. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas*), located in the Table/Map section at the end of the PRMP description.

Management Objective

Assist the Oregon Department of Fish and Wildlife in meeting wildlife management goals on public domain lands and on O&C lands where the goals are consistent with the O&C Act.

Management Directions

Motor vehicle use would be restricted within designated deer and elk winter range between November 1 and April 15. Various techniques, such as gating or signing, would be used to impose the restrictions. Administrative use of all roads would occur, as needed, on a year-round basis. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas).*

Roads would be closed to motorized vehicles, except for administrative purposes, between November 1 and April 15 in the Klamath Winter Range, which includes the deer-season road closure areas of South Gerber, Willow Valley, Harpold Ridge, Bryant Mountain, North Bryant, Windy Ridge, and Lorella. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas).*

Roads would be closed to motorized vehicles, except for administrative purposes, between November 20 and March 31 within the Pokegama Cooperative Habitat Closure Area. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas)*

Visual barriers from 25 to 50 feet wide would be maintained, where appropriate, along roads within the designated deer and elk winter range. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas).*

Forage species would be planted along roadsides, skid trails, and on landings, or forage plots would be created when forage quality is determined to be a limiting factor in achieving the management goals of the Oregon Department of Fish and Wildlife.

Forage retention requirements for wildlife would be included when implementing silvicultural treatments or habitat management activities.

In Klamath Falls, encroaching western juniper that hinders attainment of desired forage conditions would be thinned, piled and burned, or removed to maintain and improve forage for big game. These treatments would protect old juniper.

In Klamath Falls, wildlife habitat would be maintained or enhanced on rangelands. Priority would be given to maintaining or enhancing habitat for special status and big game species.

Tables and Maps for District-Specific Recreation Management Directions and National Landscape Conservation System Lands; and Maps for Visual Resource Classes and Wildlife Habitat Management Areas

Table 2-18 through *Table 2-38* in this section correspond with district-specific directions, presented earlier in this chapter, for recreation areas and National Landscape Conservation System lands. The information in these tables is presented in the order of Salem, Eugene, Roseburg, Coos Bay, Medford (the five western Oregon BLM districts), and Klamath Falls (one of the resource areas of the Lakeview District). The numbers in the left column of some tables correspond to numbers on specified maps to show the locations of the areas.

The tables are organized in this section as follows:

- Recreation
  - — Special recreation management areas
  - — Extensive recreation management areas
  - — Recreation sites
  - — Recreation trails
  - — Potential recreation sites
  - — Potential recreation trails
  - — Backcountry byways
  - — Potential backcountry byways
  - — Environmental education areas
  - — Recreation and public purpose leases
  - — Off-highway vehicle area designations
  - — Areas closed to off-highway vehicle use
  - — Off-highway vehicle emphasis areas
  - — Potential off-highway vehicle emphasis areas
  - — Oregon State scenic waterways
- National Landscape Conservation System designated lands
  - — Wild and scenic rivers
  - — Wilderness areas
  - — Wilderness study areas and wilderness instant study areas
  - — Miscellaneous National Landscape Conservation System and congressionally designated lands

Map 2-7 through *Map 2-18* are placed after the tables, in the following order:

- Map 2-7 through Map 2-15: District-specific recreation areas
- Map 2-16: Lands designated as part of the National Landscape Conservation System
- Map 2-17: Visual resource management classes of the planning area under the PRMP
- Map 2-18: Bald eagle, deer, and elk habitat management areas

Recreation

Special Recreation Management Areas

Appendix K - Recreation contains the planning frameworks for all of the special recreation management areas that would be carried forward under the PRMP.

Table 2-18. District-Specific Special Recreation Management Areas

Location # on Map 2-7[a]	Special Recreation Management Area	No Action Alternative	Alternatives 1, 2 & 3	PRMP
			(acres)	
Salem District				
1	Alsea Falls	N/A[b]	13,270	13,270
2	Fishermen's Bend	177	178	178
3	Little North Santiam River	3,282	3,282	3,282
	Marys Peak (potential)	N/A	--[c]	--
	Mill Creek (potential)	N/A	--	--
4	Molalla River/Table Rock	11,875	11,875	11,875
	Mt. Hood Corridor	2,681	--	--
5	Nestucca River	1,074	1,074	1,074
	North Fork Siletz (potential)	N/A	--	--
	Sandy River	756	--	--
6	Sandy River/Mt. Hood Corridor	N/A	11,568	11,568
7	Yaquina Head	100	100	100
8	Yellowstone	38,257	38,261	38,261
	Totals – Salem	**58,202**	**79,608**	**79,608**
Eugene District				
	Gilkey Creek	N/A	--	--
9	Lower Lake Creek	1,873	1,873	1,873
10	McKenzie River	1,525	1,226	1,226
11	Row River Trail	15,115	171	171
12	Shotgun Creek	278	413	413
	Siuslaw River	N/A	--	--
13	Upper Lake Creek	12,675	12,676	12,676
	Totals – Eugene	**31,446**	**16,359**	**16,359**
Roseburg District				
14	Cow Creek	1,809	1,809	1,809
15	North Umpqua	1,903	8,512	8,512
16	Umpqua	2,240	457	457
	Totals – Roseburg	**5,952**	**10,778**	**10,778**
Coos Bay District				
17	Coos Bay Shorelands	1,754	1,754	1,754
18	Dean Creek Elk Viewing Area	1,136	1,136	1,136
	Gregory Point (potential)	N/A	--	--
19	Loon Lake	126	126	126

Table 2-18. (Continued)

Location # on Map 2-7[a]	Special Recreation Management Area	No Action Alternative	Alternatives 1, 2 & 3	PRMP
		(acres)		
20	New River	1,133	1,133	1,133
21	Sixes River	208	208	208
22	Tioga	N/A	34,013	34,013
	Totals – Coos Bay	**4,357**	**38,370**	**38,370**
Medford District				
23	Anderson Butte	N/A	N/A	11,482
24	Coyote Creek	N/A	N/A	14,585
25	Elderberry Flat	N/A	N/A	3,393
26	Elliott Creek	N/A	N/A	3,931
	Galesville Lake (potential)	N/A	--	--
27	Hyatt Lake/Howard Prairie Lake	17,765	17,765	17,765
28	John's Peak	N/A	N/A	13,919
	Lost Creek Lake (potential)	N/A	--	--
29	Pacific Crest National Scenic Trail	7,088	7,088	7,088
30	Quartz Creek	N/A	N/A	8,727
31	Rogue National Wild and Scenic River	11,510	11,510	11,510
32	Spencer Creek	N/A	N/A	11,912
	Totals[d] - Medford	**36,363**	**36,363**	**104,312**
Klamath Falls Resource Area (of the Lakeview District)				
33	Gerber	N/A	104,421	104,421
34	Hamaker Mountain	1,286	1,286	1,286
35	Pacific Crest National Scenic Trail	500	500	500
36	Stukel Mountain	11,853	11,853	11,853
37	Upper Klamath River	5,766	6,144	6,144
38	Wood River Wetland	N/A	3,122	3,220
	Totals – Klamath Falls	**19,405**	**127,326**	**127,424**
	Total Acres – All Districts	**155,745**	**308,804**	**376,851**

[a]Only those areas carried forward in the action alternatives are identified on Map 2-7.

[b]N/A denotes that acres or miles for a designated or potential site, trail, area, or byway were not identified under the No Action Alternative and/or the action alternatives.

[c]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative, or would not be carried forward under the action alternatives.

[d]Ace totals for the Medford District include the Cascade-Siskiyou National Monument, which is located within the planning area. This national monument is managed under a separate resource management plan.

Extensive Recreation Management Areas

Table 2-19. District-Specific Extensive Recreation Management Areas

Extensive Recreation Management Areas[a]	No Action Alternative	Alternatives 1,2 & 3	PRMP
		(acres)	
Salem District			
Cascades	113,640	105,509	105,509
Marys Peak	115,543	115,126	115,126
Tillamook	102,987	102,988	102,988
Totals – Salem	**332,170**	**323,623**	**323,623**
Eugene District			
Siuslaw	147,969	147,969	147,969
Upper Willamette	137,305	150,888	150,888
Totals - Eugene	**285,274**	**298,857**	**298,857**
Roseburg District			
South River	201,120	201,119	201,119
Swiftwater	221,027	214,419	214,419
Totals - Roseburg	**422,147**	**415,538**	**415,538**
Coos Bay District			
Myrtlewood	122,103	110,763	110,763
Umpqua	195,764	173,089	173,089
Totals – Coos Bay	**317,867**	**283,852**	**283,852**
Medford District			
Ashland	213,977	213,977	188,576
Butte Falls	203,761	203,761	200,368
Glendale	186,499	186,499	171,914
Grants Pass	227,627	227,627	203,057
Totals - Medford[b]	831,864	831,864	763,915
Klamath Falls Resource Area (of the Lakeview District)			
Klamath Falls	208,138	97,571	97,571
Totals – Klamath Falls	**208,138**	**97,571**	**97,571**
Total Acres - All Districts	**2,397,460**	**2,251,305**	**2,183,356**

[a]See Map 2-7 for locations of extensive recreation management areas.

[b]Acre totals for the Medford District include the Cascade-Siskiyou National Monument, which is within the planning area. This national monument is managed under a separate resource management plan.

Recreation Sites

Table 2-20. District-Specific Recreation Sites

Location # On Map 2-11[a]	Recreation Site	No Action Alternative	Alternatives 1, 2, 3 and PRMP
		(acres)	
Salem District			
1	Alder Glen Campground and Day-Use Area	5	5
2	Alsea Falls Campground and Day-Use Area	25	25
3	Canyon Creek Day-Use Area	4	4
4	Dogwood Day-Use Area	11	11
5	Dovre Campground and Day-Use Area	5	5
6	Elk Bend Campground and Day-Use Area	4	4
7	Elk Flat OHV Staging Area	1	1
8	Elkhorn Valley Campground and Day-Use Area	78	78
9	Fan Creek Campground and Day-Use Area	4	4
10	Fishermen's Bend Campground and Day-Use Area	177	177
11	Grassy Flat OHV Staging Area	1	1
12	Hardy Creek Trail Head	3	3
13	Mill Creek Day-Use Area	5	5
14	Missouri Bend Day-Use Area	2	2
15	Old Miner's Meadow Group Use Area	2	2
16	Sheridan Peak Day-Use Area	3	3
17	Whipup OHV Staging Area	1	1
18	Wildwood Day-Use Area	556	556
19	Yaquina Head Day-Use Area	90	90
20	Yellowbottom Campground and Day-Use Area	13	13
	Totals – Salem	**990**	**990**
Eugene District			
21	Clay Creek Campground and Day-Use Area	48	48
22	Culp Creek Trailhead	1	1
23	Lake Creek Falls Day-Use Area	2	2
24	Marten Rapids Day-Use Area	2	2
25	McGowan Creek Environmental Education Area	79	79
26	Mosby Creek Trailhead	6	6
27	Rennie Landing	1	1
28	Sharps Creek Campground and Day-Use Area	27	27
29	Shotgun Creek Day-Use Area	278	278
30	Silver Creek Landing Day-Use Area	2	2
31	Taylor Landing Day-Use Area	4	4
32	Whitewater Day-Use Area	10	10
33	Whittaker Creek Campground and Day-Use Area	16	16
	Totals – Eugene	**476**	**476**

Table 2-20. (Continued)

Location # On Map 2-11[a]	Recreation Site	No Action Alternative	Alternatives 1, 2, 3 and PRMP
		(acres)	
Roseburg District			
34	Cavitt Creek Falls	16	16
35	China Ditch	5	5
36	Cow Creek Backcountry Byway Kiosk	1	1
37	Cow Creek Recreational Gold Panning Area	19	19
38	Eagleview Group Campground	11	11
	E-Mile Recreation Site	15	--[b]
39	Hill Creek Wayside	1	1
40	Island Creek Day-Use Area	40	40
41	Lone Pine Group Campground	23	23
42	Lone Rock Drift Boat Launch	1	1
43	Millpond	33	33
44	Miner-Wolf Watchable Wildlife Site	5	5
45	North Bank Ranch, Jackson Creek Day-Use Area	2	2
46	North Bank Ranch, West Entrance	1	1
47	Osprey Boat Ramp	4	4
48	Rock Creek	21	21
49	Scaredman	13	13
50	Susan Creek Campground	27	27
51	Susan Creek Day-Use Area	19	19
52	Susan Creek Falls Trailhead	3	3
53	Swiftwater Day-Use Area	5	5
54	Swiftwater Trailhead	8	8
55	Tyee	13	13
56	Wolf Creek Falls Trailhead	3	3
	Totals – Roseburg	**289**	**274**
Coos Bay District			
57	Bear Creek Campground	80	80
	Big Tree Recreation Site	18	--
58	Burnt Mountain Campground	38	38
59	Cape Blanco Lighthouse (under permit from the U.S .Coast Guard)	35	35
60	Dean Creek Elk Viewing Area	1,136	1,136
61	East Shore Campground	52	52
62	Edson Creek Campground	46	46
63	Fawn Creek Campground	5	5
64	Loon Lake Campground	76	76
65	North Spit Boat Ramp	24	24
	Palmer Butte	40	--
66	Park Creek Campground	58	58

Table 2-20. (Continued)

Location # On Map 2-11[a]	Recreation Site	No Action Alternative	Alternatives 1, 2, 3 and PRMP
		(acres)	
67	Sixes River Campground	162	162
68	Smith River Falls Campground	47	47
69	Storm Ranch Day-Use Area	240	240
70	Vincent Creek Campground	4	4
	Totals – Coos Bay	**2,061**	**2,003**
Medford District[c]			
71	Argo River Access	16	16
72	Burma Pond Campground	15	41
73	Carpenter’s Island Day-Use Area	1	1
74	Chair Riffle Day-Use Area	16	16
75	Eight Dollar Mountain Botanical Wayside	20	43
76	Elderberry Flat Campground and Day-Use Area	80	75
77	Gold Nugget	53	49
78	Grave Creek Boat Ramp	4	4
79	Griffin Bar River Access	51	51
80	Hellgate Sites (Day Use and Viewpoints)	9	9
81	Hog Creek Boat Ramp	6	6
82	Hyatt Lake Campground and Day-Use Area (partially within the Cascade Siskiyou National Monument)	745	745
83	Kenney Meadows	40	34
84	Little Hyatt Lake Day-Use Area	2	2
85	Mt. Bolivar Trailhead (managed by the USFS)	2	2
86	Rainbow Day-Use Area	8	8
87	Rand Day-Use Area and Visitor Center	25	25
88	Robert Dean	14	14
89	Rocky Bar	46	46
90	Rogue River Ranch	33	33
91	Rough and Ready Wayside	22	22
92	Skull Creek Campground and Day-Use Area	5	19
93	Table Mountain Winter Play Area	10	11
94	Tucker Flat Campground and Day-Use Area	20	8
95	Whiskey Creek Cabin	5	5
96	Whitehorse River Access	76	76
97	Williams Creek Wayside	1	1
98	Woodrat Mountain Day-Use Area	20	27
	Totals – Medford[c]	**1,345**	**1,389**
Klamath Falls Resource Area (of the Lakeview District)			
99	Antelope Reservoir Day-Use Area	2	2
100	Barnes Valley Boat Ramp	6	6
101	Basin Camp	11	11

Table 2-20. (Continued)

Location # On Map 2-11[a]	Recreation Site	No Action Alternative	Alternatives 1, 2, 3 and PRMP
		(acres)	
102	Frain Ranch Campsites	310	310
103	Gerber Potholes Campsite	112	112
104	Gerber Recreation Site	496	496
105	Kilgore Reservoir Day-Use Area	2	2
106	Klamath River Campground	33	33
107	Lower Klamath Hills Day-Use Area	2	2
108	Miller Creek Campsite	9	9
109	Miller Creek Day-Use Area	2	2
110	Pitchlog Creek Campsite	10	10
111	Rock Creek Campsite	1	1
112	Round Valley Day-Use Area	2	2
113	Spring Island Boat Launch Site	6	6
114	Stan H. Spring Campsite	19	19
115	Stateline Boat Takeout	13	13
116	Surveyor Recreation Site	9	9
117	Topsy Campground	14	14
118	Twenty-One Reservoir Day-Use Area	2	2
119	Upper Midway Campsite	12	12
120	Wildhorse Campsite	7	7
121	Willow Valley Reservoir Boat Ramp	27	27
122	Wood River Wetland Day-Use Area	3,200	3,200
	Totals – Klamath Falls	**4,307**	**4,307**
	Total Acres – All Districts	**9, 468**	**9,439**

[a] Only those sites carried forward in the action alternatives are identified on Map 2-11.

[b]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative or would not be carried forward under the action alternatives.

[c]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Recreation Trails

Table 2-21. District-Specific Recreation Trails

Location # on Map 2-12	Recreation Trails	No Action Alternative (miles)	Alternatives 1, 2, 3 and PRMP (miles)
Salem District			
1	Alsea Falls Trails System	4.0	4.0
2	Baty Butte/Silver King Trail	3.4	3.4
3	Boulder Ridge Trail	0.2	0.2
4	Eagle Creek Trail	0.5	0.5
5	McIntyre Ridge Trail	0.7	0.7
6	Molalla River Trails System	24.6	24.6
7	Nasty Rock Trail	0.9	0.9
8	Table Rock Wilderness Trails	20.4	20.4
9	Upper Nestucca OHV Trail System	25.0	25.0
10	Valley-of-the-Giants Trail	0.8	0.8
	Totals – Salem	**80.5**	**80.5**
Eugene District			
11	Clay Creek Trail	1.3	1.3
12	Eagles' Rest Trail	0.7	0.7
13	Row River Trail	13.5	13.5
14	Shotgun Creek Recreation Site Trail	6.2	6.2
15	Shotgun (OHV) Trails System	23.7	23.7
16	Tyrrell Forest Succession Trail	1.0	1.0
17	Whittaker Creek Old Growth National Recreation Trail	2.5	2.5
	Totals – Eugene	**48.9**	**48.9**
Roseburg District			
18	China Ditch Trail	0.4	0.4
19	Miner-Wolf Creek Watchable Wildlife Trail	0.2	0.2
20	North Umpqua Trail	12.3	12.3
21	Sawmill Trail	1.2	1.2
22	Susan Creek Complex Trails	0.8	0.8
23	Susan Creek Day-Use Trail	0.8	0.8
24	Susan Creek Falls Trail	0.8	0.8
25	Susan Creek Indian Mounds Trail	0.3	0.3
26	Wolf Creek Falls Trail	1.2	1.2
	Totals – Roseburg	**18.0**	**18.0**
Coos Bay District			
27	Blue Ridge	10	10
28	Doerner Fir	0.5	0.5
29	Euphoria Ridge	4	4
30	Floras Lake	1	1
31	Fourmile Creek	0.3	0.3
32	Loon Lake Waterfall	0.5	0.5
33	Lost Lake	1	1

Table 2-21. (Continued)

Location # on Map 2-12	Recreation Trails	No Action Alternative (miles)	Alternatives 1, 2, 3 and PRMP (miles)
34	New River/Storm Ranch	2	2
35	New River Water Trail	5	5
36	North Fork Hunter Creek	2	2
37	North Spit	9	9
	Totals – Coos Bay	**35.3**	**35.3**
Medford District			
38	Armstrong Gulch	1	1
39	Buck Prairie Cross Country Ski/Snowmobile Trails	17	17
40	Burma Pond Trail	0.25	0.25
41	Cathedral Hill Trails	12	12
42	Grayback Mountain	6.5	6.5
43	Grizzly Peak	5	5
44	Hidden Creek	1	1
45	Jacksonville Historic Landmark	5	5
46	Kerby Peak	4	4
47	King Mountain Trail	1	1
48	Lake Selmac Trails	3	3
49	Layton Ditch Trail	13	13
50	Listening Tree	1	1
51	London Peak Accessible	1	1
52	Lower London Peak Trail	2	2
53	Lower Table Rock	2	2
54	Mule Creek	0.25	0.25
55	Pacific Crest National Scenic Trail	40	40
56	Pederson Snowmobile Trail	4	4
57	Rainie Falls Trail	2	2
58	Rogue River National Recreation Trail	23	23
59	Sterling Mine Ditch	10	10
60	Tunnel Ridge	1	1
61	Upper Table Rock	2	2
62	Wolf Gap	4	4
	Totals[a] - Medford	**161**	**161**
Klamath Falls Resource Area (of the Lakeview District)			
63	Gerber-Miller Creek-Potholes Trail	13	13
64	Keno Spencer Snowmobile Trail	6	6
65	Pacific Crest National Scenic Trail	1	1
66	Pederson Snowmobile Trail	7	7
67	Rock Slide Loop Snowmobile Trail	5	5
68	Surveyor Peak Snowmobile Trail	3	3
69	Wood River Wetland Trail	1	1
	Totals – Klamath Falls	**36**	**36**
	Total Miles – All Districts	**379.7**	**379.7**

[a]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Potential Recreation Sites

Table 2-22. District-Specific Potential Recreation Sites

Location # on Map 2-13[a]	Potential Recreation Sites	No Action Alternative (acres)	Alternatives 1, 2, 3 and PRMP (acres)
Salem District			
1	Alder Glen Expansion	--[b]	1
2	Alsea Falls Expansion	--	96
3	Barlow	--	115
	Bear Creek	N/A[c]	--
	Dick's Ridge	N/A	--
4	Marmot	--	155
5	Molalla River	--	86
	Parker Creek	N/A	--
	Quartzville Creek	N/A	--
	Valley of the Giants Trailhead	N/A	--
	Totals – Salem	**N/A**	**453**
Eugene District			
6	Cottage Grove Old Growth Environmental Education Area	80	76
7	Deer Creek	--	12
	Doe Creek	N/A	--
	Edwards Creek	N/A	--
	Esmond Lake	N/A	--
	Fall Creek	N/A	--
	Fall Creek Reservoir	N/A	--
	Frying Pan	N/A	--
	Haight Creek	N/A	--
	Homestead	N/A	--
8	Hult Pond Campground	N/A	11
9	Hult Pond Day-Use Area	N/A	2
10	Hult Pond Equestrian Trailhead	N/A	1
	North Fork Gate Creek	N/A	--
11	Old Rennie Homestead	--	10
	Overland Trailhead	N/A	--
	Oxbow	N/A	--
	Red Bridge Trailhead	N/A	--
	Saleratus	N/A	--
	Sidog	N/A	--
	Siuslaw Bend	N/A	--
	Wolf Creek Falls	N/A	--
	Totals – Eugene	**N/A**	**112**
Roseburg District			
	Brickyard Pond	N/A	--

Table 2-22. (Continued)

Location # on Map 2-13[a]	Potential Recreation Sites	No Action Alternative (acres)	Alternatives 1, 2, 3 and PRMP (acres)
	Chimney Rock Pond	N/A	--
12	Chimney Rock Viewpoint Wayside	--	2
13	Doc's Landing Day-Use Area and Boat Ramp	--	11
	Hardscrabble	N/A	--
14	Hubbard Creek OHV Staging Area	--	10
15	Iron Mountain Gold Panning Site	--	40
	Lavadoure Boat Ramp	N/A	--
	Michigan Springs	N/A	--
16	North Umpqua Trail Primitive Campsite	--	4
	Olalla-Thompson Creek	N/A	--
17	Pickett Bridge	--	10
	Red Top Pond	N/A	--
	South River OHV Trailhead[d]	--	5
18	Susan Creek Group Campground	--	10
	Swiftwater OHV Trailhead[d]	--	5
19	Tioga Bridge / Wayside / Trailhead	--	25
20	Upper Susan Creek Falls Trailhead	--	2
	Weaver Road Pond	N/A	--
	Totals – Roseburg	**N/A**	**124**
Coos Bay District			
21	Big Bend	N/A	200
	East Fairview Boat Ramp	N/A	--
22	Fawn Creek Boat Ramp	N/A	11
23	McKinley Camp	N/A	10
	Smith River Falls Boat Ramp	N/A	--
24	Smith River Log Dump	N/A	5
	South Sisters Rock	N/A	--
25	Spruce Reach Island Day-Use Area	--	15
26	Tioga Basin	N/A	30
	Umpqua Lighthouse	N/A	--
	Vincent Creek Boat Ramp	N/A	--
27	Wells Creek Guard Station	N/A	1
	Totals – Coos Bay	**N/A**	**272**
Medford District			
	Galesville Reservoir	40	--
28	Little Applegate Day-Use Area	20	20
29	North Fork Big Butte Creek	20	19
30	Nugget Falls	5	5
31	Sensenig Falls	40	44

Table 2-22. (Continued)

Location # on Map 2-13[a]	Potential Recreation Sites	No Action Alternative	Alternatives 1, 2, 3 and PRMP
		(acres)	
32	Skookum Creek Wayside	5	10
33	Zane Gray's Cabin	NA	21
	Totals[e] - Medford	**130**	**119**
Klamath Falls Resource Area (of the Lakeview District)			
34	Alkali Springs Day-Use Area	--	2
35	Bryant Mountain Horse Camp	2	2
36	Captain Jack Lake Camp	3	2
37	Clover Creek Day-Use Area	30	2
38	Dog Hollow Reservoir Day-Use Area	2	2
	Greensprings Highway Day-Use Area	20	--
39	Hamaker Mountain Snow Park Day-Use Area	30	2
40	Harpold Reservoir Camp	2	2
41	Hogback Mountain Day-Use Area	10	1
42	Horton Rim Trailhead	--	2
43	Klamath River Bypass Reach Fishing Access # 5 and # 6 Day-Use Area	--	4
44	Klamath River Powerhouse Shed Fishing Site Day-Use Area	--	2
45	Malone Dam Day-Use Area	--	2
46	Old Foundations Area Day-Use Area	5	4
47	Smith Reservoir Camp	3	2
48	South Gerber Boat Ramp Day-Use Area	--	1
49	Spencer Creek Day-Use Area	20	1
50	Stukel Mountain Aspen Grove Camp	10	2
51	Stukel Mountain Glider Launch Day-Use Area	5	2
52	Stukel Mountain Target Practice Day-Use Area	20	2
53	Swan Lake Rim Trail Access	5	2
54	Van Meter Reservoir Camp	10	2
	Totals – Klamath Falls	**177**	**43**
	Total Acres – All Districts	**N/A**	**1,123**

[a]Only the recreation sites carried forward in the action alternatives are identified on Map 2-13.

[b]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative or would not be carried forward under the action alternatives.

[c]N/A denotes that acres or miles for a designated or potential site, trail, area, or byway were not identified under the No Action Alternative.

[d]Exact site yet to be determined; no mapped location.

[e]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Potential Recreation Trails

Table 2-23. District-Specific Potential Recreation Trails

Location # on Map 2-14[a]	Potential Recreation Trails	No Action Alternative	Alternatives 1, 2, 3, and PRMP
		(miles)	
Salem District			
1	Baty Butte/Silver King Trail Expansion	--[b]	8.2
2	Corvallis-to-Sea Trail	--	1.6
3	Crabtree Mountain	--	12.8
4	CZ Mainline Linear Trail	--	1.0
5	Dovre Trail	--	0.1
	Elkhorn Creek Trails	N/A[c]	--
6	Equestrian Trail	--	5.3
	Harry Mountain Trail	N/A	--
7	Jane Creek Trail	--	2.8
	Marys Peak Trail	N/A	--
8	Marmot Trails		8
9	Molalla Trails Expansion	--	17.5
10	Nestucca River Trail	--	7.8
	North Fork Alsea River Trail	N/A	--
11	Robb Mill Trail	--	3.1
12	Sandy River Trails		25
13	Table Rock Wilderness Trails		3.0
14	Wilhoit Springs Trails	--	2.6
	Totals – Salem	**N/A**	**98.8**
Eugene District			
15	Blue Mountain Trail	--	0.8
16	Hult Pond Equestrian Trails	N/A	7.2
17	Shotgun OHV Additions	N/A	10
	Siuslaw River Trail	N/A	--
18	South Bank McKenzie	N/A	5.1
19	Whittaker Creek Falls	N/A	1.5
	Totals – Eugene	**N/A**	**24.6**
Roseburg District			
	Alexander Butte Trail	N/A	--
	Ben Irving Reservoir Trail	N/A	--
	Bushnell-Irwin Rocks Trail	N/A	--
	Cougar Creek Trail	N/A	--
	Cow Creek Bluffs Trail	N/A	--
	Deadman Mountain Trail	N/A	--
20	Eagleview to Tyee Trail	--	1
21	Millpond to Rock Creek Trail	--	2
22	North Bank Ranch Trail	N/A	4
	Red Top Pond Trail	N/A	--
	Salt Creek Trail	N/A	--
23	Susan Creek to Tioga Bridge Trail	N/A	1

Table 2-23. (Continued)

Location # on Map 2-14[a]	Potential Recreation Trails	No Action Alternative (miles)	Alternatives 1, 2, 3, and PRMP (miles)
	Tyee Mountain Trail	N/A	--
24	Upper Susan Creek Falls Trail	--	1
	Wolf Creek Falls Tr. Extension	N/A	--
	Totals – Roseburg	**N/A**	**9**
Coos Bay District			
25	Bear Creek Extension	--	3
26	Brummit Creek Trail System	--	10
27	Coos Head Trail System	--	3
28	Doerner Fir Extension	--	1
29	Hunter Creek Bog	N/A	1
30	McKinley Camp Trail	N/A	1
31	Rocky Peak Trail	--	6
32	Roman Nose/Kentucky Creek	N/A	6
33	Upper Rock Creek	N/A	2
34	Wassen Creek	N/A	5
	Totals – Coos Bay	**N/A**	**38**
Medford District			
35	Beacon Hill Trail	N/A	3
36	Buck Rock-Berry Rock Loop	10	10
37	East Fork Illinois Mining Ditch System	N/A	9
38	Horse Creek Ridge Trail	N/A	1.5
39	Eight Dollar Mountain River Access Trail	N/A	1
40	Green Top Loop	10	10
41	Illinois Valley Horse Trails	N/A	8
42	Medco Railroad (Eagle Point-Butte Falls)	50	50
43	Robert Dean Trail	N/A	12
44	Round Top Mountain	N/A	5
	Totals – Medford	**70**	**109.5**
Klamath Falls Resource Area (of the Lakeview District)			
45	Applegate National Historic Trail	2	0.7
	Barnes Valley Creek	3	--
46	Bryant Mountain	16	10.4
47	Chase Mountain	13	6.1
	Clover Creek	0.5	--
48	Gerber-OC&E Trail	--	1.7
	Gerber Point	2.5	--
49	Gerber Potholes	4.5	5.4
50	Gerber Reservoir Loop Trail	--	18.2
51	Hamaker Mountain	5	5.1
52	Hogback Mountain Loop Trail	--	8.0
53	Horton Rim Trail	--	16.5
54	J.C. Boyle Reservoir-Keno Trail	--	0.2
	Klamath River Edge Trail	2.5	--

Table 2-23. (Continued)

Location # on Map 2-14[a]	Potential Recreation Trails	No Action Alternative	Alternatives 1, 2, 3, and PRMP
		(miles)	
55	Lower Klamath Hills Trail	--	5.0
56	Old Baldy Trail	3.5	2.3
57	Spencer Creek	2	3.4
58	Stukel Mountain	--	6.1
59	Stukel Mountain OHV Trail	9	12.9
60	Surveyor Mountain/Johnson Creek	3	1.4
61	Swan Lake Rim	14	18.2
62	Upper Klamath River Trail (north side)	8.5	1.0
63	Upper Klamath River Trail (south side)	10	14.8
	Totals – Klamath Falls	**99**	**137.4**
	Total Miles – All Districts	**N/A**	**417.3**

[a]Only those trails carried forward in the action alternatives are identified on Map 2-14.

[b]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative, or would not be carried forward under the action alternatives.

[c]N/A denotes that acres or miles for a designated site, trail, area or byway were not identified under the No Action Alternative.

Backcountry Byways

Table 2-24. District-Specific Backcountry Byways

Location # On Map 2-10	Backcountry Byways	No Action Alternative	Alternatives 1, 2, 3, and PRMP
		(miles)	
Salem District			
1	Nestucca River	29	29
2	Quartzville	12.5	12.5
3	South Fork Alsea River	11	11
	Totals – Salem	**52.5**	**52.5**
Eugene District			
	No backcountry byways.		
Roseburg District			
4	Cow Creek	20	20
5	North Umpqua National Scenic Byway	8.4	8.4
	Totals – Roseburg	**28.4**	**28.4**
Coos Bay District			
	No backcountry byways.		
Medford District			
6	Cow Creek	10	10
7	Galice-Hellgate	39	39
8	Grave Creek-Marial	38	38
	Totals – Medford	**87**	**87**
Klamath Falls Resource Area (of the Lakeview District)			
	No backcountry byways.		
	Total Miles – All Districts	**167.9**	**167.9**

Potential Backcountry Byways

Table 2-25. District-Specific Potential Backcountry Byways

Location # on Map 2-10[a]	Potential Backcountry Byways	No Action Alternative	Alternatives 1, 2, 3, and PRMP
		(miles)	
Salem District			
	No potential backcountry byways		
Eugene District			
	Alsea	N/A[b]	--[c]
	Blue Mountain	N/A	--
9	Calapooya Divide	28.0	28.0
10	Coburg Hills	43.4	43.4
11	Lost Creek	19.7	19.7
12	Mill Pond	10.7	10.7
	Oxbow	N/A	--
13	Siuslaw River	25.3	25.3
	Whittaker Creek Area	N/A	--
	Totals – Eugene	**127.1**	**127.1**
Roseburg District			
	Coos Bay Wagon Road	N/A	--
	Loon Lake	N/A	--
	Smith River	N/A	--
	Totals – Roseburg	N/A	0
	Coos Bay District		
	Coos Bay Wagon Road	N/A	--
	Mill Creek/Loon Lake/Tyee	N/A	--
	Myrtlepoint to Sitkum Road	N/A	--
	Smith River Road	N/A	--
	South Sisters-Oxbow Access Road	N/A	--
	Totals – Coos Bay	**N/A**	**0**
Medford District			
14	Cow Creek-West Fork Evans Creek Road	40	40
15	Hyatt Lake-Howard Prairie Lake	10	10
16	McKee Bridge-Anderson Butte	16	16
17	Shale City	10	10
18	West Fork Cow Creek-Eden Valley	23	23
	Totals – Medford[d]	99	99
Klamath Falls Resource Area (of the Lakeview District)			
19	Gerber Area Watchable Wildlife Tour/Modoc Trail	30	28.8
20	Topsy Road	15	5.9
	Totals – Klamath Falls	**45**	**34.7**
	Total Miles – All Districts	**271.1**	**260.8**

[a]Only the byways carried forward to the action alternatives are identified on Map 2-10.

[b]N/A denotes that acres or miles for a designated or potential site, trail, area, or byway were not identified under the No Action Alternative.

[c]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative or would not be carried forward under the action alternatives.

[d]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Environmental Education Areas

Table 2-26. District-Specific Environmental Education Areas

Environmental Education Areas	No Action Alternative	Alternatives 1, 2, 3, and PRMP
	(acres)	
Salem District		
Aquila Vista	178	178
Larch Mountain	183	183
Totals – Salem	**361**	**361**
Eugene District		
Cottage Grove Old Growth	80	76
McGowan Creek	79	79
Totals – Eugene	**159**	**155**
Roseburg District		
North Bank Habitat Management Area	0	50
Totals – Roseburg	**0**	**50**
Coos Bay District		
Dean Creek Elk Viewing Area	--[a]	1,136
New River ACEC	--	1,356
Powers	70	70
Totals – Coos Bay	**70**	**2,562**
Medford District		
Eight Dollar Mountain	20	20
Upper and Lower Table Rocks	80	80
Totals – Medford	**100**	**100**
Klamath Falls Resource Area (of the Lakeview District)		
Clover Creek	6	6
Surveyor Forest	192	192
Totals – Klamath Falls	**198**	**198**
Total Acres – All Districts	**888**	**3,426**

[a]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative, or would not be carried forward under the action alternatives.

Recreation and Public Purpose Leases

Table 2-27. District-Specific Recreation And Public Purpose Leases

R&PP Leases (and Lessee)	No Action Alternative	Alternatives 1, 2, 3, and PRMP
	(acres)	
Salem District		
JJ Collins Memorial Park (Columbia County)	2	2
Little North Fork (Marion County)	11	11
Oxbow (Multnomah County)	279	279
Scaponia (Columbia County)	5	5
Silver Falls State Park (State of Oregon)	230	230
Wells Island (Polk County)	73	73
Totals – Salem	**600**	**600**
Eugene District		
McKercher Park (Linn County)	2	2
Willamette River Greenway (Oregon State Parks)	3	3
Totals – Eugene	**5**	**5**
Roseburg District		
E-Mile County Park (Douglas County)	N/A[a]	15
Richard Baker County Park (Douglas County)	7.5	7.5
Totals – Roseburg	**7.5**	**22.5**
Coos Bay District[b]		
Frona Park (Coos County)	80	80
Judge Hamilton Park (Coos County)	88	88
Laverne County Park (Coos County)	120	120
Middle Creek Park (Coos County)	78	78
Rock Prairie Park (Coos County)	160	160
Totals – Coos Bay	**526**	**526**
Medford District		
Cantrall-Buckley Park (Jackson County)	12.1	12.1
Cathedral Hills (Josephine County)[c]	400	--
Gold Ray Dam (Jackson County)	4.2	4.2
Illinois River Park (Oregon Department of Transportation)	80	80
Lake Selmac (Josephine County)	48	48
Pinehurst School (Jackson County School District 94)	11.2	11.2
Totals – Medford	**555.5**	**155.5**
Klamath Falls Resource Area (of the Lakeview District)		
No R&PP leases.		
Total Acres – All Districts	**1,694**	**1,309**

[a]N/A denotes that acres or miles for a designated or potential site, trail, area, or byway were not identified under the No Action Alternative.

[b]Recreational leases with Coos County were established prior to the R&PP Act as congressional withdrawals to Coos County for recreational purposes and are termed congressionally designated recreation withdrawals.

[c]At the county's request, the Cathedral Hills R&PP lease with Josephine County will not be renewed in 2008.

Off-Highway Vehicle Area Designations

Table 2-28. District-Specific Off-Highway Vehicle Area Designations

Off-Highway Vehicle Area Designations	No Action	Alternative 1	Alternative 2	Alternative 3	PRMP
			(acres)		
Salem District					
Open	160,614	0	0	0	0
Limited to existing roads and trails	48,771	0	0	0	0
Limited to existing roads and designated trails	87,144	0	0	0	0
Limited to designated roads and trails	16,192	274,907	274,777	276,909	274,600
Limited to designated roads	69,508	85,165	85,165	85,165	85,165
Closed	17,439	39,372	39,469	37,314	39,646
Eugene District					
Open	0	77	77	77	0
Limited to existing roads and trails	320,883	0	0	0	0
Limited to designated roads and trails	0	321,207	321,151	321,166	321,138
Closed	3,281	3,017	2,905	2,885	3,277
Roseburg District					
Open	0	0	0	0	0
Limited to existing roads and trails	416,560	0	0	0	0
Limited to designated roads and trails	6,731	423,986	423,986	423,986	423,986
Closed	3,964	3,317	3,317	3,317	3,317
Coos Bay District					
Open	0	0	0	0	0
Limited to designated roads and trails	318,676	318,676	318,676	318,718	318,437
Closed	3,605	3,605	3,605	3,557	3,844
Medford District					
Open	139,878	0	0	0	0
Limited to existing roads and trails	26,514	0	0	0	0
Limited to designated roads and trails[a]	661,357	829,664	826,476	829,664	825,843
Closed[a]	59,150	57,320	60,512	57,305	60,508
Klamath Falls Resource Area					
Open	29,902	0	0	0	0
Limited to existing roads and trails	137,154	0	0	0	0

Table 2-28. (Continued)

Off-Highway Vehicle Area Designations	No Action	Alternative 1	Alternative 2	Alternative 3	PRMP
	(acres)				
Limited to designated roads and trails	47,222	213,747	214,010	214,010	214,010
Closed	10,703	10,971	10,971	10,971	10,971
All Western Oregon BLM Lands					
Open	330,394	77	77	77	0
Limited to existing roads and trails	949,882	0	0	0	0
Limited to existing roads and designated trails	87,144	0	0	0	0
Limited to designated roads and trails	1,050,160	2,382,187	2,379,076	2,384,453	2,378,014
Limited to designated roads	69,508	85,165	85,165	85,165	85,165
Closed	97,388	116,823	120,197	114,820	121,336

[a]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Areas Closed to Off-Highway Vehicle Use

Table 2-29. Areas Closed To Off-Highway Vehicle Use, By Alternative

Closed (areas closed to off-highway vehicle use)[a]	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
	(acres)				
Salem District					
Alsea Falls East Elk Emphasis Areas	0	520	520	520	520
Bummer Ridge Elk Emphasis Areas	0	3,566	3,566	3,566	3,566
Crabtree Complex RNA/ONA/ACEC	1,231	1,231	1,231	1,231	1,231
Elk Creek ACEC	784	0	784	0	784
Forest Peak RNA/ACEC	155	155	155	155	155
Grass Mountain RNA/ACEC	930	930	930	930	930
Hunter/Church Creek Area	0	2,267	2,267	2,267	2,267
High Peak – Moon Creek RNA/ACEC	1,490	1,490	1,490	1,490	1,490
Jackson Bend ACEC[b]	0	15	15	15	15
Larch Mountain EEA	183	0	0	0	0
Little Grass Valley ACEC	80	0	0	0	0
Little North Fork Wilson River ACEC	0	1,822	1,745	1,822	1,745
Little Sink RNA/ACEC	81	81	81	81	81
Lost Prairie ACEC	61	61	61	61	61
Lower Scappoose Eagle	0	179	0	0	0
Middle Santiam Terrace ACEC	108	182	182	182	182
Mill Creek Ridge ACEC	0	114	114	0	114
Miscellaneous Recreation Sites (Alter Glen, Dove Creek, and Fan Creek)	7	0	0	0	0
Molalla Meadows ACEC	0	197	197	197	197
Molalla River Non-Motorized Trail System	3,132	2,692	2,692	2,692	2,692
Mt. Hood Corridor and Bull Run Watershed Management Unit	0	2,660	2,660	2,660	2,660
North Santiam ACEC	15	0	0	0	0
Pacific City	75	75	75	75	75
Progeny Test Sites	211	793	793	793	793
Raymond Creek Bald Eagle Roost Area	278	0	0	0	0
Rickreall Ridge ACEC	177	368	368	235	368
Saddlebag Mountain RNA/ACEC	153	300	300	300	300
Sandy River Gorge ONA/ACEC	392	8,423	8,393	8,487	8,393
Sheridan Peak ACEC	310	0	0	0	0
Silt Creek ACEC	0	110	107	123	107
Skunk Creek Elk Emphasis Areas	660	690	690	690	690
Soosap Meadows ACEC	343	343	0	0	177
Table Rock Wilderness	6,351	6,613	6,613	6,613	6,613
The Butte RNA/ACEC	40	40	40	40	40
Valley of the Giants ACEC	51	1,311	1,311	0	1,311

Table 2-29. (Continued)

Closed (areas closed to off-highway vehicle use)[a]	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
	(acres)				
Valsetz-Luckiamute CTMA Elk Emphasis Areas	0	1,981	1,981	1,981	1,981
Walker Flat ACEC	10	10	10	10	10
Waterloo ACEC	0	9	9	9	9
White Rock Fen ACEC	55	55	0	0	0
Willamette River Parcels	76	89	89	89	89
Totals – Salem	**17,439**	**39,372**	**39,469**	**37,314**	**39,646**
Eugene District					
Cannery Dune	36	40	40	40	40
Coburg Hills Relic Forest Island ACEC	855	0	0	0	0
Collard Dune	40	36	36	36	36
Cottage Grove Lake RFI ACEC	15	0	15	0	15
Cottage Grove Old Growth EEA	80	80	80	80	80
Cougar Mountain Yew Grove ACEC	90	0	0	0	8
Dorena Lake RFI ACEC	19	0	0	0	0
Dorena Prairie ACEC	8	8	8	8	8
Esmond Lake ACEC	0	0	41	36	85
Fox Hollow RNA/ACEC	159	159	159	159	159
Grassy Mountain ACEC	74	25	25	25	29
Heceta Sand Dunes ONA/ACEC	210	210	210	210	210
Horse Rock Ridge RNA/ACEC	378	378	378	378	378
Hult Marsh ACEC	177	112	107	107	177
Lorane Ponderosa Pine ACEC	105	26	18	18	26
McGowan Creek EEA	79	79	79	79	79
McGowan Meadow ACEC	0	38	33	33	38
Mohawk RNA/ACEC	290	290	290	290	290
Oak Basin Prairies ACEC	0	37	30	30	37
Row River Trail	171	171	171	171	171
Shotgun Creek SRMA	278	414	414	414	414
Upper Elk Meadows RNA/ACEC	217	217	217	217	217
Willamette Valley Prairie, Oak, and Pine ACEC	0	697	554	554	780
Totals - Eugene	**3,281**	**3,017**	**2,905**	**2,885**	**3,277**
Roseburg District					
Bear Gulch RNA/ACEC	351	351	351	351	351
Beatty Creek RNA/ACEC	864	864	864	864	864
Bushnell-Irwin Rocks RNA/ACEC	1,085	1,085	1,085	1,085	1,085
Callahan Meadows ACEC	0	82	82	82	82
Myrtle Island RNA/ACEC	19	19	19	19	19
North Myrtle Creek RNA/ACEC	453	453	453	453	453

Table 2-29. (Continued)

Closed (areas closed to off-highway vehicle use)[a]	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
	(acres)				
Miscellaneous Recreation Trails (North Umpqua, Rock Creek, Susan Creek, and Wolf Creek Falls)	19	19	19	19	19
Progeny Test Sites	729	0	0	0	0
Red Ponds RNA/ACEC	141	141	141	141	141
Tater Hill RNA/ACEC	303	303	303	303	303
Totals - Roseburg	**3,964**	**3,317**	**3,317**	**3,317**	**3,317**
Coos Bay District					
Cherry Creek RNA/ACEC & ISA	592	592	592	592	592
China Wall ACEC	302	302	302	296	302
Dean Creek Elk Viewing Area (portion)	1,084	1,084	1,084	1,084	1,084
Euphoria Ridge ACEC	0	0	0	0	239
New River ACEC (portion)	883	883	883	883	883
North Spit Snowy Plover Habitat Restoration Areas	68	68	68	68	68
Powers Environmental Education Area	69	69	69	69	69
Progeny Test Sites & Seed Orchards	565	565	565	565	565
Tioga Creek ACEC	42	42	42	0	42
Totals – Coos Bay	**3,605**	**3,605**	**3,605**	**3,557**	**3,844**
Medford District					
Brewer Spruce Wilderness Instant Study Area	1,705	1,705	1,705	1,705	1,705
Cobleigh Road ACEC	0	244	239	239	244
Dakubetube Wildland ACEC	0	1,530	1,539	1,520	1,530
East Fork Whiskey Creek ACEC	0	0	3,188	0	3,188
Eight Dollar Mountain EEA	43	43	43	43	43
French Flat ACEC	651	504	504	504	504
Grayback Glades RNA/ACEC	1,022	1,022	1,022	1,022	1,022
Holton Creek RNA/ACEC	421	421	421	421	421
Lost Lake RNA/ACEC	387	387	387	387	387
North Fork Silver Creek RNA/ACEC	499	499	499	499	499
Old Baldy RNA/ACEC	115	115	115	115	115
Oregon Gulch RNA/ACEC	1,051	1,051	1,051	1,051	1,051
Pacific Crest National Scenic Trail Corridor[c]	3,199	2,310	2,310	2,310	2,310
Peavine	12,659	12,659	12,659	12,659	12,659
Pickett Creek ACEC	0	32	32	32	32
Pilot Rock ACEC	544	0	0	0	0
Pipe Fork RNA/ACEC	516	516	516	516	516

Table 2-29. (Continued)

Closed (areas closed to off-highway vehicle use)[a]	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
			(acres)		
Rogue Wild and Scenic River Corridor (wild and recreational sections)	15,951	11,502	11,502	11,502	11,502
Round Top Butte RNA/ACEC	605	605	605	605	605
Scotch Creek RNA/ACEC	1,799	1,799	1,799	1,799	1,799
Soda Mountain Wilderness Study Area	6,106	6,106	6,106	6,106	6,106
Sterling Mine Ditch	143	143	143	143	143
Table Mountain Winter Snow Play Area	11	11	11	11	11
Table Rocks ACEC/EEA	1,244	1,244	1,244	1,244	1,244
Waldo Takilma ACEC	0	1,760	1,760	1,760	1,760
West Illinois	363	363	363	363	363
Wetland areas, meadows and caves	880	880	880	880	880
Whiskey Creek Proposed ACEC	0	633	633	633	633
Wild Rogue Wilderness Area	8,971	8,971	8,971	8,971	8,971
Woodcock Bog RNA/ACEC	265	265	265	265	265
Totals – Medford[c]	**59,150**	**57,320**	**60,512**	**57,305**	**60,508**
Klamath Falls Resource Area (of the Lakeview District)					
Clover Creek	27	27	27	27	27
Gerber Reservoir (Barnes Valley, Ben Hall, and Pitch Log creeks)	3,859	3,943	3,943	3,943	3,943
Klamath Hills Wildlife Area	1,636	1,636	1,636	1,636	1,636
Miller Creek ACEC	939	939	939	939	939
Old Baldy RNA/Pacific Crest National Scenic Trail	355	355	355	355	355
Spencer Creek	80	264	264	264	264
Willow Valley/Antelope Creek	582	582	582	582	582
Wood River Wetland ACEC	3,225	3,225	3,225	3,225	3,225
Totals – Klamath Falls	**10,703**	**10,971**	**10,971**	**10,971**	**10,971**
Totals - All Districts	**98,142**	**117,602**	**120,779**	**115,349**	**121,563**

[a]Only those areas carried forward under the selected alternative would be closed to off-highway vehicle use. For those not carried forward, off-highway vehicle use would be limited to designated roads and trails.

[b]Some of the areas of critical environmental concern (ACECs) vary by alternative.

[c]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

Off-Highway Vehicle Emphasis Areas

Table 2-30. District-Specific Off-Highway Vehicle Emphasis Areas

Off-Highway Vehicle Emphasis Areas[a]	No Action Alternative	Alts. 1 & 3	Alt.2	PRMP
	(acres)			
Salem District				
Upper Nestucca	13,500	9,579	9,579	9,579
Eugene District				
Shotgun Creek	6,874	8,090	8,090	8,090
Roseburg District				
Hubbard Creek	12,041	12,041	12,041	12,041
Coos Bay District				
Blue Ridge	--[b]	1,609	1,609	1,609
Medford District				
Anderson Butte	--	--	11,742	11,482
Coyote Creek	--	--	14,597	14,585
East Howard	--	--	6,812	--
Elderberry Flats	--	--	3,393	3,393
Elliot Creek	--	--	3,931	3,931
Ferris Gulch	2,200	--	2,222	--
Illinois Valley	--	--	4,681	--
Lake Creek	--	--	8,561	--
Quartz Creek	7,120	--	6,867	8,727
Salt Creek	--	--	4,692	--
Spencer Creek	--	--	7,468	11,912
Timber Mountain/Johns Peak	16,250	--	16,375	13,919
Worthington Road/Obenchain	--	--	9,410	--
Total Acres - Medford	**25,570**	**--**	**100,751**	**67,949**
Klamath Falls Resource Area (of the Lakeview District)				
No off-highway vehicle emphasis areas.				
Total Acres - All Districts	**57,985**	**31,319**	**132,070**	**99,268**

[a]See Map 2-25 for the locations of these OHV emphasis areas.

[b]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative, or would not be carried forward under the action alternatives or PRMP.

Potential Off-Highway Vehicle Emphasis Areas

Table 2-31. District-Specific Potential Off-Highway Vehicle Emphasis Areas

Potential Off-Highway Vehicle Emphasis Areas	No Action Alternative (acres)	Alternatives 1, 2, 3, and PRMP (acres)
Salem District		
Crooked Finger	--[a]	454
Flat Mountain	--	6,892
Tillamook	6,852	--
Eugene, Roseburg, Coos Bay, and Medford Districts; Klamath Falls Resource Area		
No potential off-highway vehicle emphasis areas.		
Total Acres – All Districts	**6,852**	**7,346**

[a]Two dashes (--) denote that a designated or potential site, trail, area, or byway either was not identified under the No Action Alternative, or would not be carried forward under the action alternatives.

Oregon State Scenic Waterways

Table 2-32. District-Specific Oregon State Scenic Waterways

State Scenic Waterways	Segment Description	Total Miles
Salem District[a]		
Clackamas River	*Recreational segment*: Olallie Lake Scenic Area boundary to North Fork Reservoir	54
	Recreational segment: River Mill Dam to Baker's Bridge at Carver	12
Nestucca River	*Recreational segment*: McGuire Dam to the confluence with Ginger Creek *Scenic segment*: Ginger Creek to East Creek near Blaine	23
North Fork Clackamas River	*Scenic segment*: From source to North Fork Reservoir	12
Sandy River	*Natural segment*: Dodge Park (Bull Run River) to Indian John Island *Scenic segment*: Indian John Island to Dabney Park	12.5
South Fork Clackamas River	*Scenic segment*: River mile four to confluence with mainstem of Clackamas River	4
Walker Creek	*Recreational segment*: Source to confluence with Nestucca River	3
Eugene District		
No Oregon State scenic waterways.		
Roseburg District		
North Umpqua River	*Recreational segment*: Soda Springs Dam to Rock Creek	34
Coos Bay District		
No Oregon State scenic waterways.		
Medford District		
Rogue River	*Recreational segment:* Confluence of the Applegate to Grave Creek	27
	Natural segment: Grave Creek to the USFS boundary	20
Klamath Falls Resource Area (of the Lakeview District)		
Klamath River[b]	*Scenic segment*: J. C. Boyle Powerhouse to the Oregon/California state line	11
	Total Miles – All Districts	**192.5**

[a]The river segments of the Clackamas, Nestucca, and Sandy Rivers listed on this table have joint state and federal management plans in place.

[b]This Klamath River segment has a cooperative management agreement between the Oregon Parks and Recreation Department and the BLM.

National Landscape Conservation System Designated Lands

Wild and Scenic Rivers

Designated Wild and Scenic Rivers and River Segments

Table 2-33. District-Specific Designated Wild And Scenic Rivers And River Segments

Designated Rivers/ River Segments	Classification	Outstandingly Remarkable Values	Total Miles[a]	Acres[b] (BLM lands only)
Salem District				
Clackamas (Segment 6)	Recreational	Fish, Recreation	1	143
Elkhorn Creek (Segment 1)	Wild	Scenery, Wildlife	5.8	142
Elkhorn Creek (Segment 2)	Scenic	Scenery, Wildlife	0.6	225
Quartzville Creek	Recreational	Recreation, Scenery	9.7	2,083
Salmon River (Segment 4)	Recreational	Botany, Ecology, Fish, Hydrology, Recreation, Scenery, Wildlife	3.2	0
Salmon River (Segment 5)	Scenic	Botany, Ecology, Fish, Hydrology, Recreation, Scenery, Wildlife	4.8	728
Sandy River (Segment 1)	Scenic	Cultural, Fish, Recreation	3.8	445
Sandy River (Segment 2)	Recreational	Cultural, Fish, Recreation, Scenery	8.7	279
		Totals – Salem	**37.6**	**4,045**
Eugene District				
No designated wild and scenic rivers or river segments.				
Roseburg District				
North Umpqua River	Recreational	Cultural, Fish, Hydrology, Recreation, Scenery	8.4	2,142
		Totals – Roseburg	**8.4**	**2,142**
Coos Bay District				
No designated wild and scenic rivers or river segments.				
Medford District				
Rogue River (Applegate River to Grave Creek)	Recreational	Fish, Recreation, Scenery	27	4,911
Rogue River (Grave Creek to Mule Creek)	Wild	Fish, Recreation, Scenery	20	6,602
		Totals – Medford	**47**	**11,513**
Klamath Falls Resource Area (of the Lakeview District)				
Upper Klamath River	Scenic	Fish, History, Prehistory, Recreation, Scenery, Wildlife	11	2,780
		Totals – Klamath Falls	**11**	**2,780**
		Totals – All Districts	**104**	**20,480**

[a]Mileage calculations include both BLM-administered and non-BLM-administered lands.

[b]Acreage calculations are for BLM-administered lands only and based on the amount of BLM-administered lands within a 0.05-mile-wide river corridor.

Suitable Wild and Scenic Rivers and River Segments

Table 2-34. District-Specific Suitable Wild And Scenic Rivers And River Segments

Suitable Rivers/River Segments	Potential Classification	Outstandingly Remarkable Values	Total Miles[a]	Acres[b] (BLM lands only)
Salem District				
Molalla River (Segment B)	Recreational	Geology, Recreation, Scenery	13.2	2,988
Nestucca River (Segment A)	Recreational	Fish, Recreation, Scenery, Wildlife	15.5	3,016
		Totals – Salem	**28.7**	**6,004**
Eugene District				
McKenzie River (Segment A)	Recreational	Fish, Recreation, Scenery	11	962
Siuslaw River (Segment B)	Recreational	Fish, Wildlife	46	4,518
Siuslaw River (Segment C)	Recreational	Recreation, Wildlife	13	1,211
		Totals – Eugene	**70**	**6,691**
Roseburg District				
No suitable wild and scenic rivers or river segments.				
Coos Bay District				
No suitable wild and scenic rivers or river segments.				
Medford District				
Big Windy Creek	Wild	Recreation, Scenery	6.8	1,928
Dulog Creek	Wild	Recreation, Scenery	1.8	480
East Fork Big Windy Creek	Wild	Recreation, Scenery	3.6	923
Howard Creek	Wild	Fish, Recreation, Scenery	7.0	1,752
		Totals – Medford	**19.2**	**5,083**
Klamath Falls Resource Area (of the Lakeview District)				
No suitable wild and scenic rivers or river segments.				
		Totals – All Districts	**117.9**	**17,778**

[a]Mileage calculations include both BLM-administered and non-BLM-administered lands.

[b]Acreage calculations are for BLM-administered lands only and based on the amount of BLM-administered lands that are located within a half mile wide river corridor.

Eligible Wild and Scenic Rivers and River Segments

Table 2-35. District-Specific Eligible Wild And Scenic Rivers And River Segments

Eligible	Potential Classification	Outstandingly Remarkable Values	Total Miles[a]	Acres[b] (BLM lands only)
Salem District				
Alsea River	Recreational	Fish, Recreation	16.5	312
Clackamas River	Recreational	Recreation, Scenery	15.4	44
Drift Creek (Segments A and B)	Recreational	Fish	30.1	112
Fall Creek	Recreational	Fish	11.7	642
Kilchis River	Recreational	Fish, Recreation, Wildlife	14.6	56
Little Luckiamute River	Recreational	Ecology	27.1	40
Little North Santiam River	Recreational	Fish, Recreation, Scenery	17.2	1,203
Lobster Creek (Segment B)	Recreational	Fish	16.6	305
Luckiamute River	Recreational	Ecology	61.2	553
Middle Santiam River	Recreational	Cultural, Ecology	7.9	175
Nehalem River	Recreational	Recreation, Fish and Wildlife	122.0	36
Nestucca River (Segment B)	Recreational	Fish, Recreation, Scenery, Wildlife	8.0	216
North Fork Clackamas River	Scenic	Fish	14.4	358
North Fork Siletz River	Scenic	Ecology, Fish, Wildlife	10.6	826
North Fork Trask River	Recreational	Fish, Scenic	11.9	732
North Santiam River (Segment A)	Scenic	Fish, Recreation, Scenery	19.1	217
North Santiam River (Segment B)	Recreational	Fish, Recreation	27.9	132
Sandy River (Segment A)	Recreational	Cultural, Fish, Recreation	15.0	627
Sandy River (Segment B)	Recreational	Cultural, Fish, Recreation, Scenery	11.8	872
Siletz River	Recreational	Fish, Recreation, Scenery	68.8	38
South Fork Trask River	Recreational	Fish, Wildlife	9.3	30
South Yamhill River	Recreational	Cultural, Ecology	62.5	0
Table Rock Fork Molalla River	Recreational	Cultural	13.4	1,385
Trask River	Recreational	Fish, Recreation, Wildlife	19.5	333
Tualatin River	Recreational	Cultural	80.6	312
Willamette River	Recreational	Cultural, Ecology, Fish, Recreation, Wildlife	164.4	88
Wilson River	Recreational	Fish, Recreation, Wildlife	29.8	79
Yaquina River	Recreational	Fish	44.6	238
		Totals – Salem	**951.9**	**9,970**
Eugene District				
Fall Creek	Recreational	Recreation	6.0	1,126
Lake Creek (Segment B)	Recreational	Fish, Recreation	18.3	482
McKenzie River (Segment B)	Recreational	Fish, Recreation, Scenery, Wildlife	40.0	55
Nelson Creek	Recreational	Fish	7.0	542
North Fork Gate Creek	Recreational	Fish	7.9	201
South Fork Gate Creek	Recreational	Fish	8.9	106
		Totals - Eugene	**88.1**	**2,512**

Table 2-35. (Continued)

Eligible	Potential Classification	Outstandingly Remarkable Values	Total Miles[a]	Acres[b] (BLM lands only)
Roseburg District				
Cow Creek (West Fork to South Umpqua)	Recreational	Cultural, Fish, History, Wildlife	26	744
South Umpqua (Tiller to North Umpqua)	Recreational	Cultural, Fish, History, Wildlife	73	746
Umpqua (River Forks to Elkton)	Recreational	Cultural, Fish, History, Recreation, Scenery	57	1,891
		Totals - Roseburg	**156**	**3,381**
Coos Bay District				
Sixes	Recreational	Fish, History	28	271
South Fork Coos	Recreational	Fish, Recreation	37	503
South Fork Coquille	Recreational	Fish, Prehistory	35	139
Umpqua (Mouth to Kellogg)	Recreational	Ecology, Fish, Geology, History, Prehistory, Recreation, Scenery	70	1,045
		Totals – Coos Bay	**170**	**1,958**
Medford District				
Antelope Creek	Recreational	Fish	21	810
Applegate River	Recreational	Fish	53	860
Big Butte Creek (including the south fork of Big Butte Creek)	Recreational	Fish	12	770
Cheney Creek	Recreational	Fish	7	711
Cow Creek	Recreational	Fish	34	1,434
Elk Valley Creek	Recreational	Fish	6	509
Left Fork Foots Creek	Recreational	Fish	4	189
Little Applegate River	Recreational	Fish	23	1,369
Quines Creek	Recreational	Fish	7	816
Riffle Creek	Recreational	Fish	6	857
Rogue River (Segment 1)	Recreational	Fish, Recreation	11	30
Rogue River (Segment 2)	Recreational	Fish, Recreation	20	281
Rogue River(Segment 3)	Recreational	Fish, Recreation	31	489
Sams Creek	Recreational	Fish	8	541
South Fork Little Butte Creek	Recreational	Fish	25	446
West Fork Illinois River	Scenic	Scenery	17	1,173
		Totals – Medford	**285**	**11,285**
Klamath Falls Resource Area (of the Lakeview District)				
No eligible wild and scenic rivers or river segments.				
		Totals – All Districts	**1,651**	**29,106**

[a]Mileage calculations include both BLM-administered and non-BLM-administered lands.

[b]Acreage calculations are for BLM-administered lands only and based on the amount of BLM-administered lands that are located within a half mile wide river corridor.

Wilderness Areas

Table 2-36. District-Specific Wilderness Areas

Wilderness Areas		Administered by the BLM (acres)
Salem District		
Table Rock		5,706
Managed according to the 1987 *Table Rock Wilderness Management Plan* to preserve the area's undisturbed natural integrity.		
Eugene, Roseburg, and Coos Bay Districts		
No wilderness areas.		
Medford District		
Wild Rogue		8,971
This wilderness spans across both BLM and U. S. Forest Service (USFS) lands. Public Law 95-237 states that all BLM-administered lands within the Wild Rogue Wilderness shall be administered by the Secretary of Agriculture, and in this case, the USFS.		
Klamath Falls Resource Area (of the Lakeview District)		
No wilderness areas.		
	Total Acres – All Districts	**14,677**

Wilderness Study Areas and Wilderness Instant Study Areas

Table 2-37. District-Specific Wilderness Study And Wilderness Instant Study Areas

Wilderness Study and Wilderness Instant Study Areas	Classification	Administered by the BLM (acres)
Salem District		
Little Sink	Instant Study	80
Eugene District		
No wilderness study or wilderness instant study areas.		
Roseburg District		
No wilderness study or wilderness instant study areas.		
Coos Bay District		
Cherry Creek/Douglas fir	Instant Study	570
Medford District		
Brewer Spruce	Instant Study	1,705
Soda Mountain[a]	Study	6,107
Klamath Falls Resource Area		
Mountain Lakes	Study	340
	Total - All Districts	**8,802**

[a]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

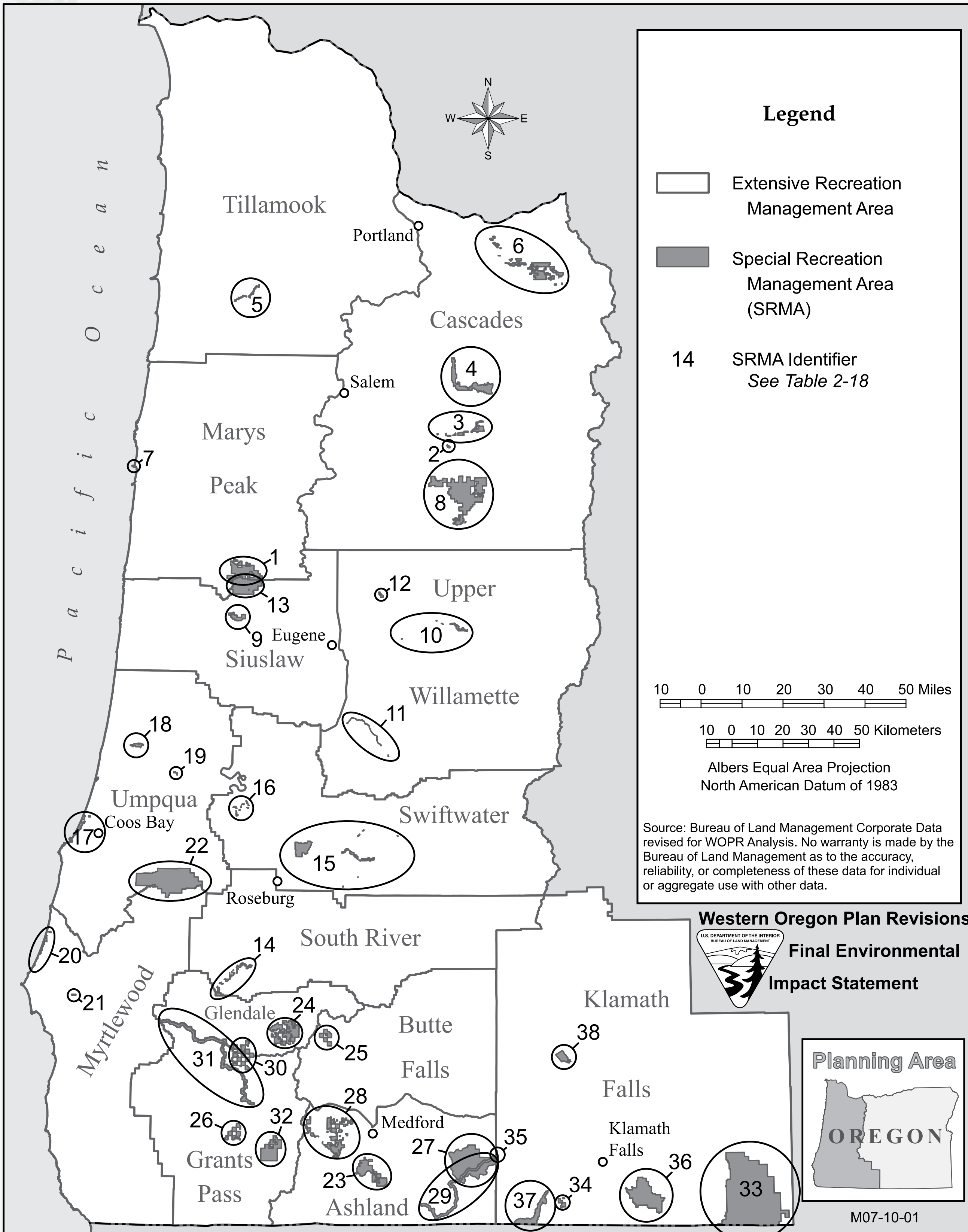
Miscellaneous National Landscape Conservation System and Congressionally Designated Lands

Table 2-38. District-Specific Miscellaneous National Landscape Conservation System And Congressionally Designated Lands

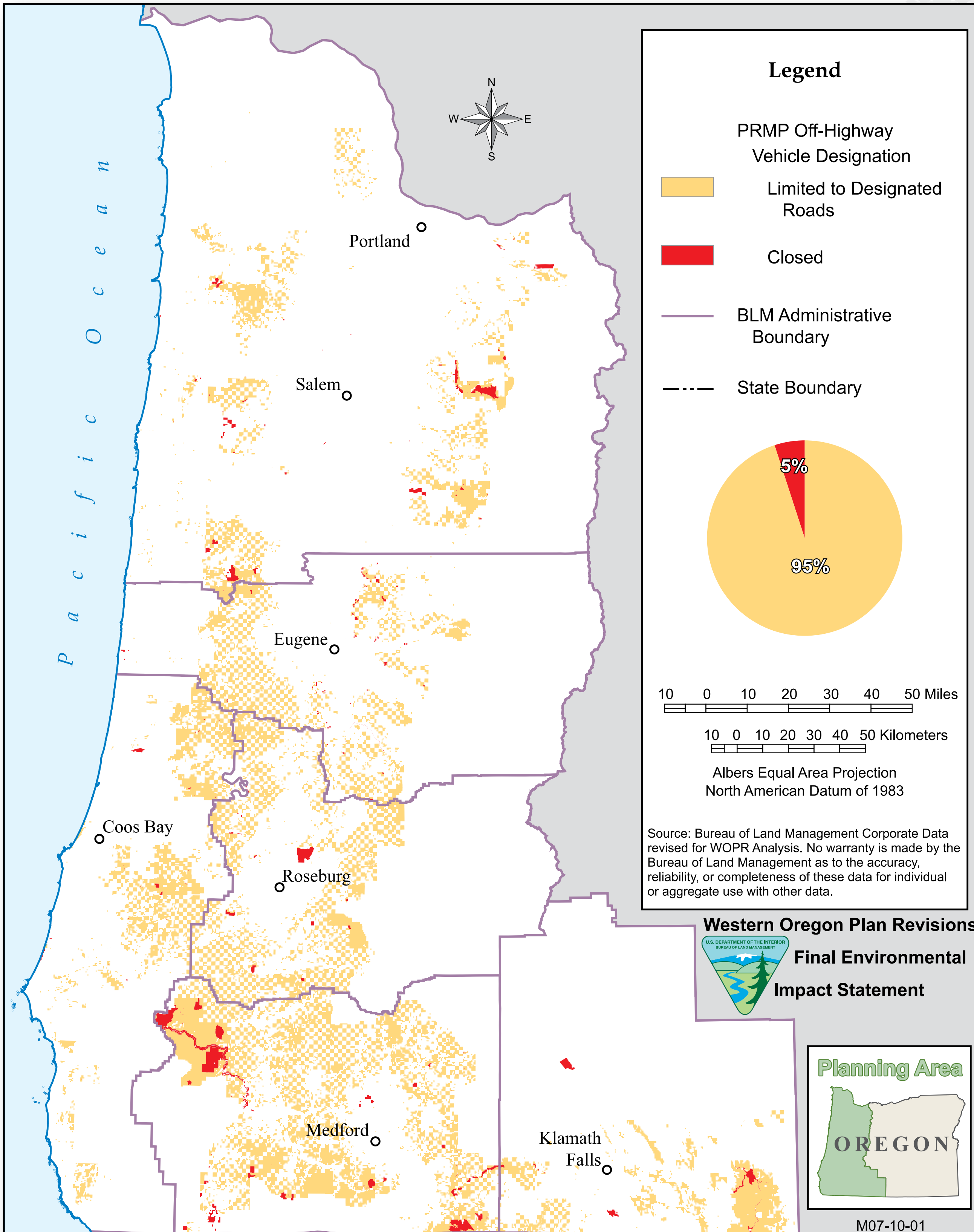
Miscellaneous National Landscape Conservation System Designated Lands	Administered by the BLM (acres)	(miles)
Salem District		
Bull Run Watershed Management Unit	658	
Mt. Hood Corridor	4,644	
Yaquina Head Outstanding Natural Area	102	
Eugene, Roseburg, and Coos Bay Districts		
None.		
Medford District		
Cascade-Siskiyou National Monument[a]	52,947	
Pacific Crest National Scenic Trail		40
Klamath Falls Resource Area		
Pacific Crest National Scenic Trail		1
Total - All Districts	**58,351**	**41**

[a]Acre totals for the Medford District include the Cascade-Siskiyou National Monument since it is located within the planning area. This national monument is managed under a separate resource management plan.

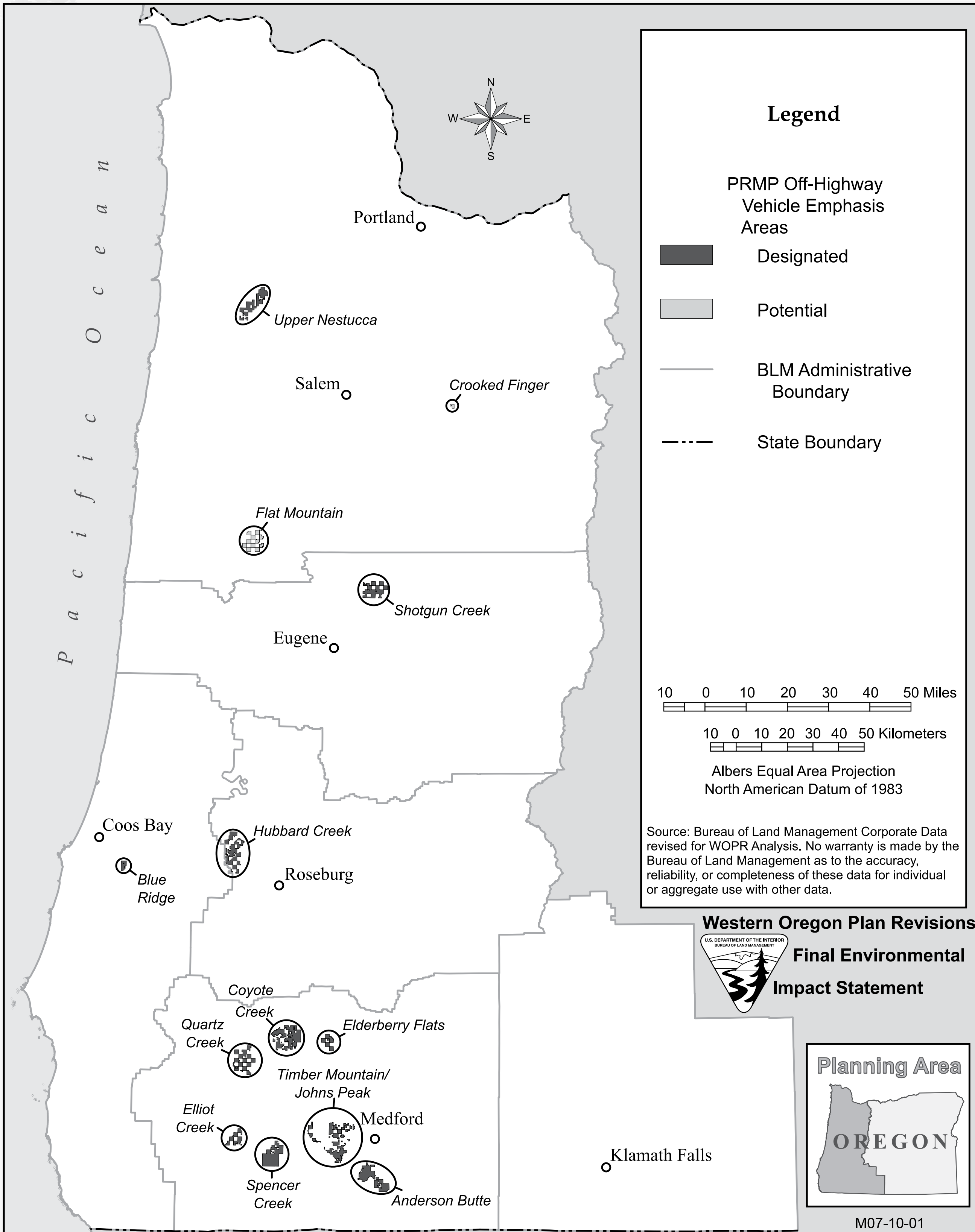
Map 2-7. Recreation Management Areas



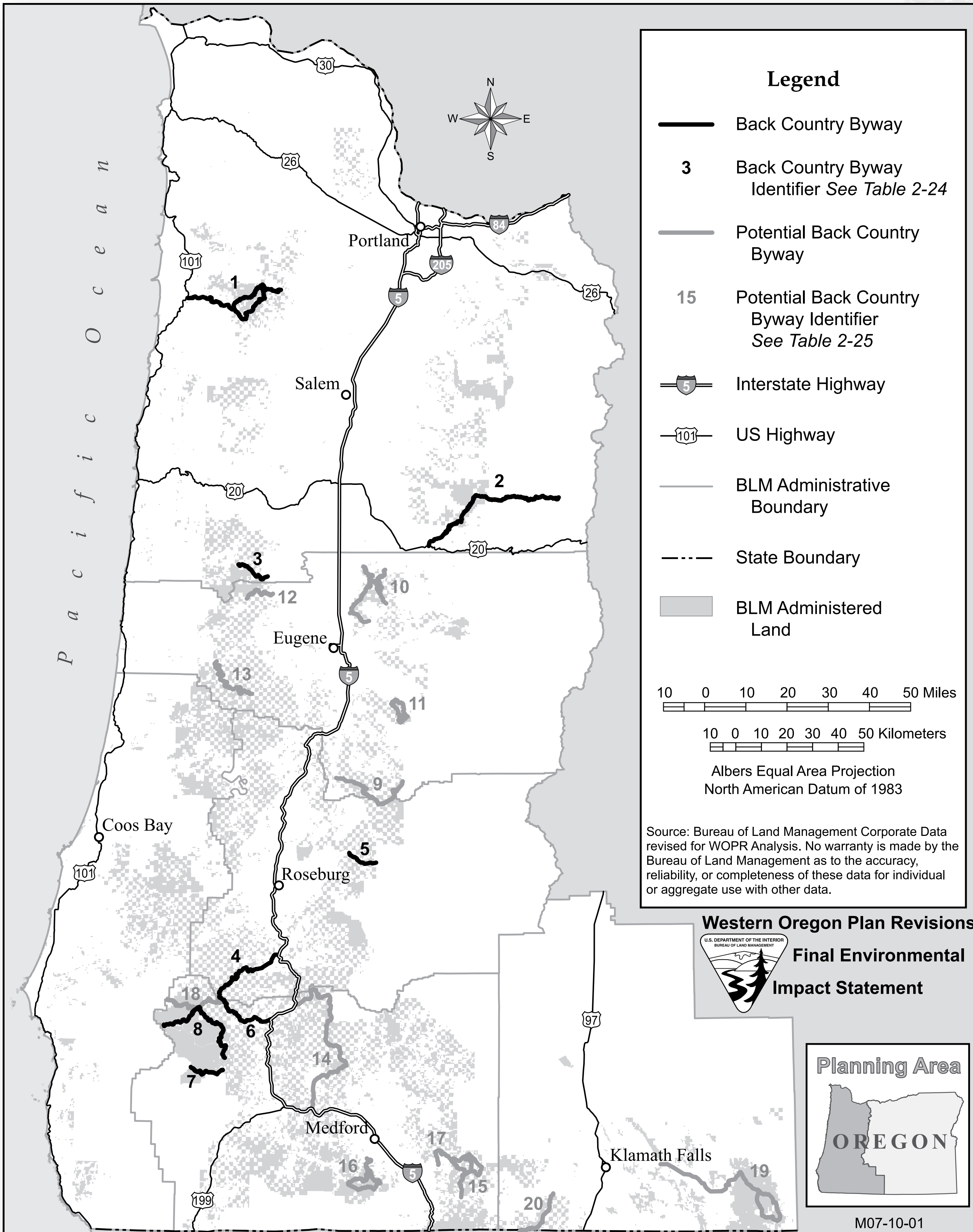
Map 2-8. Off-Highway Vehicle Designations - PRMP



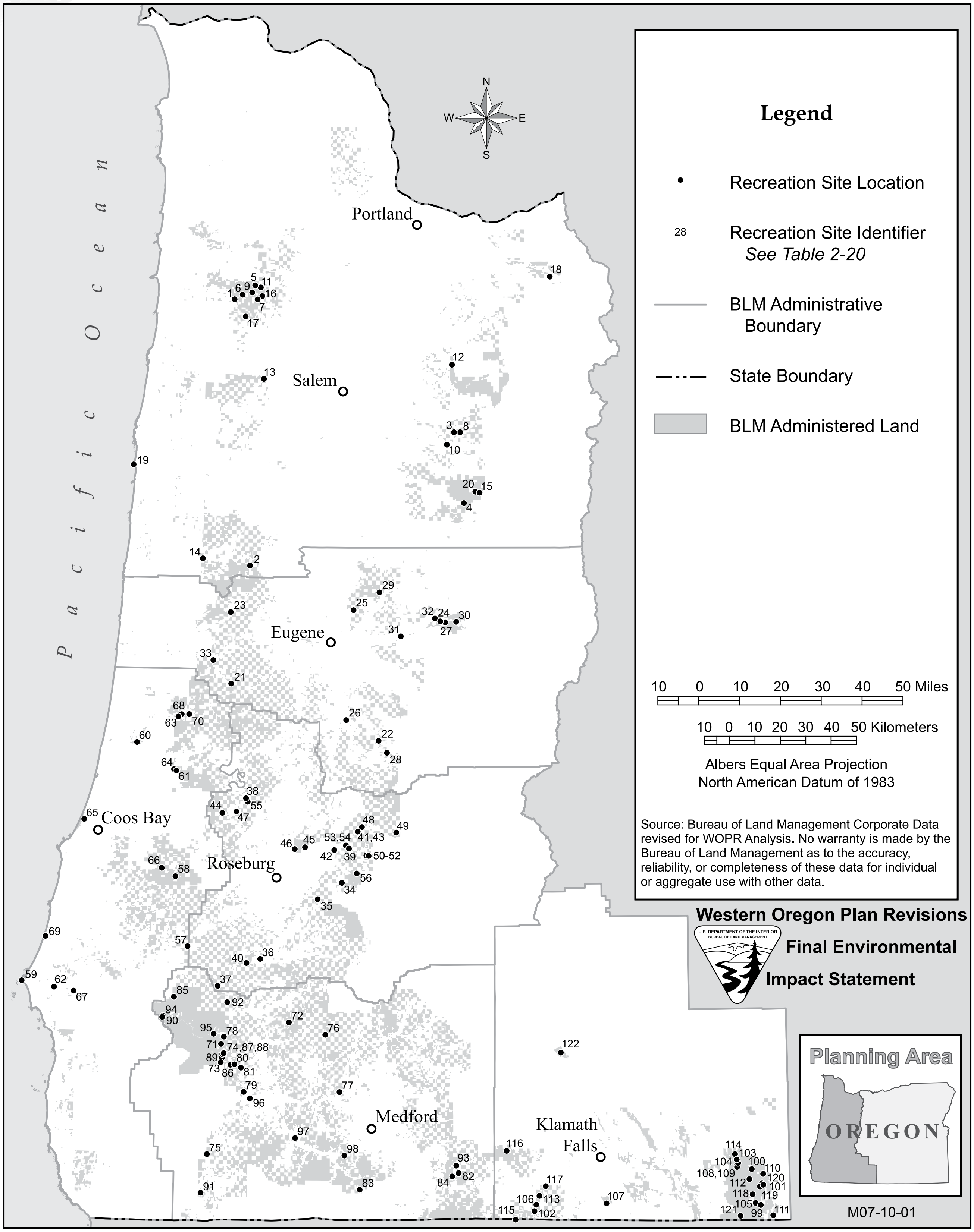
Map 2-9. Off-Highway Vehicle Emphasis Areas - PRMP



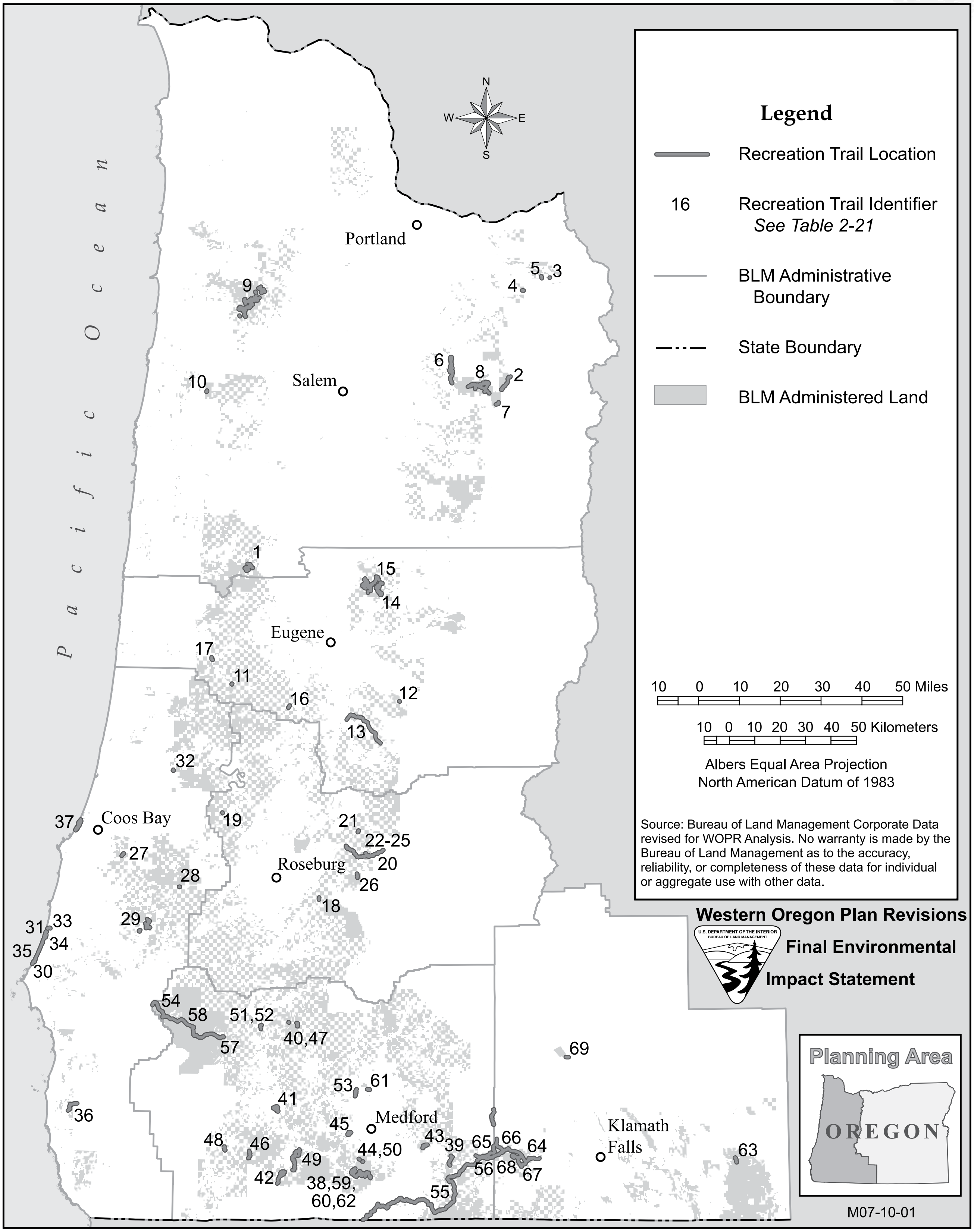
Map 2-10. Backcountry Byways



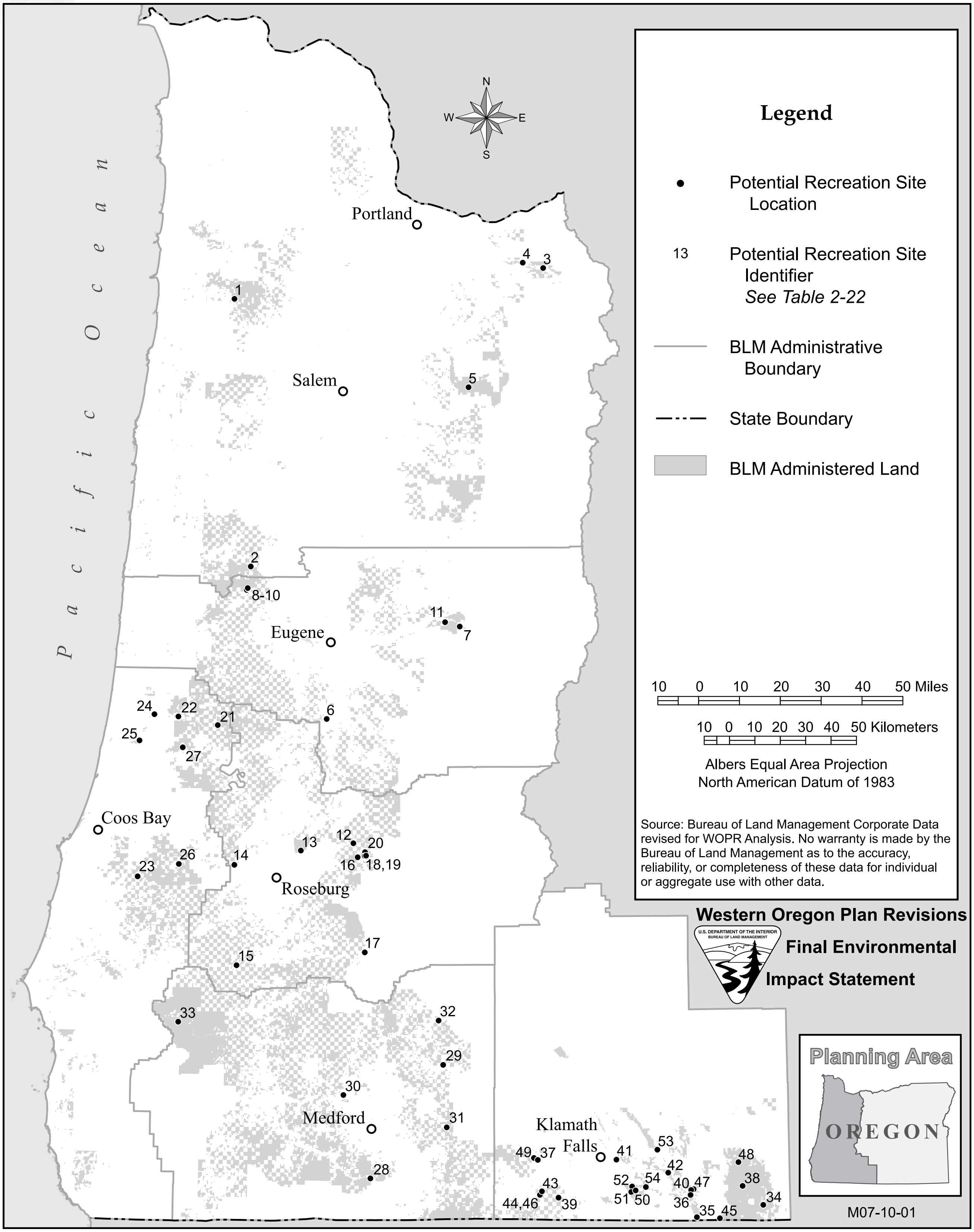
Map 2-11. Designated Recreation Sites



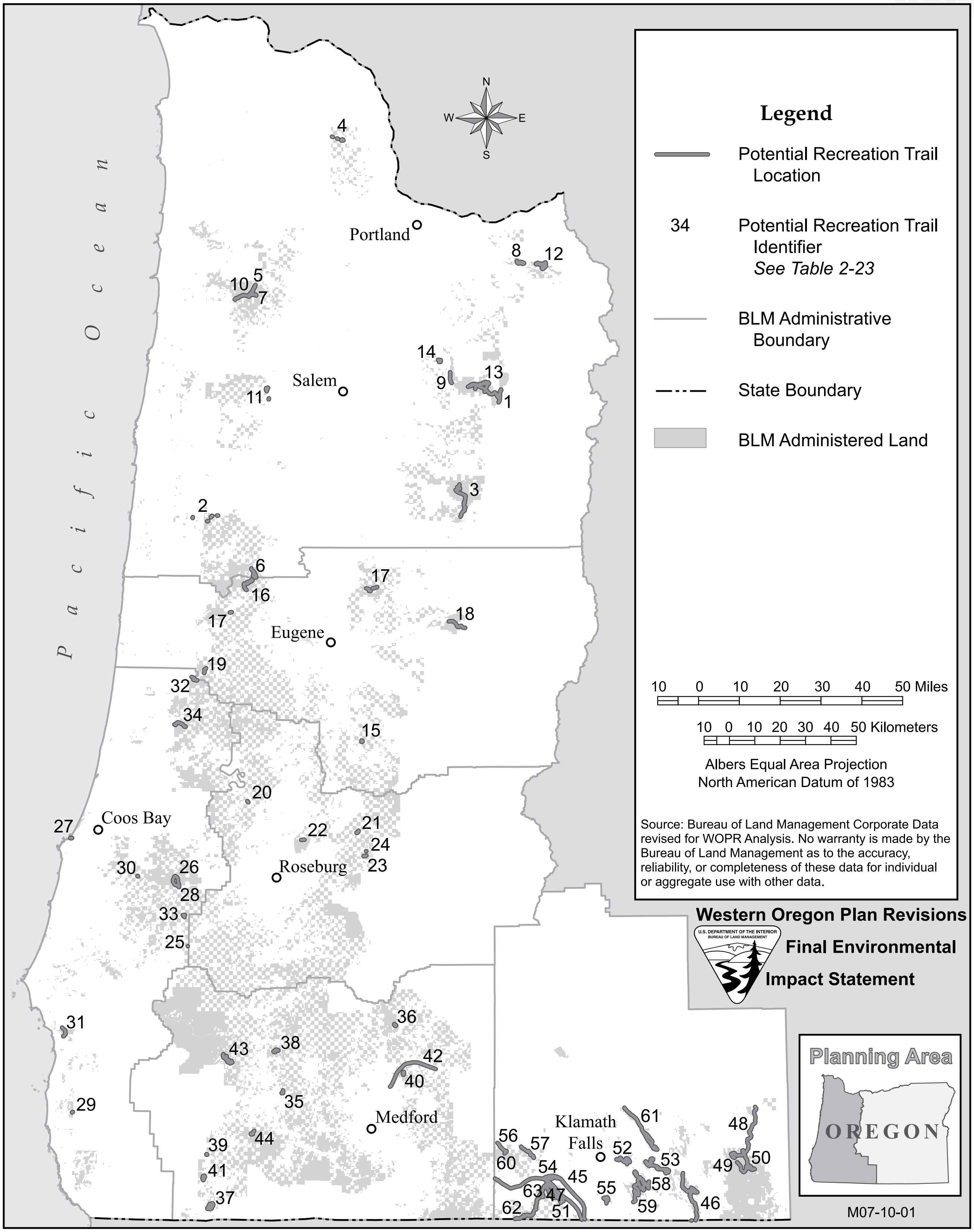
Map 2-12. Designated Recreation Trails



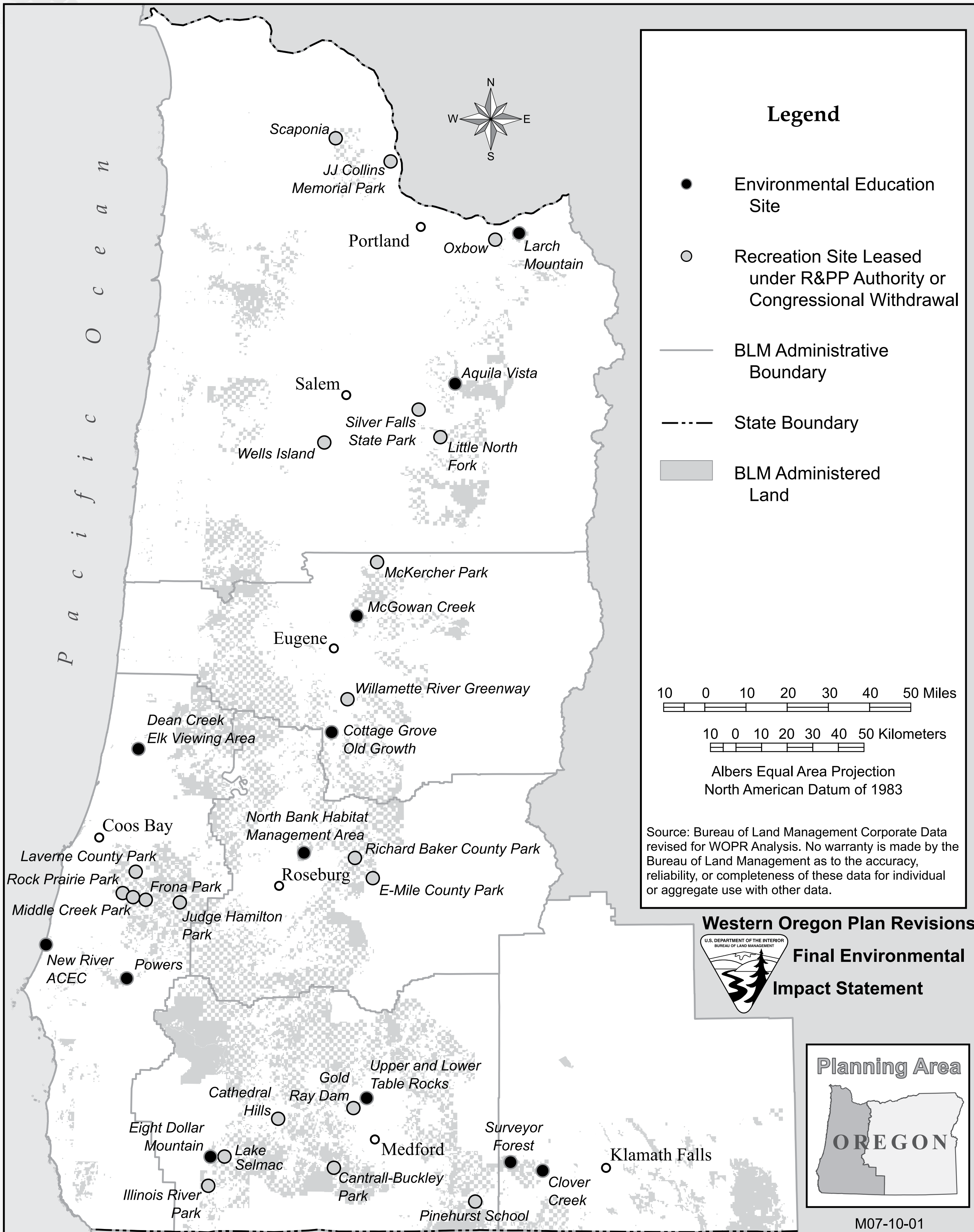
Map 2-13. Potential Recreation Sites



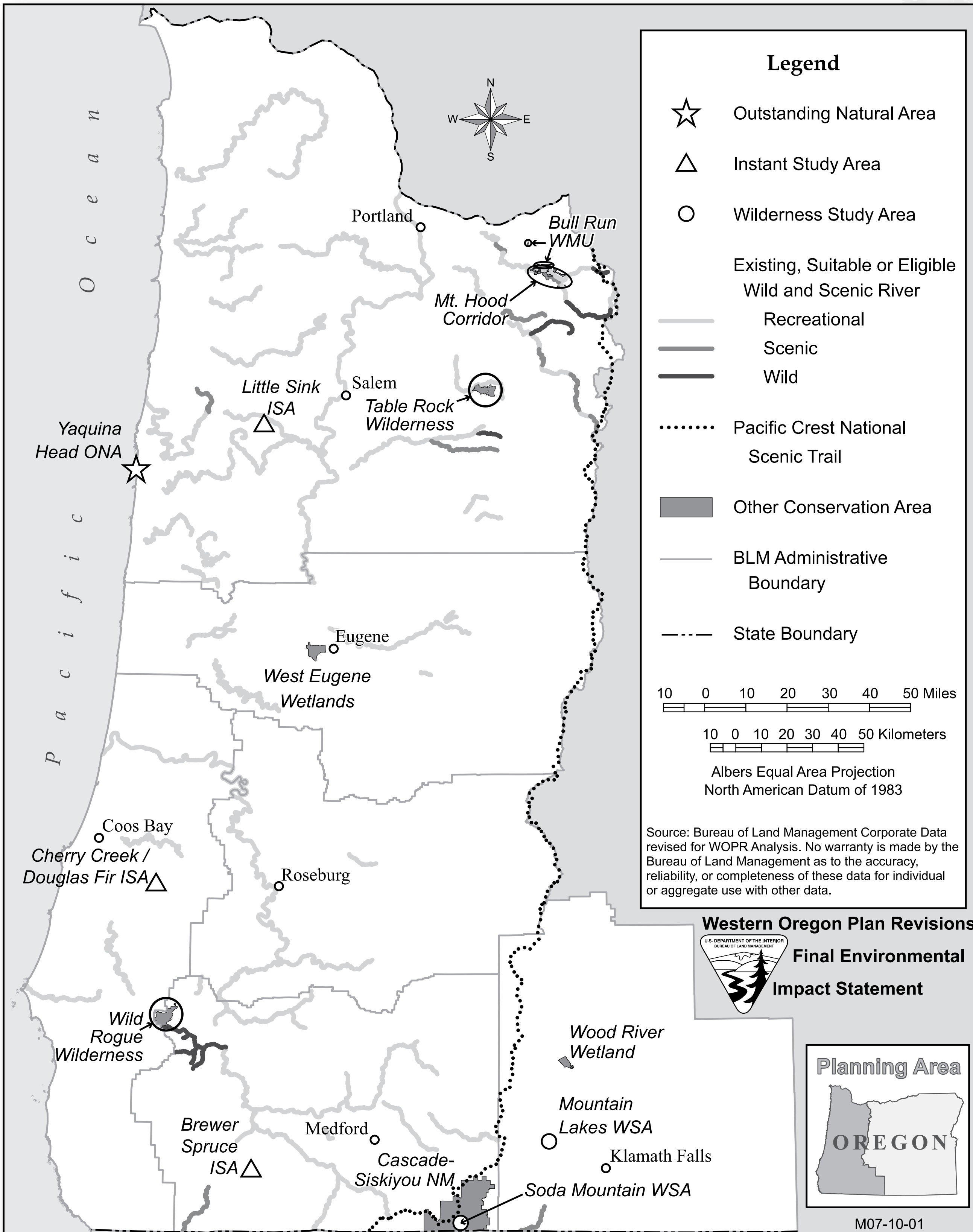
Map 2-14. Potential Recreation Trails



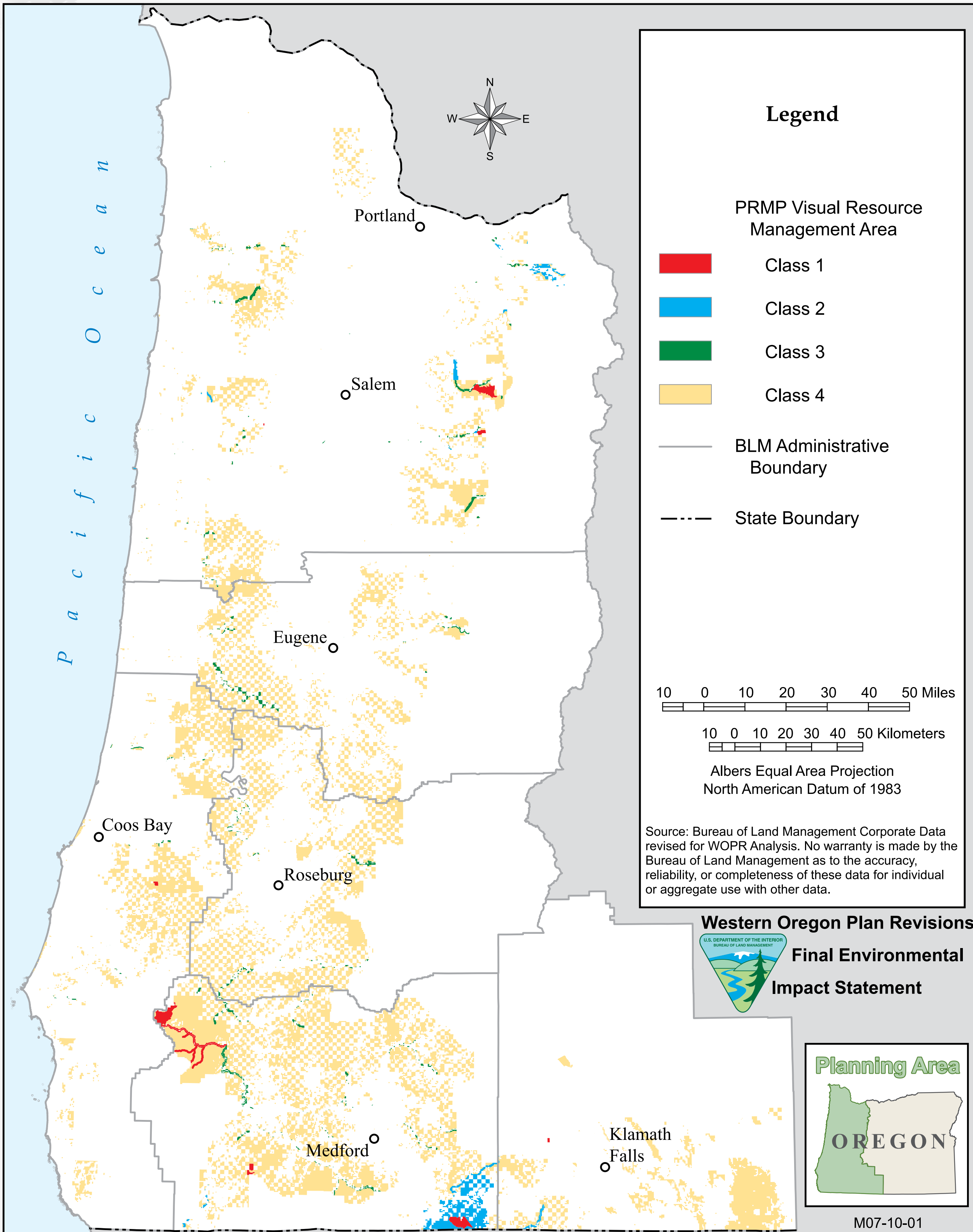
Map 2-15. Environmental Education Sites And Recreation Sites Leased Under Recreational & Public Purpose Authority Or Congressional Withdrawal



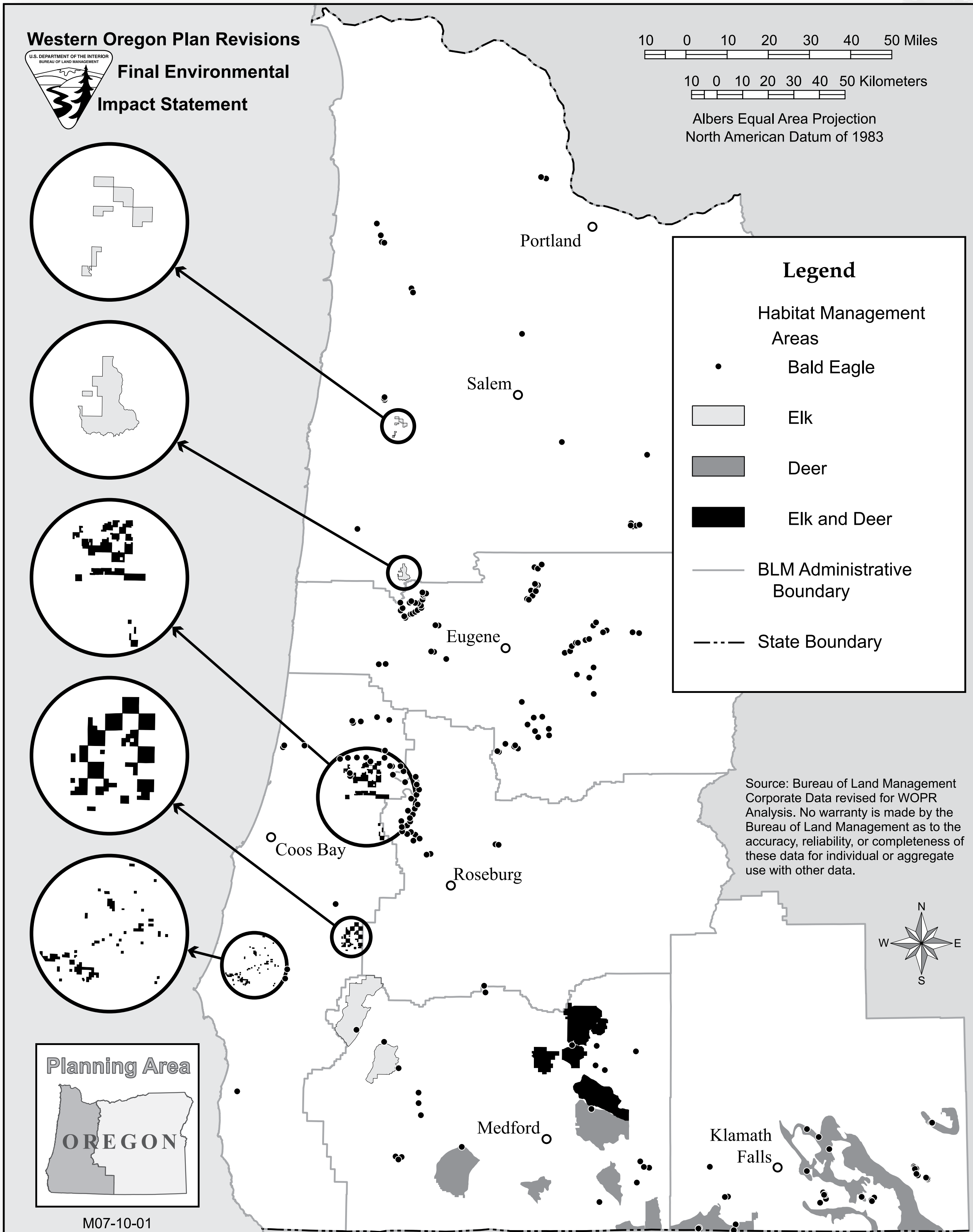
Map 2-16. National Landscape Conservation System Designated Lands



Map 2-17. Visual Resource Management Areas - PRMP



Map 2-18. Bald eagle, Deer and Elk Habitat Management Areas - PRMP



Alternatives 1, 2, and 3

This section identifies the management objectives and management directions that would apply under Alternatives 1, 2, and 3, which are carried forward as written in the Draft EIS. Some management objectives, management directions, and land use allocations are common to Alternatives 1, 2, and 3. There are some objectives and directions that are unique among the three alternatives. These differences would result in a variance in the degree or rate in which the alternatives would achieve the identified purpose and need.

Management Objectives and Directions Common to Alternatives 1, 2, and 3

Air

Management Objective

Prevent impacts to air quality in areas designated as Class I for air quality and nonattainment areas.

Management Directions

- Prescribed burns would be implemented in accordance with the Oregon Smoke Management Plan to reduce emissions, to avoid smoke intrusions into designated areas, and to avoid degrading the visibility in Class I areas.
- Dust palliatives would be used, as necessary, during timber hauling operations to reduce dust.

Cultural and Paleontological Resources including American Indian Traditional Uses

Management Objective

Conserve scientific, traditional use, heritage, educational, public, and recreational values of cultural and paleontological resource sites.

Management Directions

- Ground-disturbing actions would avoid sites that are listed (or are eligible for listing) on the National Register of Historic Places. If avoidance would not be practical, prior to disturbance the sites with scientific value would be salvaged through practices such as data recovery, which include excavation, relocation, or documentation.
- Cultural properties that are determined to be available for consideration as the subject of scientific or historical study would be classified as scientific use sites or experimental use sites.
- Unusual cultural properties that are not currently available for scientific or historical study, because of scarcity, a research potential that surpasses the current state of the art, singular historic importance, cultural importance, tribal importance, architectural interest, or comparable reasons, would be classified as *conservation for future use sites*. Sites would be selected for the purpose of retaining a representative sample of site types from those available in areas where conflicts with other resource management activities are not anticipated. These sites would be preserved.

Use sites

For complete descriptions of the use site classifications, search for 8110 (BLM Manual H-8110) at http://www.blm.gov.

- Cultural properties that are found to be appropriate for use as interpretive exhibits at their original location (i.e., in place) or found to be appropriate for related educational and recreational uses would be classified as *public use sites*. Priority locations for these interpretive exhibits would include developed recreation sites, recreation corridors, and locations where recreation is being promoted. These sites would be preserved.
- Cultural properties that are only important for their scientific values and whose research potential is effectively exhausted (ones where the salient information has been collected and preserved or has been destroyed by natural or human activity) would receive no special management.
- Significant cultural resource properties would be acquired for public, cultural heritage, and scientific purposes when such properties are adjacent to or inholdings of BLM-administered land.
- Cultural and paleontological resources that are threatened by natural processes or human activity would be excavated, and the data would be recovered where warranted by the scientific importance of the site.

Energy and Minerals

Management Objective

Maintain existing opportunities and develop new opportunities for the exploration and development of locatable, leasable, and saleable energy and mineral resources, and for casual mineral prospecting.

Management Directions

- Areas would be available for energy and mineral resource exploration and development.
- Biomass would be recovered from harvesting actions, silvicultural treatments, and forest health and fuels treatments.
- New and existing quarry and pit sites would be used to provide economical sources of rock and aggregate. Existing quarry and pit sites, along with the areas involved in their incremental expansion, would be managed as existing facilities and would not be available for other management uses.
- See *Table 2-39 (Areas open or closed to energy and mineral developments for Alternatives 1, 2, and 3)* for the areas that would be open or closed to energy and mineral developments. See *Appendix Q - Energy and Minerals* for a reasonably foreseeable development scenario for the BLM units within the planning area and the stipulation that would be applied to the developments.

Fire and Fuels Management

Management Objectives

- Promote ecosystem function and resiliency.
- Reduce the fire hazards to communities that are at risk from uncharacteristic wildfires.
- Decrease the risk of large wildfires, and reduce the cost and associated hazard of fire suppression.
- Reduce the risk of resource damage due to uncharacteristic wildfires.

Management Directions

- Prescribed burns would be used to emulate natural fire occurrences and processes.
- Ecosystems with the highest risk of uncharacteristic wildfires and the greatest potential for risk reduction would receive priority for fuels treatments.
- Silvicultural treatments would be applied in oak woodlands to create open conditions with large fire-resistant oaks.

Table 2-39. Areas Open Or Closed To Energy And Mineral Developments (Alternatives 1, 2, And 3)

Categories	Subcategories	Acres by BLM District					
		Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls
Federal Surface and Mineral Estate		398,100	318,000	425,600	329,600	866,300	212,000
Federal Minerals/Private Surface		27,800	1,300	1,700	12,200	4,700	21,000
Locatable (e.g., metallics and gemstones)							
Closed	Nondiscretionary	5,900	400	300	1,000	16,800	4,700
Closed	Discretionary	16,200	15,300	4,800	11,500	20,800	700
Open	Standard Restrictions/ Stipulations	49,200	290,600	366,200	99,500	536,500	191,600
Open	Additional Restrictions	326,800	10,000	20,800	217,600	293,400	37,900
Salable (e.g., sand, gravel, stone, clays, pumice)							
Closed	Nondiscretionary	5,900	100	30	600	--	300
Closed	Discretionary	220,400	9,100	8,400	14,700	--	14,500
Open	Standard Restrictions/ Stipulations	49,200	200	381,700	84,600	864,800	--
Open	Additional Restrictions	122,600	307,000	29,200	229,700	--	222,500
Leasable (e.g., oil, gas, geothermal, coal, chemical minerals)							
Closed	Nondiscretionary	5,900	100,000	30	1,600	22,000	300
Open	Standard Restrictions/ Stipulations	49,200	--	356,300	101,400	232,500	--
Open	Additional Restrictions	122,000	138,000	53,300	56,300	539,700	197,600
Open	No Surface Occupancy	221,000	177,000	9,700	170,300	73,300	40,800

- Silvicultural treatments would treat hazardous fuels, particularly in wildland urban interface areas. See *Map 2-4 (Wildland urban interface)*.
- Immediate action to control and suppress all wildfires would be taken in all areas, except in the large contiguous blocks of BLM lands, which are Galice, Wild Rogue Wilderness, Rogue River Wild and Scenic River in the Medford District, and the Gerber Block in the Klamath Falls Resource Area, where aggressive initial attack and direct control procedures would be employed.
- Fire-suppression activities in the large contiguous blocks of BLM lands, which are Galice, Wild Rogue Wilderness, Rogue River Wild and Scenic River in the Medford District, and the Gerber Block in the Klamath Falls Resource Area, would include direct control, perimeter control, and prescription control. See *Map 2-4 (Wildland urban interface)*.
- Fuels treatment would be applied to stands of any age in order to reduce the fuel hazards. Fuel treatments would include tree cutting, brush cutting, pruning, reducing crown bulk density, treating activity fuels, and prescribed burning.
- Vegetation removal would occur around ponds that are constructed for fire management for safety or operational reasons.

Fish

Management Objectives

- Restore stream complexity.
- Restore access to stream channels for all life stages of fish species.
- Prevent livestock from causing trampling disturbances to spawning beds where federally listed salmonid fish species occur.

Management Directions

- Priority for restoration activities would be given to projects in streams with a high intrinsic potential for fish and to high-priority fish populations that have been defined in recovery plans.
- Stream complexity would be restored through the placement of large wood and boulders.
- New and replacement stream-crossing structures on fish-bearing streams would be designed to provide access within stream channels for fish.
- For streams with salmonid species listed under the Endangered Species Act, livestock would not be released into riparian areas until 30 days following the emergence of salmonids from spawning beds.

Grazing

Management Objective Pertinent Only to the Coos Bay District, Medford District, and the Klamath Falls Resource Area of the Lakeview District

Provide livestock grazing permits and leases while maintaining or improving public rangelands.

Management Directions Pertinent Only to the Medford District and the Klamath Falls Resource Area of the Lakeview District

- Livestock grazing would be managed in accordance with the *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington*. See:
  - — *Figure 2-3 (Lands available for livestock grazing)*
  - — *Appendix M - Grazing (Grazing Allotments in the Klamath Falls Resource Area and the Medford District)*
  - — *Appendix M - Grazing (Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Oregon and Washington)*
- Grazing levels and management practices would be maintained for the allotments as listed in *Appendix M*. Adjustments would be made when needed to meet or make progress toward meeting the standards for rangeland health for Oregon and Washington. See *Appendix M - Grazing (Grazing Allotments in the Klamath Falls Resource Area and the Medford District)*
- Areas disturbed by natural and human-induced events, including wildland fire, prescribed burns, timber-management treatments, and juniper cuts, would be rested from livestock grazing, except where grazing would either not impede site recovery or where grazing could be used as a tool to aid in achieving recovery objectives. Livestock grazing would be resumed after soil and vegetation had sufficiently recovered to support livestock grazing.
- Livestock grazing would be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits on lands that are not available through the issuance of a grazing lease or permit.
- Prescribed livestock grazing would be used to control invasive plants, reduce fire danger, or accomplish other management objectives.

Rangeland standards

For the rangeland health standards and livestock grazing guidelines document, search for the document by its complete title at htpp:www.blm.gov

Management Direction Pertinent Only to the Coos Bay District

The authorization of livestock grazing through the issuance of grazing leases would be discontinued. However, grazing would be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits in a manner that is consistent with the grazing regulations.

Management Directions Pertinent Only to the Klamath Falls Resource Area of the Lakeview District

- The authorization of livestock grazing through the issuance of grazing leases would be discontinued, in whole or in part, for the grazing allotments identified in *Table 2-40 (Allotments not available for livestock grazing in the Klamath Falls Resource Area [Alternatives 1, 2, and 3])*.
- Grazing would not continue to be authorized under Section 15 of the Taylor Grazing Act (43 U.S.C. §315 et seq.) for the allotments listed in *Table 2-40*. However, grazing would be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits in a manner that is consistent with the grazing regulations.
- Exclosures or other areas, as identified on *Table 2-41 (Exclosures or other areas closed to grazing in the Klamath Falls Resource Area [Alternatives 1, 2, and 3])*, would be closed to grazing, except as scheduled.
- Range improvements would be developed in the Klamath Falls Resource Area as described in *Appendix M - Grazing* and *Figure 2-4 (Location of proposed range improvements in the Klamath Falls Resource Area)*.

Management Directions Pertinent Only to the Medford District

- The authorization of livestock grazing through the issuance of grazing leases would be discontinued, in whole or in part, for the grazing allotments identified in *Table 2-42 (Allotments not available for livestock grazing in the Medford District[Alternatives 1, 2, and 3])*.
- Grazing would not be authorized under Section 15 of the Taylor Grazing Act (43 U.S.C. §315 et seq.) for the allotments listed in *Table 2-42*. However, grazing could be authorized through management agreements, temporary nonrenewable grazing permits or leases, or special-use permits in a manner that is consistent with the grazing regulations.
- Range improvements would be implemented to achieve the Oregon standards for rangeland health or other allotment-specific objectives.

Taylor Grazing Act

For the complete act and its regulations, search for Title 43 and all sections starting with Section 315 at http://www.uscode.house.gov

Table 2-40. Allotments Not Available For Livestock Grazing In The Klamath Falls Resource Area, Alternatives 1, 2, And 3

Allotment Name	Allotment Number	Acres	Forage Allocation (AUMs)
Edge Creek[a]	00102	5,950	---
Plum Hills	00813	160	20
	Totals	**6,110**	**20**

[a]The portion of the Upper Klamath Scenic River within the Edge Creek Allotment would be closed to grazing. This portion of the allotment was not allocated any AUMs (animal unit months). The remainder of the allotment would be available for grazing as described in *Appendix M - Grazing (Grazing Allotments in the Klamath Falls Resource Area and the Medford District)*.

Table 2-41. Exclosures Or Other Areas Closed To Grazing In The Klamath Falls Resource Area, Alternatives 1, 2, And 3

Allotment Name	Allotment Number	Areas Closed within Allotments
Edge Creek	00102	• Hayden Creek Exclosures (2) • Fox Lake Exclosure
Buck Lake	00104	• Tunnel Creek Exclosure • Surveyor Campground Exclosure
Dixie	00107	• Dixie (Long Prairie Creek) Exclosure
Stukel-O'Neil	00822	• Aspen Exclosure
Rodgers	00852	• Van Meter Flat Reservoir Exclosure
Yainax	00861	• Bull Spring Exclosure • Timothy Spring Exclosure
Bear Valley	00876	• Holbrook Spring Exclosure
Bumpheads	00877	• Bumpheads Reservoir Outlet Exclosure • Antelope Creek Exclosure
Horsefly	00882	• Long Branch Exclosure • Caseview Spring Exclosure • Norcross Spring Exclosure (area within the spring exclosure fence) • Boundary Spring Exclosure • Barnes Valley Riparian Pasture (except as scheduled)
Pankey Basin	00884	• Pankey Creek Riparian Exclosure
Dry Prairie	00885	• Ben Hall Creek Riparian Pasture (except as scheduled)
Horse Camp Rim	00886	• 21 Reservoir Exclosure
Pitchlog	00887	• Pitchlog Creek Exclosure • Willow Spring Exclosure • CCC Spring Exclosure
Willow Valley	00890	• East Fork Lost River Exclosure • Duncan Spring/Antelope Creek Exclosures (2) • Antelope Riparian Pasture (except as scheduled)
Wood River	30855	• Entire area excluded from regular grazing use, except as a tool to support wetland restoration

Table 2-42. Allotments Not Available For Livestock Grazing In The Medford District (Alternatives 1, 2, And 3)

Allotment Name	Allotment Number	Acres	Forage Allocation (AUMs)
Trail Creek	10003	12,868	113
Longbranch[a]	10004	10,844	71
Antioch Road	10005	40	4
Roundtop Evans	10006	27,086	110
West Perry Road	10010	75	10
East Perry Road	10011	40	7
Obenchain Mountain	10014	120	12
Nichols Gap	10018	280	18
Eagle Point Canal	10020	465	55
Shady Branch	10025	320	32
Derby Station	10030	540	36
West Derby	10034	1,120	89
Emigrant Creek	10111	40	7
Baldy	10120	798	87
Lost Creek	10123	80	6
Cartwright	10127	40	4
Bybee Peak	10144	321	36
Stiehl	10210	175	18
Fielder Creek	10211	40	5
Del Rio	10216	40	5
Sugarloaf/Greensprings	20158	2,926	210
Applegate	20201	25,518	294
Tunnel Ridge	20202	2,183	14
Timber Mountain	20204	1,720	70
Sardine and Galls Creek	20205	3,765	158
Sterling Creek	20207	29,209	190
Spencer Gulch	20208	1,935	150
Quartz Gulch	20209	680	9
Burton Butte	20212	5	2
Chapman Creek	20213	3,309	81
Ecker	20217	40	6
Stage Road	20218	40	4
Lomas Road	20222	635	50
Star	20223	118	24
Pickett Mountain	20302	820	30
Jump Off Joe	20303	80	8
Deer Creek[a]	20308	278	0
Reeves Creek	20309	1,672	95
Q Bar X	20310	15	3
Esterly Lake	20312	4,457	152
Glade Creek	20315	560	17
Cherry Gulch	20316	40	6
Totals		**135,337**	**2,298**

*These portions of the Longbranch and Deer Creek Allotments would be closed to grazing. The remainder of the allotments would be available for grazing as described in *Appendix M - Grazing*.

Hazardous Materials

Management Objectives

- Limit the use of hazardous materials.
- Remove hazardous materials from BLM-administered lands.

Management Directions

- Response to hazardous material incidents would include timely cleanup, proper notifications, criminal investigations, and site assessments.
- Hazardous materials would be stored, treated, and disposed of in accordance with applicable laws and regulations.
- Employees and the public would be protected from known hazardous materials on BLM-administered lands.

Lands, Realty, Access, and Transportation

Note: See the PRMP section of this chapter for maps referenced in this section.

Management Objectives

- Make land tenure adjustments to facilitate the management of resources.
- Provide legal access to BLM-administered lands and facilities adequate to support resource management programs.
- Provide needed rights-of-way for access to nonfederal lands in a manner that is consistent with federal, state, and local planning goals and rules.
- Provide a road transportation system that serves resource management needs.
- Protect lands that have important resource values or substantial levels of investment by withdrawing them, where necessary, from the implementation of nondiscretionary public land and mineral laws.

Management Directions

- Lands in Zone 1 would be retained under BLM administration. Lands in Zone 1 include:
  - — National Landscape Conservation System designated lands
  - — Areas of critical environmental concern
  - — Research natural areas
  - — Outstanding natural areas
  - — Recreation sites
  - — Critical habitat for threatened or endangered species
- Lands in Zone 2 would be available for exchange to enhance public resource values, improve management capabilities, and reduce the potential for land use conflict. Zone 2 lands are not specifically listed. They consist of all lands not listed in the description of Zone 1 lands and the lands listed in *Appendix P - Lands*.
- Lands in Zone 3 would be available for disposal. These lands would include:
  - — Lands that are not practical or are uneconomical to manage (because of their intermingled location and unsuitability for management by another federal agency)
  - — Survey hiatuses
  - — Encroachments
  - — Survey hiatuses and encroachments that are discovered in the future would be assigned to Zone 3. See *Map 2-5 (Location of land tenure Zone 3)*.

> ***Land Zones***
>
> **Zone 1**: Retain for continuing resource development.
> **Zone 2**: Available for exchange to facilitate management.
> **Zone 3**: Available for sale or exchange to facilitate management.
> See *Table 3-85 (Areas of existing land tenure zones by district)* in *Chapter 3* and *Appendix P - Lands.*

- The acres of O&C lands of all classifications, and the acres of O&C and public domain lands that are available for harvesting, would not be reduced through disposal, exchange, or purchase. This standard would be met by evaluating the total net change in land tenure in the planning area at 10-year intervals.
- Lands would be acquired or disposed of to facilitate resource management objectives as opportunities occur. See *Appendix P - Lands*.
- Public domain lands that have been under Section 7 of the Taylor Grazing Act would be available for disposal.
- Newly acquired lands would be managed for the purpose for which they were acquired or in a manner that is consistent with the management objectives for adjacent BLM-administered lands.
- Temporary-use permits, as identified under the Federal Land Policy and Management Act (Section 302), would be issued for a variety of uses, such as, but not limited to, stockpile and storage sites and as tools to authorize unintentional trespass situations pending final resolution.
- No leases or permits would be issued for landfills or other disposal facilities.
- Land-use authorizations would be used to resolve agricultural or occupancy trespasses, where appropriate.
- Existing leases and permits would be recognized as valid uses.
- Lands would be withdrawn from the operation of public land and mineral laws, where appropriate, to avoid the damage that would be caused by nondiscretionary activities. See *Appendix P - Lands*.
- Withdrawals would be limited to the area needed and would restrict only those activities needed to accomplish the purposes of the withdrawal.
- Lands would be available for rights-of-way.
- Class I visual resource management areas, such as wild and scenic rivers that are classified as wild, wilderness areas, and wilderness study areas, would be *right-of-way exclusion areas* (i.e., rights-of-way would not be granted).
- Recreation sites, areas of critical environmental concern, research natural areas, wild and scenic rivers that are classified as scenic and recreational rivers, and Class II visual resource management areas would be *right- of-way avoidance areas* (i.e., rights-of-way would be granted where no practicable alternative was available).
- Existing rights-of-way would be recognized as valid uses.
- Access across BLM-administered lands to nonfederal lands would be granted, except within the National Landscape Conservation System designated lands.
- Utility corridors would be the preferred location for energy transmission or distribution facilities. Corridors would generally be 1,000 feet on each side of the centerline unless otherwise designated. No development or management activities would be permitted that would conflict with construction, operation, or maintenance of facilities corresponding to the purpose of the utility corridor. See *Map 2-6 (Utility corridors)*.
- Communication facilities would be allowed on existing communication sites. See *Map 2-6 (Utility corridors)* and *Appendix P - Lands*.
- Reasonable expansion of existing communication sites and the development of new sites would be allowed. The priority for accommodating the need for additional capacity would be the use of existing sites.
- Existing roads would be managed to protect resource values, to provide for safety, to protect facility investment, and to provide access for management activities. Trees would be removed along roads for safety or operational reasons.
- New permanent or temporary roads, and stream-crossing structures, would be constructed for the implementation of management directions.
- Roads that are not needed for long-term management would be decommissioned. Roads would be temporarily closed or travel would be restricted for administrative and resource purposes.

National Landscape Conservation System

The National Landscape Conservation System designations on BLM-administered lands in western Oregon include:

- Wild and scenic rivers
- Wilderness, wilderness study areas, and wilderness instant study areas
- A national monument
- A national scenic trail
- An outstanding natural area
- A scenic corridor
- A watershed management unit

Note: For district-specific information, see the tables and maps in the PRMP section of this chapter.

Management Objective

Conserve, protect, and restore the identified outstanding cultural, ecological, and scientific values of the National Landscape Conservation System designated lands.

Management Directions

Wild and Scenic Rivers

- Designated wild and scenic river corridors (including those classified as wild, scenic, or recreational) would be managed to protect their outstandingly remarkable values and to enhance the natural integrity of river-related values.

  See *Table 2-33 (District-specific designated wild and scenic rivers and river segments)*.
- Interim protection would be provided to wild and scenic river corridors (including those classified as wild, scenic, or recreational) that are suitable for inclusion as components of the National Wild and Scenic Rivers System.

  See *Table 2-34 (District-specific suitable wild and scenic rivers and river segments)*.
- Interim protection would be provided to wild and scenic river corridors (including those classified as wild, scenic, or recreational) that are eligible, but have not yet been studied for suitability as components of the National Wild and Scenic Rivers System.

  See *Table 2-35 (District-specific eligible wild and scenic rivers and river segments)*.

Wilderness Areas

- Wilderness areas would be managed to preserve the undisturbed natural integrity of these areas.

  See *Table 2-36 (District-specific wilderness areas).*

Wilderness Study Areas and Wilderness Instant Study Areas

- Wilderness study areas and wilderness instant study areas would be managed to maintain wilderness suitability.

  See *Table 2-37 (District-specific wilderness study areas and wilderness instant study areas)*.

Cascade-Siskiyou National Monument

- The Cascade-Siskiyou National Monument (located in the Medford District) would be managed to protect the geophysical, botanical, and other biological features for which the area was designated.

  See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands)*.

Pacific Crest National Scenic Trail

- The portion of the Pacific Crest National Scenic Trail in the Medford District and the Klamath Falls Resource Area of the Lakeview District would be managed for outdoor recreational opportunities while conserving its scenic, historic, natural, and cultural values.

  See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands)***.**

Yaquina Head Outstanding Natural Area

- The Yaquina Head Outstanding Natural Area (located in the Salem District) would be managed to promote conservation of scenic, historic, natural, and cultural values, and for educational, scientific, and recreational opportunities.

  See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands)***.**

Mt. Hood Corridor

- The BLM-administered lands within the Mt. Hood Corridor (located in the Salem District) would be managed to protect and enhance scenic quality. Timber harvesting would be excluded, except to maintain safe conditions for the visiting public, to control the continued spread of wildfires, and for activities related to the administration of the corridor.

  See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands)***.**

<u>Note:</u> The Oregon Parks and Recreation Department (Oregon State parks), Oregon Department of State Lands, Portland General Electric (PGE), and a mixture of county, local, and private owners administer the remaining lands in this corridor.

Bull Run Watershed Management Unit

- The BLM-administered lands within the Bull Run Watershed Management Unit (located in the Salem District) would be managed to protect and enhance water quality. Timber harvesting would be excluded, except as necessary to protect or enhance water quality, or as necessary for the construction, expansion, protection, or maintenance of facilities for either a municipal water supply or transmission of energy.

  See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands)***.**

<u>Note:</u> This watershed is the source of the Portland metropolitan area's domestic water supply and is congressionally designated and separate from other watersheds that are administratively designated. Also note that the U. S. Forest Service and the Portland Water Bureau administer the greater portion of the lands in this unit.

Plants, Fungi, and Invasive Species

Management Objective

Provide for conservation of species that are listed, or are candidates for listing, under the Endangered Species Act or state-listed species where the BLM has entered into a cooperative management agreement for a species.

Management Directions

- Management would be consistent with recovery plans and designated critical habitat, including: the protection and restoration of habitat; altering the type, timing, and intensity of actions; and other strategies designed to recover populations of species.
- Species listed under the state of Oregon Endangered Species Act would be managed in accordance with cooperative management agreements.
- Plants with recovery plans are listed in *Appendix F - Botany (Digest of Actions Contained in Individual Recovery Plans for Special Status Plant Species)*.

Management Objective

State-listed species where the BLM has not entered into a conservation agreement and species listed by the BLM as sensitive species will be managed on public domain lands and on O&C lands where protection does not conflict with sustained yield forest management in areas dedicated to timber production. This is so that special status designation would no longer be warranted, and that actions will not contribute to the need to list the species under the Endangered Species Act. Where conflicts with sustained yield management occur, protections on O&C lands would only be applied to prevent extinction of a species even if it is not yet listed under the Endangered Species Act.

Management Directions

- Conservation plans for special status plant species would be implemented and are incorporated by reference. Management would be consistent with conservation plans. For a list of plants with conservation plans, see *Appendix F- Botany (Digest of Conservation Plans for Special Status Plant Species)*.
- Special status species plants without conservation plans would be managed to maintain or restore their populations and habitat.
- Protection measures include altering the type, timing, and intensity of actions; and other strategies designed to maintain populations of species.

Management Objective

Support natural species composition and vegetation on noncommercial areas, including noncommercial forests, oak woodlands, shrublands, grasslands, cliffs, rock outcrops, talus slopes, meadows, wetlands, springs, fens, ponds, and vernal pools.

Management Directions

- Natural processes, native species composition, and vegetation structure would be maintained or restored. Management would include the use of prescribed burns; retention of legacy components (e.g., large trees, snags, and down logs); and removal of encroaching vegetation in meadows, grasslands, or oak woodlands in a manner that is consistent with natural or historic processes and conditions.
- Degraded or disturbed areas would be revegetated with species appropriate to the native or historic plant communities.
- Road construction, road maintenance, and culvert replacement would be designed to retain or reconnect the hydrologic flows to wetlands, springs, fens, ponds, and vernal pools.

Management Objective

Avoid the introduction of invasive plants or the spread of invasive plant infestations that are preventable.

Management Directions

- Cost-effective measures would be implemented to prevent, detect, and rapidly control new invasive plant infestations.
- Manual, mechanical, cultural, chemical, and biological treatments would be used to manage invasive plant infestations.
- Invasive plants would be controlled in accordance with the final environmental impact statement and record of decisions for the Northwest Area Noxious Weed Control Program. These documents are incorporated by reference.

Special Forest Products

Management Objective

Provide for the harvest and collection of special forest products.

Management Directions

- Special forest product collection would be implemented in a manner that limits adverse impacts to other resources. This would be accomplished by restricting collection amounts and restricting collection activities.
- Stipulations would be included in permits issued for the collection of special forest products to limit adverse impacts to the plant community, individual plants, soil, and water.
- Areas for the collection of individual special forest products would be rotated to maintain the availability of special forest products.

Recreation

Note: For district-specific information, see the tables and maps at the end of the previous section on the PRMP in this chapter. *Map 2-24* and *Map 2-25* for off-highway vehicle areas for Alternatives 1, 2, and 3 are located at the end of this chapter.

Management Objective

Provide a diversity of developed and dispersed outdoor recreational opportunities that contribute to meeting recreational demand and quality visitor experiences.

Management Directions

- Legal public access would be obtained to BLM-administered lands that have high recreational potential.
- Special recreation management areas would be managed in accordance with their planning frameworks. See *Appendix K - Recreation* and *Map 2-7 (Recreation management areas)*. These frameworks describe implementation-level actions that would achieve recreational management objectives for those areas.
- Lands not designated as special recreation management areas would be managed as extensive recreation management areas for dispersed recreational opportunities.
- Recreational developments (including sites, trails, and backcountry byways) would be maintained.
- Potential recreational developments (including sites, trails, and backcountry byways) would be developed in the future, depending on recreational demand and feasibility.
- Locatable mineral withdrawals would be obtained for recreational developments that contain mineral development potential.
- Closed or abandoned logging roads would be developed to provide additional trail opportunities.
- Service-oriented and outreach programs, including interpretation and education, would be provided to visitors.
- Environmental education areas would be managed to provide educational opportunities for the public.
- Recreation sites authorized under the Recreation and Public Purposes Act would be managed according to their lease agreements.
- A 77-acre portion of Heceta Dunes on the Eugene District would be designated as open to off-highway vehicle use.

- Areas listed in *Table 2-29 (District-specific areas closed to off-highway vehicle use)* would be designated as closed to off-highway vehicle use. Also see *Map 2-24 (Off-highway vehicle areas for Alternatives 1, 2, and 3)*.
- Areas not designated as closed would be designated as *limited to designated roads and trails*. See *Table 2-28 (District-specific off-highway vehicle area designations) and Map 2-24 (Off-highway vehicle areas for Alternatives 1, 2, and 3)*.
- Areas listed in *Table 2-30 (District-specific off-highway vehicle emphasis areas)* would be designated as off-highway vehicle emphasis areas. These designations would be located within areas that are limited to designated roads and trails where off-highway vehicle use is more concentrated and intensively managed. See *Map 2-25 (Off-highway vehicle emphasis areas for Alternatives 1, 2, and 3)*.
- Potential off-highway vehicle emphasis areas listed in *Table 2-31 (District- specific potential off-highway vehicle emphasis areas)* would be developed in the future, depending on recreational demand and feasibility.
- Off-highway vehicle areas and off-highway vehicle emphasis areas would be managed according to interim management guidelines until subsequent comprehensive travel management plans are completed. See *Appendix K - Recreation*. Detailed maps that show proposed off-highway vehicle area designations with a preliminary road and trail network are available to the public at each district office.
- Lands within state scenic waterway corridors (excluding portions that occur on O&C lands) that are suitable for permanent timber production would be managed to protect and enhance identified scenic, aesthetic, recreation, scientific, research, fish, and wildlife qualities. (See *Table 2-32* for a list of district-specific Oregon State scenic waterways.)

Research

Management Objective

Provide for research to support the management of lands and resources administered by the BLM in western Oregon.

Management direction

- Ongoing research projects would be continued according to current or updated study plans. New research projects would require study plans. Management directions on study sites that conflict with research objectives would be deferred until the research is complete.

Soils

Management Objective

Improve or maintain soil productivity.

Management direction

- Management activities associated with prescribed burns, wildfire suppression, silviculture, timber harvesting, and grazing would be consistent with maintaining or improving soil productivity.

Timber

Management Objective

Assure the survival of planted trees and enhance the growth of desirable trees in harvested or disturbed areas.

Management Directions

- Newly harvested and inadequately stocked areas would be prepared for the regeneration of desirable tree species.
- Site preparation methods would include mechanical or manual procedures, and prescribed burns.
- Adequate reforestation would be achieved as promptly as practical following timber harvests, as follows:
  - — Harvested areas would be planted with indigenous commercial tree species.
  - — Identified root disease centers would be planted with indigenous disease-resistant tree species.
  - — Genetically selected stock would be used to the extent available.
- The establishment and survival of coniferous seedlings would be promoted through maintenance and protective treatments.

Management Objective

Enhance the health, stability, growth, vigor, and economic value of forest stands in the harvest land base.

Management Directions

- Lands currently growing primarily brush or hardwoods would be converted to the appropriate conifer species, unless the hardwoods would produce a higher net monetary return.
- Precommercial thinning would be applied to forest stands that exceed healthy density levels.
- Fertilizer would be applied to forest stands that are at suitable density levels and where treatment is expected to provide a positive economic return.
- Pruning would be applied to enhance timber value in a manner that is consistent with fuels and disease management.
- Yarding corridors or new roads would be permitted within riparian management areas if no practical alternative exists to access adjacent uplands.
- Uneven-aged management would be applied in the eastern portion of the Klamath Falls Resource Area.
- Incidental harvest of trees associated with implementing management directions would occur, for safety or operational reasons, from lands that are not in the harvest land base.

Visual Resource Management

See *Map 2-17 (Visual resource management classes)* and *Table 2-43 (Acres of visual resource management classes by district for the No Action Alternative and Alternatives 1, 2, and 3)*.

Management Objective

Preserve the existing character of the landscape in Class I visual resource management areas.

Management Directions

- Designated, suitable, and eligible wild and scenic rivers that are classified as wild, wilderness areas, wilderness study areas, and wilderness instant study areas would be designated as Class I visual resource management areas.
- These areas would be managed in accordance with natural ecological changes. Some very limited management activities would occur in these areas. The level of change to the characteristic landscape would be very low and would not attract attention. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Table 2-43. Acres Of Visual Resource Management (VRM) Classes By District (No Action Alternative and Alternatives 1, 2, And 3)

Visual Resource Management (VRM) Classes	No Action Alternative (acres)	Alternatives 1, 2, and 3 (acres)
Salem District		
VRM Class I	14,100	7,550
VRM Class II	22,800	7,627
VRM Class III	59,600	16,313
VRM Class IV	301,600	371,705
Eugene District		
VRM Class I	0	0
VRM Class II	4,471	0
VRM Class III	33,130	8,183
VRM Class IV	277,499	307,062
Roseburg District		
VRM Class I	28	0
VRM Class II	18,045	0
VRM Class III	4,385	6,409
VRM Class IV	396,546	419,952
Coos Bay District		
VRM Class I	600	592
VRM Class II	6,600	0
VRM Class III	14,700	1,958
VRM Class IV	307,700	319,700
Medford District		
VRM Class I	14,330	27,059
VRM Class II	113,880	48,718
VRM Class III	393,100	11,844
VRM Class IV	337,220	780,537
Klamath Falls Resource Area (of the Lakeview District)		
VRM Class I	0	340
VRM Class II	33,500	2,961
VRM Class III	81,800	0
VRM Class IV	96,700	221,600
Totals for all western Oregon BLM lands		
VRM Class I	29,058	35,541
VRM Class II	199,296	59,306
VRM Class III	586,715	44,707
VRM Class IV	1,717,265	2,420,556

Management Objective

Retain the existing character of the landscape in Class II visual resource management areas.

Management Directions

- The designated, suitable, and eligible wild and scenic rivers that are classified as scenic; the Cascade-Siskiyou National Monument; the Pacific Crest National Scenic Trail; the Mt. Hood Corridor; the Bull Run Watershed Management Unit; and the Yaquina Outstanding Natural Area would be designated as Class II visual resource management areas. See *Table 2-38 (District-specific miscellaneous National Landscape Conservation System designated lands)*.
- These areas would be managed for low levels of change to the characteristic landscape. Management activities would be seen, but would not attract the attention of the casual observer. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Management Objective

Partially retain the existing character of the landscape in Class III visual resource management areas.

Management Directions

- Designated, suitable, and eligible wild and scenic rivers that are classified as recreational would be designated as Class III visual resource management areas.
- These areas would be managed for moderate levels of change to the characteristic landscape. Management activities would attract attention, but would not dominate the view of the casual observer. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Management Objective

Allow for major modification of the existing character of the landscape in Class IV visual resource management areas.

Management Directions

- All lands that are not designated as Class I, Class II, or Class III would be designated as Class IV visual resource management areas.
- These lands would be managed for high levels of change to the characteristic landscape. Management activities would dominate the view and would be the major focus of viewer attention.

Water

Management Objectives

Maintain and restore water quality.

Maintain and restore the proper functioning condition of riparian and wetland areas to provide shade, sediment filtering, and surface and streambank stabilization.

Management Directions

- Priority for restoration, road maintenance, or road decommissioning would be given to projects that reduce chronic sediment inputs along stream channels and floodplains in source water areas.
- Prescribed burns would be applied in riparian management areas to reduce the potential for uncharacteristic wildfires.
- Best management practices (see *Appendix I - Water*) would be implemented to meet water quality standards.

Riparian Management Area Land Use Allocation for the Nonforest Areas of the Medford District and the Klamath Falls Resource Area of the Lakeview District

The following management directions are common to Alternatives 1, 2, and 3, but are specific to the nonforest areas of the riparian management areas.

Riparian management areas would be delineated by the water influence zone as indicated by hydrophilic vegetation.

Management Objective

Maintain and restore the proper functioning condition of riparian and wetland areas.

Management Directions

- Livestock grazing in riparian management areas would be managed at a level that allows the maintenance or development of the proper functioning condition of riparian and wetland plant communities. Methods would include installing and maintaining livestock exclosures, managing season of use and intensity, and implementing other appropriate techniques.
- Perennial and intermittent streams, wetlands, lakes, and natural ponds would be managed to maintain, improve, or restore floodplain connectivity.
- Conifer encroachment would be removed in riparian management areas unless conifers are an appropriate component of the riparian community type.

Wilderness Characteristics

Management Objective

Maintain wilderness characteristics on designated BLM-administered lands.

Management direction

- Wilderness characteristics would be maintained on the BLM-administered lands listed in *Table 2-44* (*Lands with wilderness characteristics maintained under special management for Alternatives 1, 2, and 3)* and shown in *Figure 2-6 (Lands with wilderness characteristics)*, excluding the portions of those areas on O&C lands that are suitable for permanent timber production.

Wild Horses

Management Objective

Maintain a healthy population of wild and free-roaming horses in the Pokegama Herd Management Area of the Klamath Falls Resource Area of the Lakeview District. See *Figure 2-7 (Location of Pokegama Herd Management Area)*.

Management Directions

- Wild horses would be gathered to maintain the established appropriate management level of 30 to 50 head, as follows:
  - — During gathers, the number of horses would normally be reduced to the low end of the appropriate management level, and then allowed to increase to the top end of the appropriate management level before another gather occurred.
  - — Wild horses would be removed from private land at private landowner request.
  - — Wild horses straying outside the herd management area would be removed or returned to the herd management area.
- Horses from other herd areas would be periodically introduced to the Pokegama herd to maintain the viable genetic diversity of the herd.

Table 2-44. Lands With Wilderness Characteristics Maintained Under Special Management (Alternatives 1, 2, And 3)

BLM Lands	Total (acres)	Identified Wilderness Characteristics		
		Naturalness	Outstanding Opportunities for Solitude	Outstanding Opportunities for Primitive, Unconfined Recreation
Salem District				
Bull of the Woods/Opal Creek Additions	3,203	X	X	X
South Fork Clackamas River	919	X	X	
Salmon Huckleberry Additions	637	X	X	X
Mount Hebo	81	X	X	X
Eugene District				
No lands were identified with wilderness characteristics.				
Roseburg District				
Special management would not apply to lands with wilderness characteristics.				
Coos Bay District				
Wasson Creek	3,408	X	X	X
Medford District				
Special management would not apply to lands with wilderness characteristics.				
Klamath Falls Resource Area				
No lands were identified with wilderness characteristics.				
Total Acres – All Districts	**8,248**			

- Water developments would be maintained or established to provide season-long water for wild horses within the herd management area. See *Appendix M - Grazing* and *Figure 2-4 (Location of proposed range improvements in the Klamath Falls Resource Area)*.
- The appropriate management level would be adjusted when:
  — monitoring data identified a change in long-term forage availability
  — health assessments and evaluations determined that wild horse numbers or patterns of grazing use were a contributing factor toward not meeting one or more of the Oregon standards for rangeland health

Wildlife

Management Objective

Provide for the conservation of species that are listed or are candidates for listing under the Endangered Species Act, or are state-listed species where the BLM has entered into a cooperative management agreement for a species.

Management Directions

- Management would be consistent with approved recovery plans and designated critical habitat, including the protection and restoration of habitat and other actions designed to recover populations of species.
- Species listed under the state of Oregon Endangered Species Act would be managed in accordance with cooperative management agreements.
- Wildlife species with approved recovery plans include the marbled murrelet, bald eagle, and the Columbia River population of the Columbia white-tailed deer. Management would be consistent with these recovery plans. See *Appendix H - Wildlife*.
- For the western snowy plover, the BLM's contribution to recovery would consist of the following directions:
  - — Public use of nesting areas would be managed during the nesting season to reduce activities that would substantially lower nesting success.
  - — Predator controls would be employed when data demonstrates that loss of nests due to predators substantially reduces overall nesting success.
  - — Control measures would be implemented if invasive plant species are creating a loss of suitable nesting habitat.
  - — Measures would be implemented for the support of coastal dune processes to sustain suitable western snowy plover nesting habitat.
- Activities would be restricted from March 1 through September 30 within threshold distances of active northern spotted owl nest sites identified through consultation. Restrictions on activities would usually not be required for nest sites located near roads or in other areas of permanent human activity.
- Bald eagle management areas would be managed to protect current suitable nesting and winter roosting habitat and to develop replacement habitat for nesting and roosting. Management activities would include prescribed burns and other treatments, such as commercial thinning and density management, to reduce fuel loading and accelerate growth. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas)*.

Management Objective

State-listed species where the BLM has not entered into a conservation agreement and species listed by the BLM as sensitive species will be managed on public domain lands and on O&C lands where protection does not conflict with sustained yield forest management in areas dedicated to timber production. This is so that special status designation would no longer be warranted, and so that actions will not contribute to the need to list the species under the Endangered Species Act. Where conflicts with sustained yield management occur, protections on O&C lands will only be applied to prevent extinction of a species even if it is not yet listed under the Endangered Species Act.

Management Directions

- Management would be consistent with approved conservation plans. See *Appendix H - Wildlife*.
- Protection measures include altering the type, timing, and intensity of actions; and other strategies designed to maintain populations of species.
- For the Columbia white-tailed deer, the record of decision for the North Bank Habitat Management Area would continue to be implemented. The final environmental impact statement and record of decision for the North Bank Habitat Management Area are incorporated by reference.
- For greater sage grouse, the Greater Sage Grouse Conservation Assessment and Strategy for Oregon would continue to be implemented. It is incorporated by reference.

Management Objective

Assist the Oregon Department of Fish and Wildlife in meeting big game management goals on public domain lands and on O&C lands where the goals are consistent with the O&C Act.

Management Directions

- Roads would be closed to motorized vehicles within the designated deer and elk winter range between November 1 and April 15 to achieve a maximum level of 1.5 miles of open road per square mile of federal land. Administrative use of all roads would occur, as needed, on a year-round basis. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas)*.
- Roads would be closed to motorized vehicles, except for administrative purposes, between November 1 and April 15 in the Klamath Winter Range. This includes the deer-season road closure areas of South Gerber, Willow Valley, Harpold Ridge, Bryant Mountain, North Bryant, Windy Ridge, and Lorella. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas)*.
- Visual barriers from 25 to 50 feet wide would be maintained, where appropriate, along roads within the designated deer and elk winter range. See *Map 2-18 (Bald eagle, deer, and elk habitat management areas)*.
- Native forage species would be planted along roadsides, skid trails, and on landings, or forage plots would be created when forage quality is determined to be a limiting factor in achieving management goals of the Oregon Department of Fish and Wildlife.
- Forage would be included when implementing silvicultural treatments or habitat management activities.
- Encroaching western juniper would be thinned or removed to maintain and improve forage for big game. These treatments would protect old juniper and would consider edge effect, escape cover, and forage.

Administrative Actions

Administrative actions are routine transactions and activities that are required to serve the public and to provide optimum management of resources.

Administrative actions would occur at approximately the same levels as during the past 10 years. These actions would include:

- competitive and commercial recreation activities
- lands and realty actions (including the issuance of grants, leases, and permits)
- resolution of trespasses
- facility maintenance
- improvements to existing facilities
- road maintenance
- issuance of hauling permits
- recreation site maintenance
- recreation site improvement
- hazardous materials removal
- law enforcement
- surveys to determine legal land or mineral estate ownership
- engineering support to assist in mapping
- designing and implementing projects
- sampling (specifically using the *3P fall, buck, and scale* sampling method)
- incidental removal of trees, snags, or logs for safety or operational reasons

Administrative Withdrawal Land Use Allocation

The administrative withdrawal land use allocation includes lands that are withdrawn from the harvest land base for a variety of reasons, including:

- areas dedicated to specific purposes (such as roads, buildings, maintenance yards, quarries, and other facilities and infrastructure)
- areas of critical environmental concern and recreation sites (such as campgrounds, trails, and day use areas)
- areas that are identified through the timber production capability classification (TPCC) system as withdrawn from sustained yield timber production or identified as nonforest

Management Objectives and Management Directions

The management objectives and management directions for areas of critical environmental concern and recreation sites/facilities are addressed in the alternatives under the specific programs.

Areas identified as withdrawn from the harvest land base through the timber production capability classification system do not have specific management objectives or management directions. They may be managed similarly to the adjacent or surrounding land use allocations, if those uses are not incompatible with the reason for which the lands were withdrawn (as identified by the timber production capability classification codes). Additional areas would be periodically added to those areas withdrawn through updates to the timber production capability classification system when on-the-ground examinations indicate an area meets the criteria for withdrawal.

Roads, maintenance yards, buildings, quarries, and other facilities also do not have specific management objectives or management directions, but would be managed for the purpose for which the facilities were constructed.

Unique Land Use Allocations and Management Objectives and Directions Under Alternatives 1, 2, and 3

This section describes management that is unique to the individual Alternatives 1, 2, and 3. The previous section identified the common land use allocations, management objectives, and management directions that would apply to these three alternatives.

No Action Alternative

For details about the No Action Alternative, refer to the 1995 resource management plans for the districts of Salem, Eugene, Coos Bay, Roseburg, and Medford, and the Klamath Falls Resource Area of the Lakeview District, as amended (see *Chapter 1*).

Plan maintenance for the 1995 resource management plans is documented in district annual program summaries and monitoring reports that were published from 1996 through 2005. These district annual program summaries and monitoring reports are incorporated by reference.

See *Map 2-19 (Land use allocations under the No Action Alternative).* Also see the map packet (*Maps 2-19A, 2-19B, and 2-19C*) for detailed views of the land use allocations.

Alternative 1

This action alternative is described in terms of those land use allocations that vary by alternative, which include:

- Late-Successional Management Area
- Riparian Management Area
- Timber Management Area
- Areas Of Critical Environmental Concern And Research Natural Areas

Late-Successional Management Area

Under Alternative 1, the late-successional management area land use allocation would be established as follows:

- In the areas shown on *Map 2-20 (Land use allocations under Alternative 1)*. Also see the map packet (*Maps 2-20A, 2-20B, and 2-20C*) for detailed views of the land use allocations.
- In the areas of contiguous marbled murrelet habitat and recruitment habitat (stands capable of becoming habitat for the marbled murrelet within 25 years) that are within 0.5 mile of any occupied site. Occupation would be determined by the presence of an active nest, a fecal ring, eggshell fragments, or birds demonstrating occupying behavior (i.e., flying below the forest canopy within or adjacent to a stand).

Management Objective

Maintain or promote the development of structurally complex forests.

Management Directions

- Thinning would be applied to promote the development of structurally complex forests. Timber from thinning would be available for sale.
- Snags and coarse woody debris would be retained or created when thinning stands of larger trees, which are generally those with a stand average diameter of quadratic mean diameter (QMD) greater than 14 inches.

  See *Table 2-45 (Snag and coarse woody debris [CWD] retention or creation for stands of larger trees, Alternative 1))* and *Figure 2-1 (Forest vegetation series)***.**
- Snags and coarse woody debris would be retained or created in thinning harvests in stands of smaller trees, which are generally those with a stand average diameter of quadratic mean diameter (QMD) less than or equal to 14 inches.

  See *Table 2-46 (Snag and coarse woody debris [CWD] retention or creation for stands of smaller trees, Alternative 1)* and *Figure 2-1 (Forest vegetation series)***.**

- Snag and coarse woody debris retention or creation requirements would be met by any combination of new snags and coarse woody debris from live conifer trees and the retention of existing levels of snags (Class I and Class II) and coarse woody debris (Class I and Class II).
- Snag and coarse woody debris retention or creation levels would be met at the scale of the harvest unit. Snag and coarse woody debris levels per acre would be variable within harvest units.
- Salvage would not occur in stands that are disturbed by a fire, windstorm, disease, or insect infestations, except to reduce hazards in wildland urban interface areas.

Table 2-45. Snag And Coarse Woody Debris (CWD) Retention Or Creation For Stands Of Larger Trees, Alternative 1

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	6 tpa	> 14 inches dbh	240 feet/acre	> 14 inches	> 20 feet
Douglas fir and true firs	3 tpa	> 14 inches dbh	120 feet/acre	> 14 inches	> 16 feet
Tanoak	4 tpa	> 14 inches dbh	120 feet/acre	> 14 inches	> 16 feet

tpa - trees per acre
dbh - diameter breast height
feet - linear feet

Table 2-46. Snag And Coarse Woody Debris (CWD) Retention Or Creation For Stands Of Smaller Trees, Alternative 1

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	3 tpa	> 12 inches dbh	120 feet./acre	> 12 inches	> 20 feet
Douglas fir and true firs	2 tpa	> 10 inches dbh	60 feet/acre	> 10 inches	> 16 feet
Tanoak	2 tpa	> 10 inches dbh	60 feet/acre	> 10 inches	> 16 feet

tpa - trees per acre
dbh - diameter breast height
feet - linear feet

Map 2-19. Land use allocations under No Action Alternative

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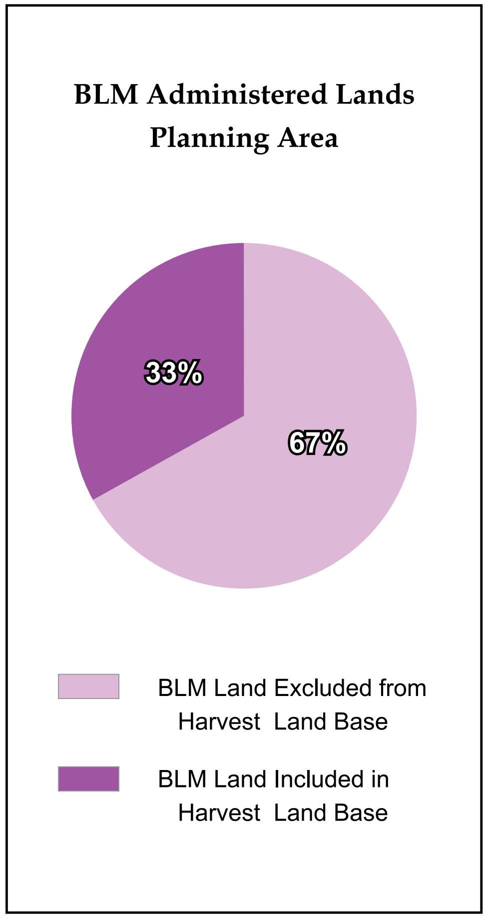

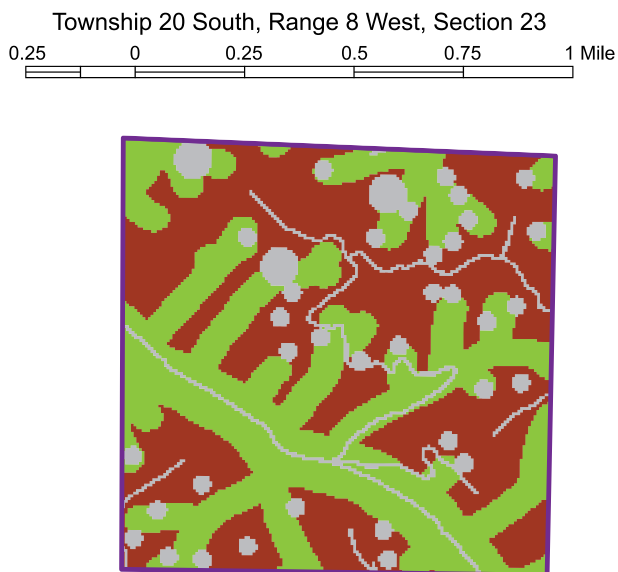

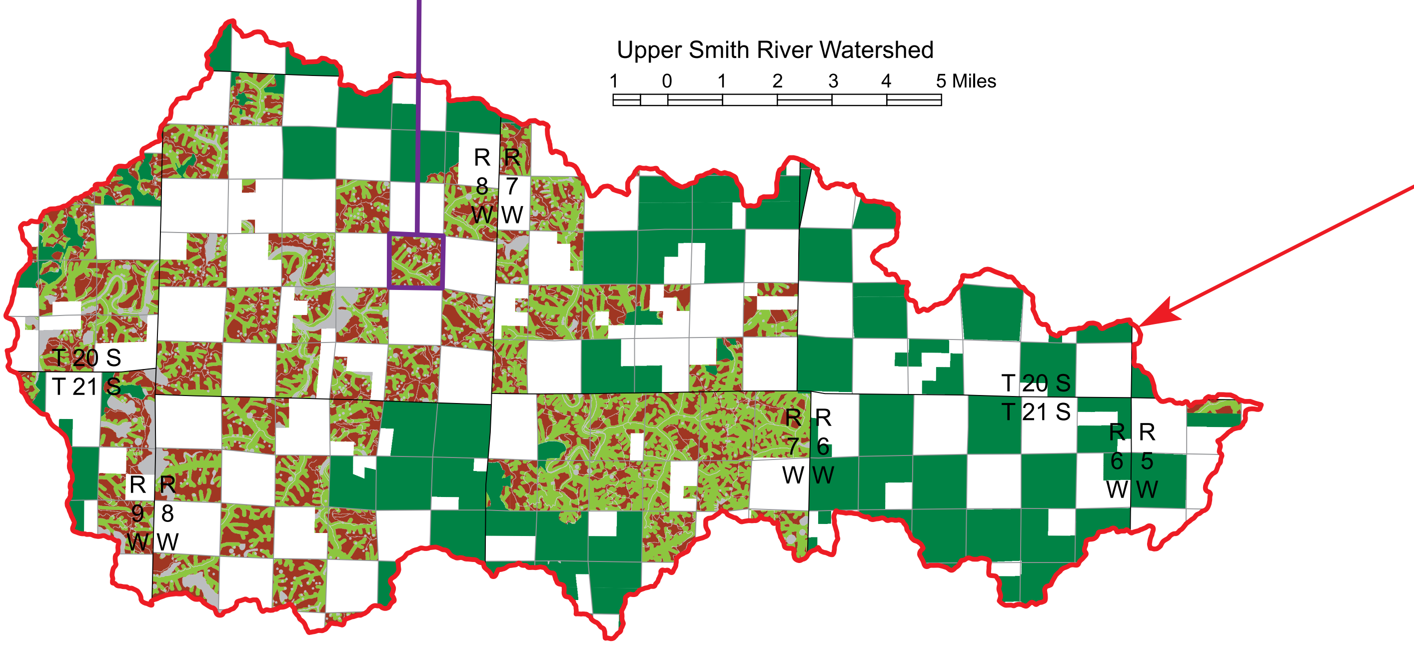

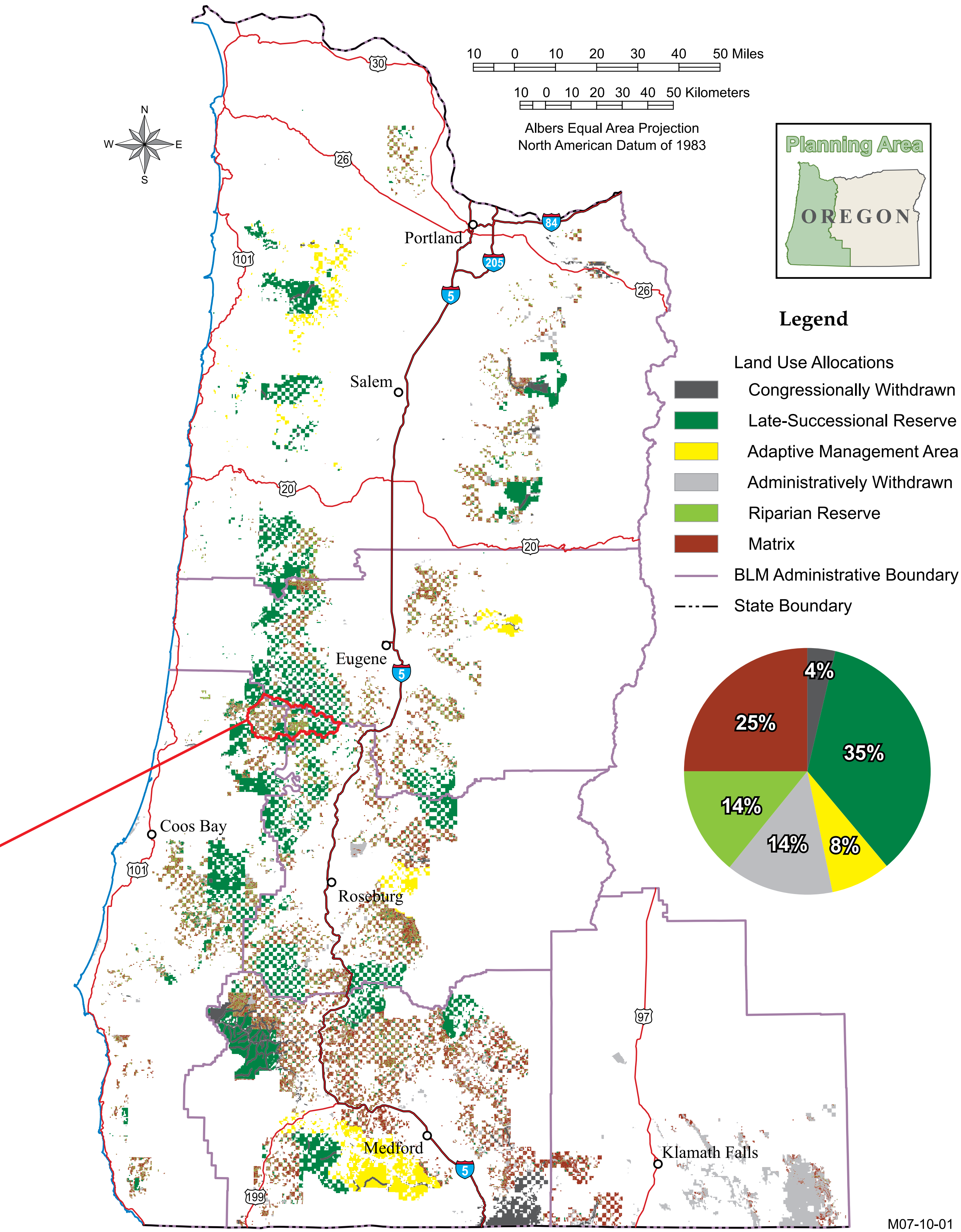
10 0 10 20 30 40 50 Miles
10 0 10 20 30 40 50 Kilometers
Albers Equal Area Projection
North American Datum of 1983
Planning Area
OREGON
Legend
Land Use Allocations
Congressionally Withdrawn
Late-Successional Reserve
Adaptive Management Area
Administratively Withdrawn
Riparian Reserve
Matrix
BLM Administrative Boundary
State Boundary
4%
35%
8%
14%
14%
25%
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
30
26
84
205
5
101
20
97
199
N
S
E
W
M07-10-01

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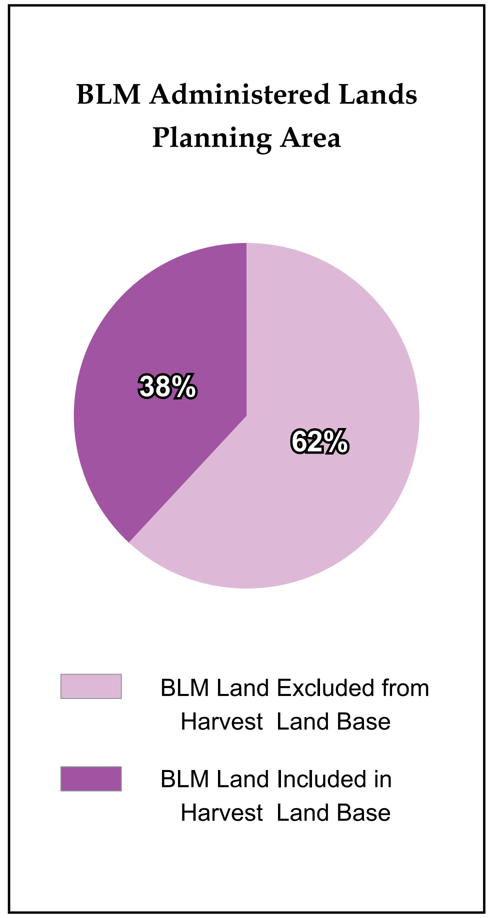

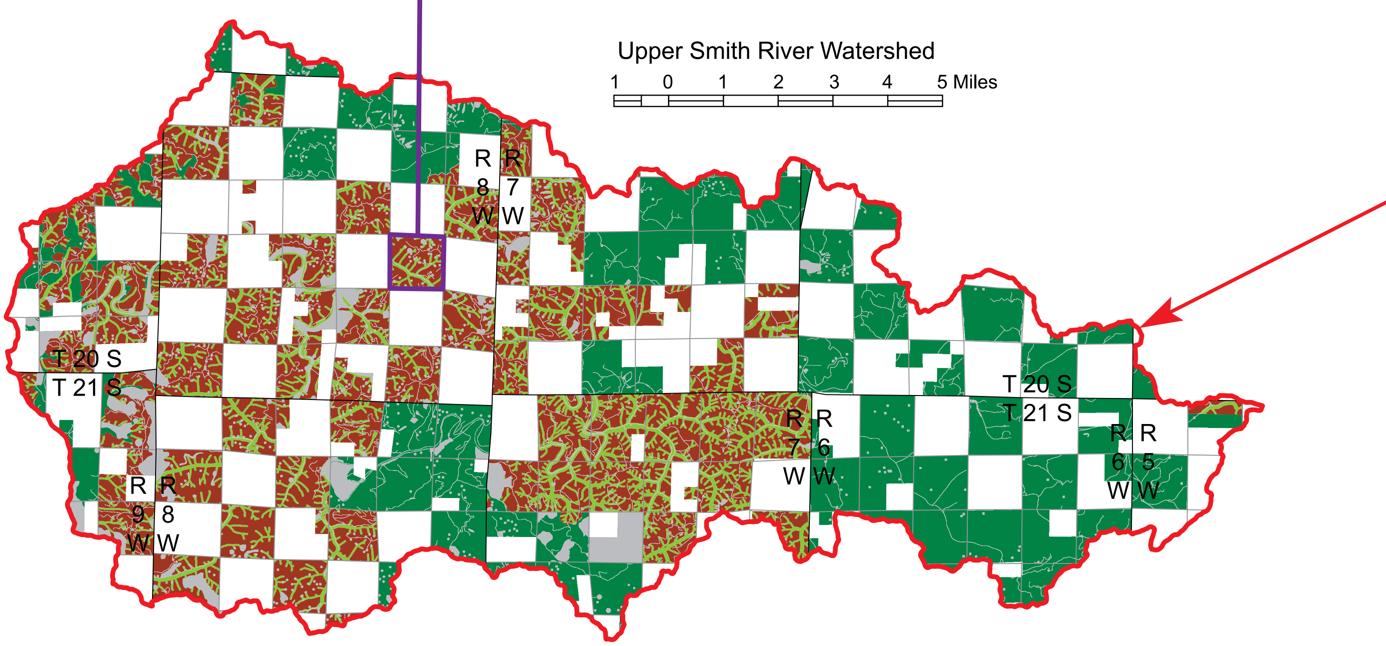

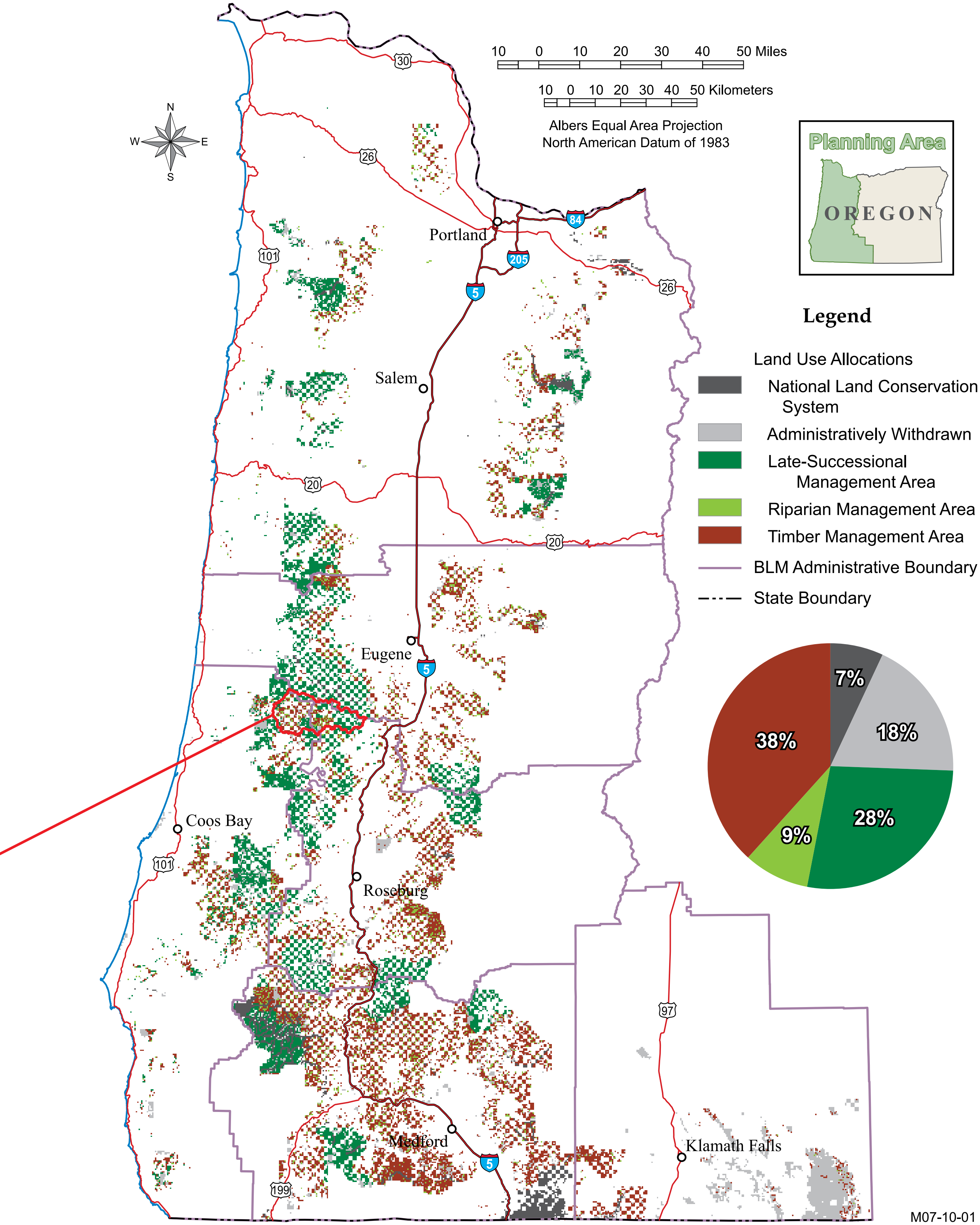
10 0 10 20 30 40 50 Miles
10 0 10 20 30 40 50 Kilometers
Albers Equal Area Projection
North American Datum of 1983
N
S
E
W
Planning Area
OREGON
Legend
Land Use Allocations
National Land Conservation System
Administratively Withdrawn
Late-Successional Management Area
Riparian Management Area
Timber Management Area
BLM Administrative Boundary
State Boundary
7%
18%
28%
9%
38%
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
30
26
101
84
205
5
20
97
199
M07-10-01

Riparian Management Area

Under Alternative 1, the riparian management area land use allocation would be established according to *Table 2-47 (Criteria established for the riparian management area land use allocation under Alternative 1)*. For a representation of those areas, see *Map 2-20 (Land use allocations under Alternative 1)*. Also see the map packet (*Maps 2-20A, 2-20B, and 2-20C*) for detailed views of the land use allocations.

Note: The *site-potential tree height* for the purposes of determining the riparian management areas would be based on district averages measured at a scale that is no finer than the fifth-field watershed.

Management Objectives

Maintain or promote the development of mature or structurally complex forests.

Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood; and root masses that stabilize streambanks.

Management Directions

- Thinning and other silvicultural treatments would be applied along smaller-order streams (generally, first-, second-, and third-order streams) to promote development of mature forests.
- Thinning and other silvicultural treatments would be applied along larger-order streams (generally, fourth-order and larger streams) to promote development of structurally complex forests.
- Snags and coarse woody debris would be retained in thinning operations, except for safety or operational reasons (e.g., maintaining access to roads and facilities).
- Salvage would not occur in stands that are disturbed by a fire, windstorm, disease, or insect infestations, except to reduce hazards in wildland urban interface areas.
- Timber from thinning and salvage operations would be available for sale.

Table 2-47. Criteria Established For The Riparian Management Area Land Use Allocation Under Alternative 1

Riparian Management Areas	Distance
Perennial and Intermittent Fish-Bearing Streams and Perennial Non-Fish-Bearing Streams	One site-potential tree height on each side of a stream extending from the edge of an active stream channel and including its channel migration zone.
Intermittent Non-Fish-Bearing Streams	Half of one site-potential tree height on each side of a stream extending from the edge of its active stream channel.
Natural Wetlands	Half of one site-potential tree height extending from a body of water or wetland to the outer edge of its riparian vegetation or to the extent of seasonally saturated soil, whichever is greatest.
Natural Lakes and Ponds	One site-potential tree height extending from a body of water to the outer edge of its riparian vegetation or to the extent of seasonally saturated soil, whichever is greatest.
Constructed Ponds and Wetlands	The body of water and the area to the outer edge of its riparian vegetation.
Nonforest Ecosystems on the East Side of the Klamath Falls Resource Area	The extent of the water influence zone as indicated by hydrophilic vegetation.

Timber Management Area

Under Alternative 1, the timber management area land use allocation would be established to consist of the commercial forest lands that are not included in the following land use allocations:

- lands of the National Landscape Conservation System
- late-successional management areas
- riparian management areas
- administratively withdrawn areas

See *Map 2-20 (Land use allocations under Alternative 1)*. Also see the map packet (*Maps 2-20A, 2-20B, and 2-20C*) for detailed views of the land use allocations.

Management Objectives

Manage forests to achieve a high level of continuous timber production that could be sustained through a balance of growth and harvest.

Offer for sale an annual allowable sale quantity.

Management Directions

- Timber would be offered for sale from regeneration harvest units. See *Table 2-48 (Timber offered for sale from regeneration harvest units, Alternative 1)* and *Figure 2-2 (Sustained yield units)*.
- Timber would be offered for sale from commercial thinning harvest units. See *Table 2-49 (Timber offered for sale from commercial thinning harvest units, Alternative 1)*.

Table 2-48. Timber Offered For Sale From Regeneration Harvest Units, Alternative 1

District	10-Year Volume (mmbf)
Salem	900
Eugene	1,070
Roseburg	570
Coos Bay	590
Medford	952
Klamath Falls Resource Area (Lakeview District)	90

Table 2-49. Timber Offered For Sale From Commercial Thinning Harvest Units, Alternative 1

District	10-Year Volume (mmbf)
Salem	100
Eugene	100
Roseburg	60
Coos Bay	60
Medford	68
Klamath Falls Resource Area (Lakeview District)	0

- Annual offering of the allowable sale quantity would potentially vary up to 10% from the declared allowable sale quantity to allow for variations in yield from different harvest areas and to allow for the preparation and sale of logical, operationally feasible, and economically viable sale areas.
- Cumulative total offering of the allowable sale quantity would be maintained within 5% over two or more years by adjusting annual offerings within the allowed 10% variation.
- Regeneration harvests would be conducted to remove volume and replace slower growing stands with young, rapidly growing stands. Generally, regeneration harvests would be scheduled for stands to maximize potential growth and yield. Regeneration harvests would be applied to younger stands for purposes that include management of age class distribution, management of diseased stands, and management of overstocked stands with poor vigor and low crown ratio. The minimum age of stands that would be considered suitable for regeneration harvesting would be 40 years of age in the western hemlock and the tanoak vegetation series, and 60 years of age in the Douglas fir and true firs vegetation series. See *Figure 2-1 (Forest vegetation series)*.
- No merchantable material would be reserved from removal in regeneration harvest units. Noncommercial snags and coarse woody debris would be retained, except for safety or operational reasons.
- Commercial thinning would be applied to recover anticipated mortality; to adjust stand composition or dominance; to reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation; and to improve merchantability and value.
- Stand density would be maintained at levels between full occupancy and the onset of density-related mortality to the extent practical.
- Stands with a composition of commercially undesirable tree species or an inadequate stocking of desirable tree species would be converted to stands that are fully stocked with desirable tree species.
- Trees killed from disturbances (such as a fire, windstorm, disease, or insect infestation) would be salvaged to recover volume and economic value within the time necessary to avoid loss of value through deterioration.

Areas of Critical Environmental Concern and Research Natural Areas

Under Alternative 1, there would be 93 areas of critical environmental concern and research natural areas designated. See *Map 2-26 (Areas of critical environmental concern for Alternatives 1, 2, and 3)* and *Table 2-65 (Areas of critical environmental concern designated by alternative*). This map and table are located at the end of this chapter.

Management Objective

Maintain or restore important and relevant values in areas of critical environmental concern, which include research natural areas and outstanding natural areas.

Management direction

- Maintenance or restoration activities would occur to protect important and relevant values.

Alternative 2

This action alternative is described in terms of those land use allocations that vary by alternative, which include:

- Late-Successional Management Area
- Riparian Management Area
- Timber Management Area
- Areas of Critical Environmental Concern and Research Natural Areas
- Management Area Adjacent to the Coquille Forest

Late-Successional Management Area

Under Alternative 2, the Late-Successional Management Area land use allocation would be established as follows:

- In the areas shown on *Map 2-21 (Land use allocations under Alternative 2)*. Also see the map packet (*Maps 2-21A, 2-21B, and 2-21C*) for detailed views of the land use allocations.
- In the areas of contiguous marbled murrelet habitat and recruitment habitat (stands capable of becoming habitat for the marbled murrelet within 25 years) that are within 0.5 mile of occupied sites identified as of the end of the 2005 field season. Occupation would be determined by the presence of an active nest, a fecal ring, eggshell fragments, or birds demonstrating occupying behavior (i.e., flying below the forest canopy within or adjacent to a stand).

Management Objectives

Maintain habitat for the northern spotted owl and the marbled murrelet.

Promote the development of habitat for the northern spotted owl in stands that do not currently meet suitable habitat criteria.

Recover economic value from timber harvested after a stand-replacement disturbance, such as a fire, windstorm, disease, or insect infestation.

Management Directions

- Thinning would be applied to promote the development of mature or structurally complex forests, and to promote the development of suitable habitat for the northern spotted owl. Timber from thinning would be offered for sale.
- Snags and coarse woody debris would be retained or created when thinning stands of larger trees, which are generally those with a stand average diameter of quadratic mean diameter (QMD) greater than 14 inches.

  See *Table 2-50 (Snag and coarse woody debris [CWD] retention or creation for stands of larger trees, Alternative 2)* and *Figure 2-1 (Forest vegetation series)***.**
- Snags and coarse woody debris would be retained or created when thinning stands of smaller trees, which are generally those with a stand average diameter of quadratic mean diameter (QMD) less than or equal to 14 inches.

  See *Table 2-51 (Snag and coarse woody debris [CWD] retention or creation for stands of smaller trees, Alternative 2)* and *Figure 2-1 (Forest vegetation series)***.**
- Snag and coarse woody debris retention or creation requirements would be met by any combination of new snags and coarse woody debris from live conifer trees and the retention of existing levels of snags (Class I and Class II) and coarse woody debris (Class I and Class II).
- Salvage of timber after a stand-replacement disturbance–such as a fire, windstorm, disease, or insect infestation–would occur to recover economic value while retaining snags and coarse woody debris according to *Table 2-52 (Snag and coarse woody debris (CWD) retention for salvaging of timber after a stand-replacement disturbance, Alternative 2)*.
- Snag and coarse woody debris retention or creation levels would be met at the scale of the harvest unit. Snag and coarse woody debris retention would be variable per acre throughout the area salvaged. If sufficient snags or coarse woody debris of the minimum sizes were not available, an equivalent number of smaller snags or coarse woody debris would be retained. Noncommercial snags and coarse woody debris would be retained, except for safety or operational reasons.

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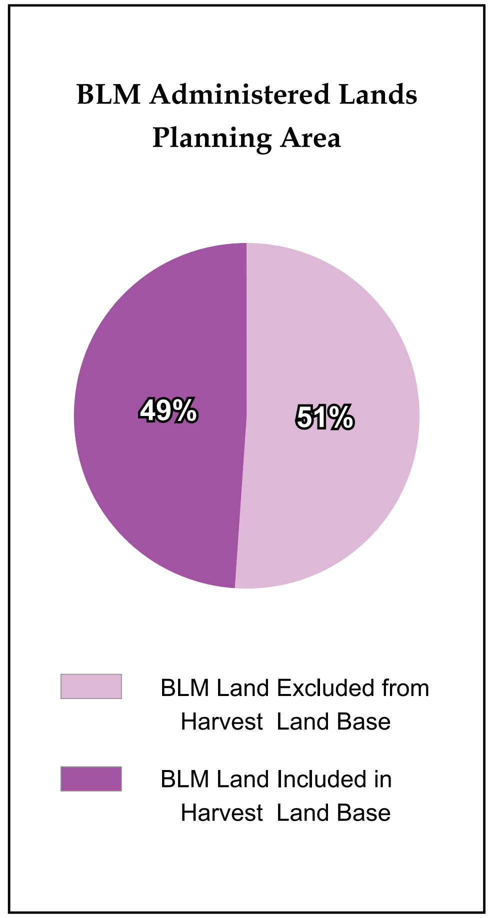
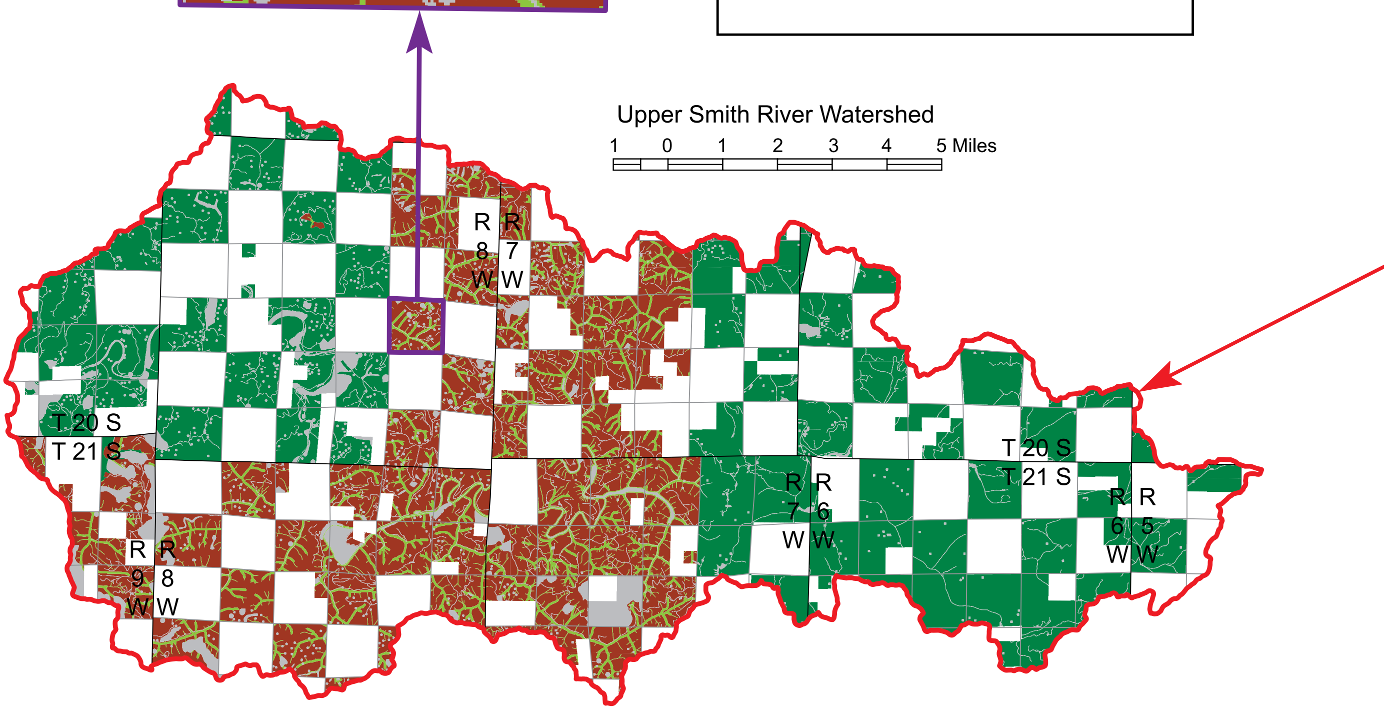
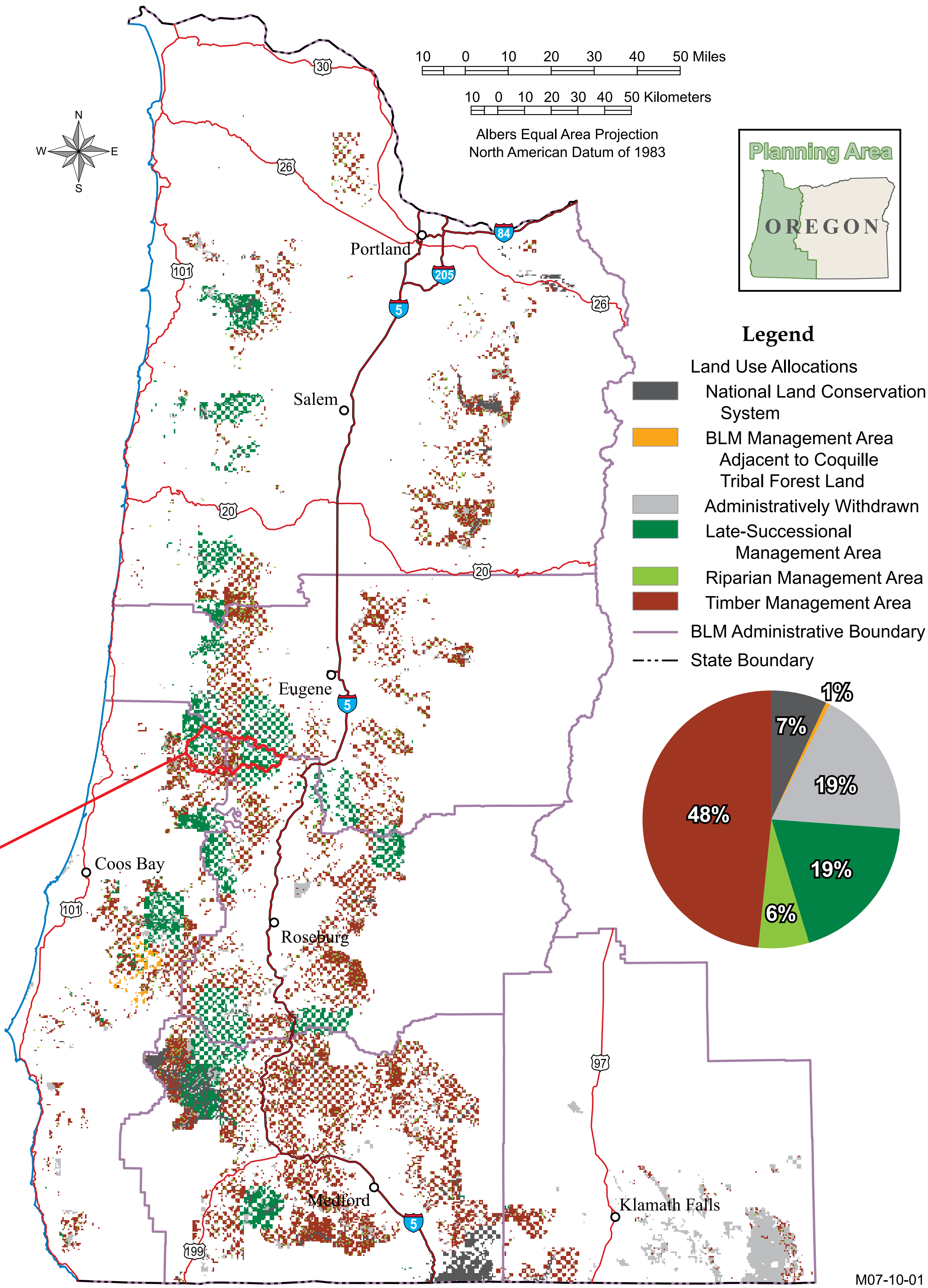
Township 20 South, Range 8 West, Section 23







10 0 10 20 30 40 50 Miles
10 0 10 20 30 40 50 Kilometers
Albers Equal Area Projection
North American Datum of 1983
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Planning Area
OREGON
Legend
Land Use Allocations
National Land Conservation System
BLM Management Area Adjacent to Coquille Tribal Forest Land
Administratively Withdrawn
Late-Successional Management Area
Riparian Management Area
Timber Management Area
BLM Administrative Boundary
State Boundary
1%
7%
19%
19%
6%
48%
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
30
26
101
84
205
5
20
97
199
M07-10-01

Table 2-50. Snag And Coarse Woody Debris (CWD) Retention Or Creation For Stands Of Larger Trees, Alternative 2

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	6 tpa	> 14 inches dbh	240 feet/acre	> 14 inches	> 20 feet
Douglas fir and true firs	3 tpa	> 14 inches dbh	120 feet/acre	> 14 inches	> 16 feet
Tanoak	4 tpa	> 14 inches dbh	120 feet/acre	> 14 inches	> 16 feet

tpa - trees per acre
dbh - diameter breast height
feet. - linear feet

Table 2-51. Snag And Coarse Woody Debris (CWD) Retention Or Creation For Stands Of Smaller Trees, Alternative 2

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	3 tpa	> 12 inches dbh	120 feet/acre	> 12 inches	> 20 feet
Douglas fir and true firs	2 tpa	> 10 inches dbh	60 feet/acre	> 10 inches	> 16 feet
Tanoak	2 tpa	> 10 inches. dbh	60 feet/acre	> 10 inches	> 16 feet

tpa - trees per acre
dbh - diameter breast height
feet. - linear feet

Table 2-52. Snag And Coarse Woody Debris (CWD) Retention For Salvaging Of Timber After A Stand-Replacement Disturbance, Alternative 2

Vegetation Series	Snag Retention or Creation		CWD Retention or Creation		
	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	8 tpa	> 20 inches dbh	480 feet/acre	> 20 inches	> 20 feet
Douglas fir and true firs	4 tpa	> 16 inches dbh	240 feet/acre	> 16 inches	> 16 feet
Tanoak	4 tpa	> 20 inches dbh	240 feet/acre	> 20 inches	> 20 feet

tpa - trees per acre
dbh - diameter breast height
feet. - linear feet

Riparian Management Area

Under Alternative 2, the Riparian Management Area land use allocation would be established according to *Table 2-53 (Zones and the zone-specific management directions of the riparian management area land use allocation under Alternative 2)*. For a representation of those areas, see *Map 2-21 (Land use allocations under Alternative 2)*. Also see the map packet (*Maps 2-21A, 2-21B, and 2-21C*) for detailed views of the land use allocations.

Management Objectives

Maintain or promote the development of mature or structurally complex forests.

Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood; and root masses that stabilize streambanks.

Management Directions Common to All Zones of the Riparian Management Areas

- Snags and coarse woody debris would be retained in thinning operations, except for safety or operational reasons.
- Salvage would not occur in stands that are disturbed by a fire, windstorm, disease, or insect infestations, except to reduce hazards in wildland urban interface areas.
- Timber from thinning and salvage operations would be available for sale.

Timber Management Area

Under Alternative 2, the Timber Management Area land use allocation would be established to consist of the commercial forest lands that are not included in the following land use allocations:

- Lands of the National Landscape Conservation System
- Late-Successional Management Area
- Riparian Management Area
- Administratively Withdrawn Areas
- Management Area Adjacent to the Coquille Forest

See *Map 2-21 (Land use allocations under Alternative 2)*. Also see the map packet (*Maps 2-21A, 2-21B, and 2-21C*) for detailed views of the land use allocations.

Management Objectives

Manage forests to achieve a high level of continuous timber production that could be sustained through a balance of growth and harvest.

Offer for sale an annual allowable sale quantity.

Management Directions

- Timber would be offered for sale from regeneration harvest units. See *Table 2-54 (Timber offered for sale from regeneration harvest units, Alternative 2)* and *Figure 2-2 (Sustained yield units)*.
- Timber would be offered for sale from commercial thinning harvest units. See *Table 2-55 (Timber offered for sale from commercial thinning harvest units, Alternative 2)*.
- Annual offering of the allowable sale quantity would potentially vary up to 10% from the declared allowable sale quantity to allow for variations in yield from different harvest areas and to allow for the preparation and sale of logical, operationally feasible, and economically viable sale areas.
- Cumulative total offering of the allowable sale quantity would be maintained within 5% over two or more years by adjusting annual offerings within the allowed 10% variation.
- Regeneration harvests would be conducted to remove volume and replace slower-growing stands with young, rapidly growing stands. Generally, regeneration harvests would be scheduled for stands to maximize potential growth and yield. Regeneration harvests would be applied to younger stands for purposes that include the management of age class distribution, the management of diseased stands, and the management of overstocked stands with poor vigor and low crown ratio. The minimum age of stands that would be considered suitable for regeneration harvesting would be 40 years of age in the western hemlock and the tanoak vegetation series, and 60 years of age in Douglas fir and true firs vegetation series.

Table 2-53. Zones And The Zone-Specific Management Directions Of The Riparian Management Area Land Use Allocation Under Alternative 2

Zones	Zone-Specific Management Directions
Perennial and Intermittent Fish-Bearing Streams and Perennial Non-Fish-Bearing Streams	
Streambank zone (0 to 25 feet)[a]	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
Water influence zone (25 to 100 feet)	• Harvesting where mature or structurally complex forest stands already exist would not be allowed, except for safety or operational reasons. • 80% effective shade or potential shade from 25 to 60 feet, whichever is less, would be maintained. • At least 50% canopy closure from 60 to 100 feet would be maintained after harvests. • Snag and coarse woody debris would be retained, except for safety or operational reasons. • Thinning and other silvicultural treatments would be applied along smaller-order streams (generally, first-, second-, and third-order streams) to promote the development of mature forests. • Thinning and other silvicultural treatments would be applied along larger-order streams (generally, fourth-order and larger streams) to promote the development of structurally complex forests.
[a] Measured from the edge of the channel migration zone.	
Debris-Flow Prone[b] Intermittent Streams	
Streambank zone (0 to 25 feet) [extends from unstable area to fish-bearing stream]	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
Debris-Flow Prone Intermittent Streams	
Water influence zone (25 to 100 feet) [extends from unstable area to fish-bearing stream]	• Harvesting where mature or structurally complex forest stands already exist would not be allowed, except for safety or operational reasons. • Snag and coarse woody debris would be retained, except for safety or operational reasons. • Thinning and other silvicultural treatments would be applied along smaller-order streams (generally, first-, second-, and third-order streams) to promote development of mature forests.
[b] Intermittent streams that are below unstable headwalls (as identified by the timber production capability classification [TPCC] codes indicating significant instability [i.e., FGNW, FPNW, and FGR2]) that would periodically deliver large wood to fish-bearing streams. Intermittent streams that would not deliver large wood to fish-bearing streams because of geomorphic conditions (such as stream junction angle and low stream gradient) or roads would not be included.	
Lakes, Natural Ponds, and Wetlands	
Greater than 1/4 acre (0 to 25 feet)[c]	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
Greater than 1/4 acre (25 to 100 feet[2])	• At least 50% of the existing live tree basal area or 110 square feet of basal area per acre, whichever is greater, would be retained. • Retention would favor trees greater than 20 inches dbh.
Less than 1/4 acre (0-50 feet[2])	• At least 50% of the existing live tree basal area or 110 square feet of basal area per acre, whichever is greater, would be retained. • Retention would favor trees greater than 20 inches dbh.
[c] Measured from the high waterline or wetland boundary, whichever is greater.	
Constructed Ponds, Ditches, and Canals	
Streambank zone (0 to 25 feet)	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
Intermittent Non-Fish-Bearing Streams	
Streambank zone (0 to 25 feet)	• Ground-based harvesting equipment would not be allowed. • 12 conifer trees per acre would be retained. • Shrubs, forbs, and noncommercial trees would be retained, except for safety or operational reasons.

Table 2-54. Timber Offered For Sale From Regeneration Harvest Units, Alternative 2

District	10-Year Volume (mmbf)
Salem	1,610
Eugene	1,520
Roseburg	990
Coos Bay	1,320
Medford	1,296
Klamath Falls Resource Area (Lakeview District)	90

Table 2-55. Timber Offered For Sale From Commercial Thinning Harvest Units, Alternative 2

District	10-Year Volume (mmbf)
Salem	110
Eugene	130
Roseburg	80
Coos Bay	110
Medford	14
Klamath Falls Resource Area (Lakeview District)	0

- Commercial thinning would be applied to recover anticipated mortality; adjust stand composition or dominance; reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation; and improve merchantability and value.
- Stand density would be maintained at levels between full occupancy and the onset of density-related mortality to the extent practical.
- Stands with a composition of commercially undesirable tree species or an inadequate stocking of desirable tree species would be converted to stands that are fully stocked by desirable tree species.
- Trees killed from disturbances (such as a fire, windstorm, disease, or insect infestation) would be salvaged to recover volume and economic value within the time necessary to avoid loss of value through deterioration.

Areas of Critical Environmental Concern and Research Natural Areas (Land Use Allocations)

Under Alternative 2, there would be 94 areas of critical environmental concern and research natural areas designated. At the end of this chapter, see *Map 2-26 (Areas of critical environmental concern under Alternatives 1, 2, and 3)* and *Table 2-65 (Areas of critical environmental concern designated by alternative*). This map and table are located at the end of this chapter.

Management Objective

Maintain or restore important and relevant values in areas of critical environmental concern, which include research natural areas and outstanding natural areas.

Management Direction

- Maintenance or restoration activities would occur to protect important and relevant values.

Management Area Adjacent to the Coquille Forest Land Use Allocation

Under Alternative 2, a management area adjacent to the Coquille Forest would be established. See *Figure 1-1 (Coquille Forest and adjacent BLM-administered lands)* in *Chapter 1*.

Management Objective

Coordinate the management of the adjacent BLM-administered lands with the Coquille Forest lands.

Management Directions

- The Coquille Tribe's September 2006 *Management Direction for Tribal Cooperative Management Areas* document provides the management direction for the Coquille Forest. The management of the 15,000 acres of BLM-administered lands that are adjacent to the Coquille Forest would adopt the management directions in this tribal plan for managing the comparable resources in this adjacent area. Those management directions are incorporated by reference. Since the management in this adjacent area would be in a manner that is consistent with the tribal plan, the tribal plan would be considered by the BLM to conform to the BLM's resource management plans in its entirety.

  See *Figure 1-1 (Coquille Forest and adjacent BLM-administered lands)* in *Chapter 1*.

Riparian Management Areas

Note: The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

See *Table 2-56 (Criteria established for the riparian management areas of the BLM-administered lands that are adjacent to the Coquille Forest as part of Alternative 2)*.

Forest Management

Note: The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- A well-distributed pattern of early and mid-seral stands would be maintained.
- A minimum of 120 linear feet of logs per acre in a cutting area (comprised of logs that are at least 16 inches in diameter at the large end, and at least 16 feet in length) would be retained.
- From 0 to 6 green conifer trees would be retained after regeneration harvests to provide a source of snag recruitment.
- Stands would be managed under an average rotation age of 80 years, but regeneration harvests would be allowed in stands as young as 60 years of age to develop the desired age class distribution across the landscape and to provide for some commodity output.

Soils and Water

Note: This management direction would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- The best management practices set forth in the plan for the tribal cooperative management area would be applied during all ground- and vegetation-disturbing activities.

Federally Listed Species under the Endangered Species Act

<u>Note:</u> The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- Field surveys would be conducted, according to protocols and other established procedures, unless surveys are deemed unnecessary through project planning and environmental assessment.
- Consideration would be given to modifying, relocating, or abandoning proposed actions to avoid contributing to the need to list a federal candidate species based on consultation with the appropriate regulatory agency.

Roads

<u>Note:</u> The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- New stream-crossing structures would be designed to accommodate at least a 100-year flood, including the associated bedload and debris.
- Fish passage would be provided and maintained at all road crossings of existing and potential fish-bearing streams.

Table 2-56. Criteria Established For The Riparian Management Areas Of The Lands That Are Adjacent To The Coquille Forest As Part Of Alternative 2

Perennial and Intermittent Fish-Bearing Streams	
0 to 25 feet	• Avoid harvesting, except for restoration purposes. • Require full suspension during cable logging. • Leave any trees damaged or felled during logging activities.
25 to 50 feet	• Manage for mature forest conditions; maintain a minimum of 80% effective stream shade. • Retain no less than 50% canopy cover. • Actively manage, where necessary, to achieve desired future conditions in a timely manner. • Allow no harvesting where mature forest conditions exist or when mature forest is achieved. • Require full suspension during cable logging, whenever feasible, or else require one-ended suspension. • Limit ground-based equipment, when possible. • Retain all dead and downed material that is present prior to an operation.
50 to 100 feet	• Retain 10 to 45 conifer trees per acre or per 35 to 157 square feet of basal area, which is 20 to 90 trees per 1,000 feet. • Retain all snags if safety allows. • Retain all dead and downed material that is present prior to an operation.
Perennial Non-Fish-Bearing Streams	
0 to 25 feet	• Avoid harvesting, except for restoration purposes. • Require full suspension during cable logging. • Leave any trees damaged or felled during logging activities.
Perennial Non-Fish-Bearing Streams	
25 to 50 feet	• Manage for mature forest conditions; maintain a minimum of 80% effective stream shade. • Retain no less than 50% canopy cover. • Actively manage, where necessary, to achieve desired future conditions in a timely manner. • Allow no harvesting where mature forest conditions exist or when mature forest is achieved. • Require full suspension during cable logging, whenever feasible. • Retain all dead and downed material that is present prior to an operation.
Intermittent Non-Fish-Bearing Streams	
	• Maintain the integrity of the stream channel. • Retain 10 to 15 conifer trees per acre; or per 35 to 45 square feet of basal area, which is 20 to 30 trees per 1,000 feet, where operationally feasible. • Retain all snags if safety allows. • Retain all dead and downed material that is present prior to the operation.

Alternative 3

This action alternative is described in terms of those land use allocations that vary by alternative, which include:

- General Landscape Area
- Riparian Management Area
- Areas of Critical Environmental Concern and Research Natural Areas
- Management Area Adjacent to the Coquille Forest

General Landscape Area

Under Alternative 3, the General Landscape Area land use allocation would consist of all lands other than:

- Lands of the National Landscape Conservation System
- Riparian Management Areas
- Administratively Withdrawn Areas
- Lands Adjacent to the Coquille Forest

See *Map 2-22 (Land use allocations under Alternative 3)*. Also see the map packet (*Maps 2-22A, 2-22B, and 2-22C*) for detailed views of the land use allocations.

Management Objectives

- Provide for the habitat conditions that are required for late-successional species.
- Maintain or promote the development of mature or structurally complex forests.
- Achieve continuous timber production that could be sustained through a balance of growth and harvest.
- Offer for sale an annual allowable sale quantity.

Management Directions

- Annual offering of the allowable sale quantity would potentially vary up to 10% from the declared allowable sale quantity to allow for variations in yield from different harvest areas and to allow for the preparation and sale of logical, operationally feasible, and economically viable sale areas.
- Cumulative total offering of the allowable sale quantity would be maintained within 5% over two or more years by adjusting annual offerings within the allowed 10% variation.
- Regeneration harvests would be applied as shown in *Table 2-57 (Harvest interval, green tree retention, and snag and coarse woody debris [CWD] retention or creation levels per vegetation series for regeneration harvests under Alternative 3)*.
- Regeneration harvests would not be applied in the areas that are generally south of Grants Pass in the Medford District, and in the Klamath Falls Resource Area of the Lakeview District.
- Forest stands would be salvaged after disturbances, where economically feasible and within the time necessary, to avoid loss of value through deterioration. Salvage would emulate a partial harvest or a regeneration harvest depending on the nature and extent of the disturbance.
- Regeneration harvests would be applied to stands that are at or beyond the harvest interval for regeneration harvesting if 50% or more of the acres in an assessment area (defined as a physiographic province within a sustained yield unit) are older than the following threshold stand ages:
  - — 90 years of age in the assessment areas of Salem/Coast Range, Salem/West Cascades, Eugene/Coast Range, Eugene/West Cascades, Coos Bay/Coast Range, Coos Bay/Klamath, Roseburg/Coast Range, and Roseburg/West Cascades
  - — 140 years of age in the assessment areas of Roseburg/Klamath and Medford/West Cascades (outside of the Uneven-Aged Management Area)

Table 2-57. Harvest Interval, Green Tree Retention, And Snag And Coarse Woody Debris (CWD) Retention Or Creation Levels Per Vegetation Series For Regeneration Harvests Under Alternative 3

Vegetation Series	Harvest Interval (years)	Green Tree Retention		Snag Retention or Creation		CWD Retention or Creation		
		Total	Component Diameters	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	360	6 tpa	> 20 inches dbh	4 tpa	> 20 inches dbh	240 feet/ acre	> 20 inches	> 20 feet
Douglas fir and true firs	240	9 tpa	> 16 inches dbh	2 tpa	> 16 inches dbh	120 feet/ acre	> 16 inches	> 16 feet
Tanoak	240	6 tpa	> 20 inches dbh	2 tpa	> 20 inches dbh	120 feet/ acre	> 20 inches	> 20 feet

dbh - diameter breast height
tpa - trees per acre
feet - linear feet

See *Figure 2-8 (Location of assessment areas [physiographic provinces within sustained yield units] under Alternative 3)*. Also see the map packet (*Maps 2-22A, 2-22B, and 2-22C*) for detailed views of the land use allocations.

- Partial harvests and commercial thinning would be applied to stands that are at or beyond the harvest interval for partial harvesting if less than 50% of the acres in an assessment area (defined as a physiographic province within a sustained yield unit) are older than the following threshold stand ages:
  - — 90 years of age in the assessment areas of Salem/Coast Range, Salem/West Cascades, Eugene/Coast Range, Eugene/West Cascades, Coos Bay/Coast Range, Coos Bay/Klamath, Roseburg/Coast Range, and Roseburg/West Cascades
  - — 140 years of age in the assessment areas of Roseburg/Klamath and Medford/West Cascades (outside of the uneven-aged management area)

  See *Figure 2-8 (Location of assessment areas [physiographic provinces within sustained yield units] under Alternative 3)***.** Also see the map packet (*Maps 2-22A, 2-22B, and 2-22C*) for detailed views of the land use allocations.
- Partial harvests would be applied as shown in *Table 2-58 (Harvest interval, green tree retention, and snag and coarse woody debris [CWD] retention or creation levels per vegetation series for partial harvests under Alternative 3)*.
- The harvest intervals for regeneration harvests and partial harvests in *Table 2-57* and *Table 2-58* are approximate schedules for harvesting timber stands, not minimum ages of trees to be cut. Individual or clumps of trees may be harvested for operational reasons. Harvests may occur at stand ages above the described harvest intervals because of the current age-class distribution as well as operational and planning constraints. Regardless of a stand's age at the time of harvest, the same stand would not be harvested again until after the harvest interval.
- Green tree retention levels would be met from conifer trees.
- Green tree, snag, and coarse woody debris retention or creation levels in *Table 2-57* and *Table 2-58* are averages that would be met at the scale of the harvest unit, and levels would be highly variable within harvest units.

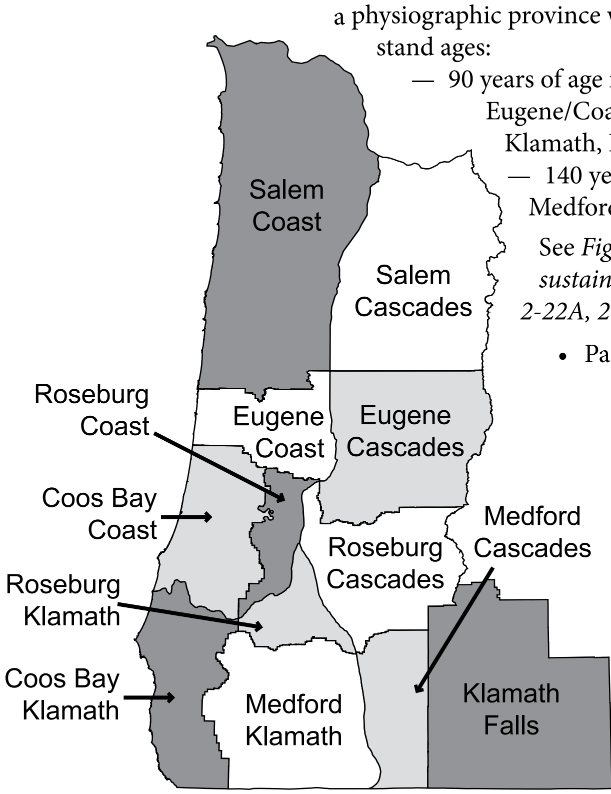
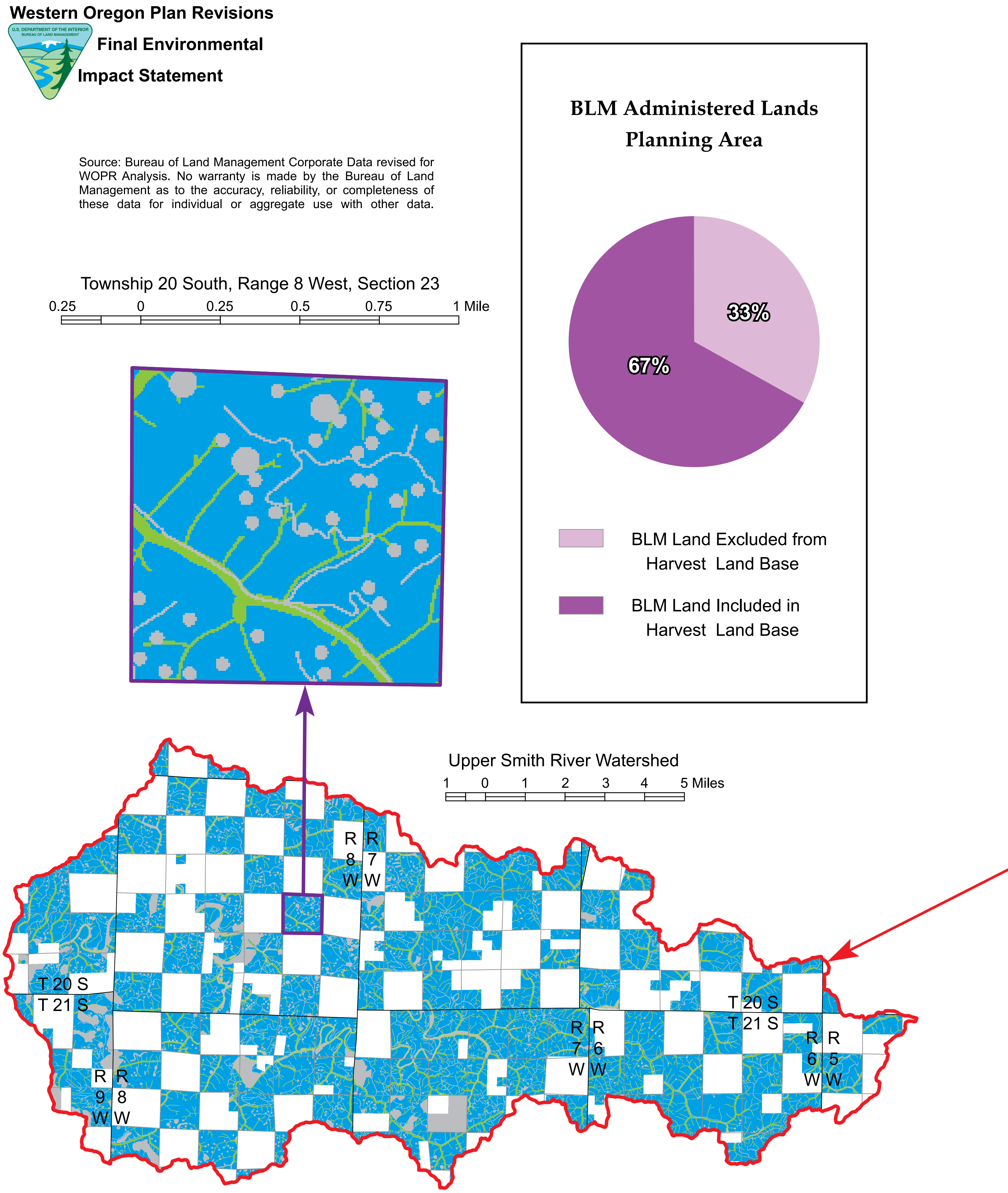
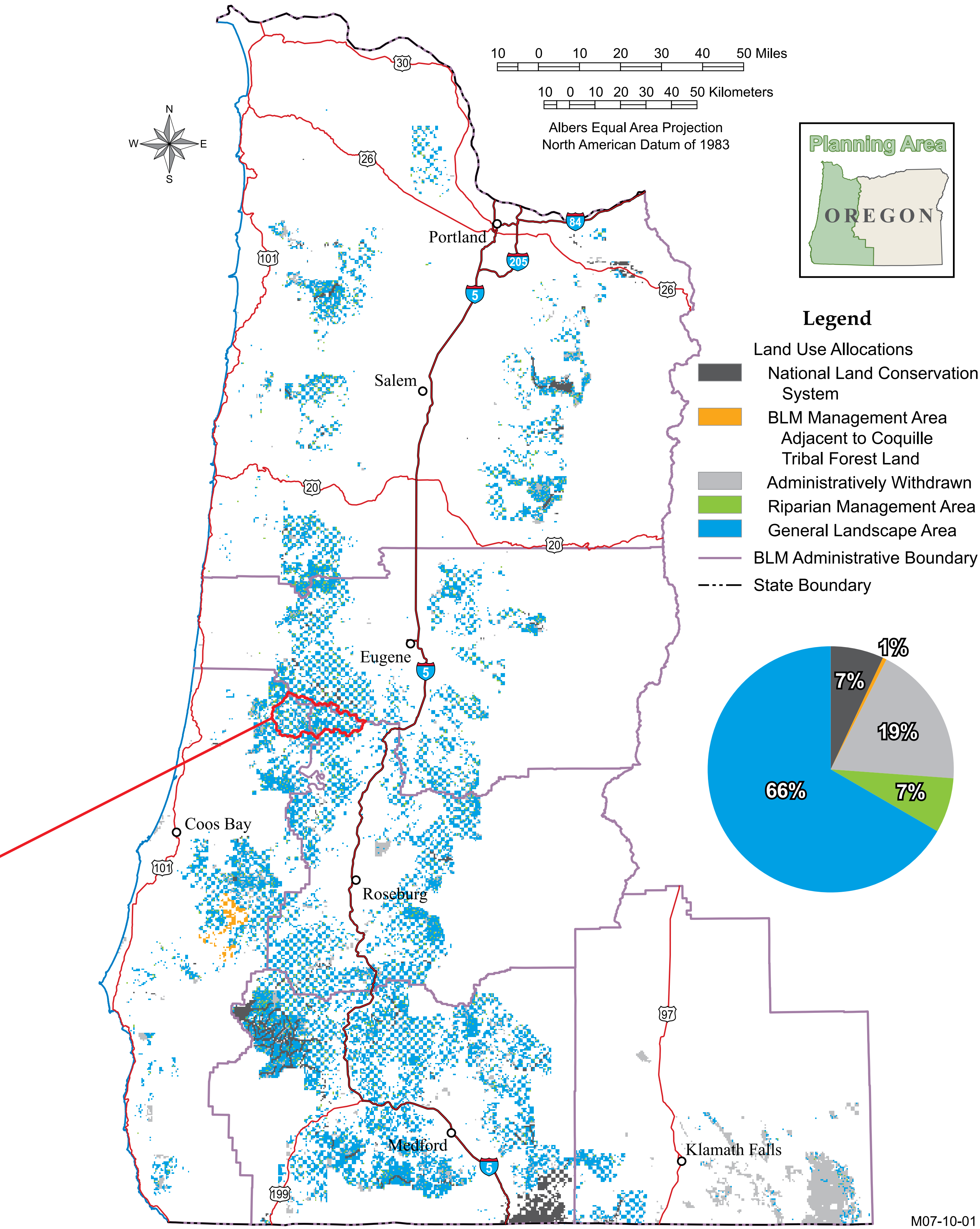


Figure 2-8. Location of management areas (physiographic provinces within sustained yield units) under

Map 2-22. Land Use Allocations Under Alternative 3





10 0 10 20 30 40 50 Miles
10 0 10 20 30 40 50 Kilometers
Albers Equal Area Projection
North American Datum of 1983
Planning Area
OREGON
Legend
Land Use Allocations
National Land Conservation System
BLM Management Area Adjacent to Coquille Tribal Forest Land
Administratively Withdrawn
Riparian Management Area
General Landscape Area
BLM Administrative Boundary
State Boundary
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
M07-10-01
1%
7%
19%
7%
66%

- Existing snags and coarse woody debris would be supplemented with created snags and coarse woody debris to meet the levels in *Table 2-57* and *Table 2-58*.
- Commercial thinning would be applied, as needed, to a stand of any age to maintain the growth and vigor of the stand, and to adjust the species composition of the stand.
- Trees killed from disturbances (such as a fire, windstorm, disease, or insect infestation) would be salvaged to recover volume and economic value within the time necessary to avoid loss of value through deterioration.
- When salvaging after disturbances (such as a fire, windstorm, disease, or insect infestation that approximate a regeneration harvest [i.e., the density of surviving trees is comparable to the green tree retention levels given in *Table 2-57*]), the green trees, snags, and coarse woody debris would be retained, if they are available, in the quantities shown in *Table 2-57* in this chapter.
- When salvaging after disturbances (such as a fire, windstorm, disease, or insect infestation that approximate a partial harvest [i.e., the density of surviving trees is comparable to the green tree retention levels given in *Table 2-58]*), the green trees, snags, and coarse woody debris would be retained, if they are available, in the quantities shown in *Table 2-58* in this chapter.
- Stands with a composition of commercially undesirable tree species or an inadequate stocking of desirable tree species would be converted to stands that are fully stocked by desirable tree species. In converting hardwood stands to the desired conifer species, the green tree, snag, and coarse woody debris retention or creation requirements for stand-replacement harvests would be applied with the following exception: hardwood trees may be substituted for conifer trees for green tree, snag, and coarse woody debris retention or creation.
- Owl activity centers of 215 acres of suitable nesting, roosting, and foraging habitat would be retained within 5/8 of a mile of each known northern spotted owl center of activity as identified in the Northern Spotted Owl database. If 215 acres of habitat are not available within 5/8 of a mile of an owl center of activity, no further acres would be retained. This habitat would be retained until 50% or more of the acres in an assessment area (defined as a physiographic province within a sustained yield unit) are older than the following threshold stand ages:
  - — 90 years of age in the areas that are generally north of Grants Pass, which include the assessment areas of Salem/Coast Range, Salem/West Cascades, Eugene/Coast Range, Eugene/West Cascades, Coos Bay/Coast Range, Coos Bay/Klamath, Roseburg/Coast Range, and Roseburg/West Cascades
  - — 140 years of age in the areas that are generally south of Grants Pass, which include the assessment areas of Roseburg/Klamath and Medford/West Cascades (outside of the uneven-aged management area). For the uneven-aged management areas, 215 acres of suitable nesting, roosting, and foraging habitat would be retained for 5 decades, which is 50 years.

Table 2-58. Harvest Interval, Green Tree Retention, And Snag And Coarse Woody Debris (CWD) Retention Or Creation Levels Per Vegetation Series For Partial Harvests Under Alternative 3

Vegetation Series	Harvest Interval (years)	Green Tree Retention		Snag Retention or Creation		CWD Retention or Creation		
		Total	Component Diameters	Total	Component Diameters	Total	Component Diameters	Component Lengths
Western hemlock	120	30 tpa	> 16 inches dbh	4 tpa	> 20 inches dbh	240 feet/acre	> 20 inches	> 20 feet
Douglas fir and true firs	80	20 tpa	> 12 inches dbh	2 tpa	> 12 inches dbh	120 feet/acre	> 12 inches	> 12 feet
Tanoak	80	20 tpa	> 16 inches dbh	2 tpa	> 16 inches dbh	120 feet/acre	> 16 inches	> 16 feet

dbh - diameter breast height tpa - trees per acre feet - linear feet

- Contiguous marbled murrelet habitat and recruitment habitat (stands capable of becoming habitat for the marbled murrelet within 25 years) would be retained within 0.5 mile of any occupied site. Occupation would be determined by the presence of an active nest, a fecal ring, eggshell fragments, or birds demonstrating occupying behavior (i.e., flying below the forest canopy within or adjacent to a stand). This habitat would be retained until 50% or more of the acres in an assessment area (defined as a physiographic province within a sustained yield unit) are older than the following threshold stand ages:
  — 90 years of age in the areas that are generally north of Grants Pass, which include the assessment areas of Salem/Coast Range, Salem/West Cascades, Eugene/Coast Range, Eugene/West Cascades, Coos Bay/Coast Range, Coos Bay/Klamath, Roseburg/Coast Range, and Roseburg/West Cascades
  — 140 years of age in the areas that are generally south of Grants Pass, which include the assessment areas of Roseburg/Klamath and Medford/West Cascades (outside of the uneven-aged management area).

Riparian Management Area

Under Alternative 3, the riparian management area land use allocation would be established according to *Table 2-59 (Zones and the zone-specific management directions of the riparian management area land use allocation under Alternative 3)*. For a representation of those areas, see *Map 2-22* (*Land use allocations under Alternative 3)*. Also see the map packet (*Maps 2-22A, 2-22B, and 2-22C*) for detailed views of the land use allocations.

Management Objectives

Maintain or promote the development of mature or structurally complex forests.

Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize stream banks.

Management Directions

- Snags and coarse woody debris would be retained in thinning operations, except for safety or operational reasons.
- Salvage would not occur in stands that are disturbed by a fire, windstorm, disease, or insect infestations, except to reduce hazards in wildland urban interface areas.
- Timber from thinning and salvage operations would be available for sale.
- Prescribed burns would be used in areas of high fuel loadings to reduce the potential for uncharacteristic wildfires.

Areas of Critical Environmental Concern and Research Natural Areas (Land Use Allocations)

Under Alternative 3, there would be 83 areas of critical environmental concern and research natural areas designated. At the end of this chapter, see *Map 2-26 (Areas of critical environmental concern under Alternatives 1, 2, and 3)* and *Table 2-65 (Areas of critical environmental concern designated by alternative)*. This map and table are located at the end of this chapter.

Management Objective

Maintain or restore important and relevant values in areas of critical environmental concern, which include research natural areas and outstanding natural areas.

Management Direction

- Maintenance or restoration activities would occur to protect important and relevant values.

Table 2-59. Zones And The Zone-Specific Management Directions Of The Riparian Management Area Land Use Allocation Under Alternative 3

Zones	Zone-Specific Management Directions
	Perennial and Intermittent Fish-Bearing Streams and Perennial Non-Fish-Bearing Streams
Stream bank zone (0 to 25 feet)[a]	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
Water influence zone (25 to 100 feet)	• Harvesting where mature or structurally complex forest stands already exist would not be allowed, except for safety or operational reasons. • 80% effective shade or potential shade from 25 to 60 feet, whichever is less, would be maintained. • At least 50% canopy closure from 60 to 100 feet would be maintained after harvests. • Snag and coarse woody debris would be retained, except for safety or operational reasons. • Thinning and other silvicultural treatments would be applied along smaller-order streams (generally, first-, second-, and third-order streams) to promote the development of mature forests. • Thinning and other silvicultural treatments would be applied along larger-order streams (generally, fourth-order and larger streams) to promote the development of structurally complex forests.
[a]Measured from the edge of the channel migration zone.	
	Lakes, Natural Ponds, and Wetlands
Greater than 1/4 acre (0 to 25 feet)[b]	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
Greater than 1/4 acre (25 to 100 feet)[b]	• At least 50% of the existing live tree basal area or 110 square feet of basal area per acre, whichever is greater, would be retained. • Retention would favor trees greater than 20 inches dbh.
Less than 1/4 acre (0-50 feet)[b]	• At least 50% of the existing live tree basal area or 110 square feet of basal area per acre, whichever is greater, would be retained. • Retention would favor trees greater than 20 inches dbh.
[b]Measured from the high waterline or wetland boundary, whichever is greater.	
	Constructed Ponds, Ditches, and Canals
Stream bank zone (0 to 25 feet)	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.
	Intermittent Non-Fish-Bearing Streams
Stream bank zone (0 to 25 feet)	• Harvesting would not be allowed, except for safety or operational reasons. • Ground-based harvesting equipment would not be allowed.

Management Area Adjacent to the Coquille Forest Land Use Allocation

Under Alternative 3, a management area adjacent to the Coquille Forest would be established. See *Figure 1-1 (Coquille Forest and adjacent BLM-administered lands)* in *Chapter 1.*

Management Objective

Coordinate the management of the adjacent BLM-administered lands with the Coquille Forest lands.

Management Directions

- The Coquille Tribe's September 2006 *Management Direction for Tribal Cooperative Management Areas (TCMAs)* document provides the management direction for the Coquille Forest. The management of the 15,000 acres of BLM-administered lands that are adjacent to the Coquille Forest would adopt the management directions in this tribal plan for managing the comparable resources in this adjacent area. Those management directions are incorporated by reference. Since the management in this adjacent area would be in a manner that is consistent with the tribal plan, the tribal plan would be considered by the BLM to conform to the BLM's resource management plans in its entirety.

See *Figure 1-1 (Coquille Forest and adjacent BLM-administered lands)* in *Chapter 1*.

Riparian Management Areas

- See *Table 2-60 (Criteria established for the riparian management areas of the BLM-administered lands that are adjacent to the Coquille Forest as part of Alternative 3)*.

Note: The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

Forest Management

Note: The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- A well-distributed pattern of early- and mid-seral stands would be maintained.
- A minimum of 120 linear feet of logs per acre in a cutting area (comprised of logs that are at least 16 inches in diameter at the large end, and at least 16 feet in length) would be retained.
- From 0 to 6 green conifer trees would be retained after regeneration harvests to provide a source of snag recruitment.

Table 2-60. Criteria Established For The Riparian Management Areas Of The Lands That Are Adjacent To The Coquille Forest As Part Of Alternative 3

Perennial and Intermittent Fish-Bearing Streams	
0 to 25 feet	• Avoid harvesting, except for restoration purposes. • Require full suspension during cable logging. • Leave any trees damaged or felled during logging activities.
25 to 50 feet	• Manage for mature forest conditions; maintain a minimum of 80% effective stream shade. • Retain no less than 50% canopy cover. • Actively manage, where necessary, to achieve desired future conditions in a timely manner. • Allow no harvesting where mature forest conditions exist or when mature forest is achieved. • Require full suspension during cable logging, whenever feasible, or else require one-ended suspension. • Limit ground-based equipment, when possible. • Retain all dead and downed material that is present prior to an operation.
50 to 100 feet	• Retain 10 to 45 conifer trees per acre or per 35 to 157 square feet of basal area, which is 20 to 90 trees per 1,000 feet. • Retain all snags if safety allows. • Retain all dead and downed material that is present prior to an operation.
Perennial Non-Fish-Bearing Streams	
0 to 25 feet	• Avoid harvesting, except for restoration purposes. • Require full suspension during cable logging. • Leave any trees damaged or felled during logging activities.
25 to 50 feet	• Manage for mature forest conditions; maintain a minimum of 80% effective stream shade. • Retain no less than 50% canopy cover. • Actively manage, where necessary, to achieve desired future conditions in a timely manner. • Allow no harvesting where mature forest conditions exist or when mature forest is achieved. • Require full suspension during cable logging, whenever feasible. • Retain all dead and downed material that is present prior to an operation.
Intermittent Non-Fish-Bearing Streams	
	• Maintain the integrity of the stream channel. • Retain 10 to 15 conifer trees per acre or per 35 to 45 square feet of basal area, which is 20 to 30 trees per 1,000 feet, where operationally feasible. • Retain all snags if safety allows. • Retain all dead and downed material that is present prior to the operation.

- Stands would be managed under an average rotation age of 80 years, but regeneration harvests would be allowed in stands as young as 60 years of age to develop the desired age class distribution across the landscape and to provide for some commodity output.

Soils and Water

Note: This management direction would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- The best management practices set forth in the plan for the tribal cooperative management area would be applied during all ground- and vegetation-disturbing activities.

Federally Listed Species under the Endangered Species Act

Note: The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- Field surveys would be conducted, according to protocols and other established procedures, unless surveys are deemed unnecessary through project planning and environmental assessment.
- Consideration would be given to modifying, relocating, or abandoning proposed actions to avoid contributing to the need to list a federal candidate species based on consultation with the appropriate regulatory agency.

Roads

Note: The following management directions would apply only to the BLM-administered lands that are adjacent to the Coquille Forest.

- New stream-crossing structures would be designed to accommodate at least a 100-year flood, including the associated bedload and debris.
- Fish passage would be provided and maintained at all road crossings of existing and potential fish-bearing streams.

Subalternatives

Subalternatives are variations of an alternative that add, remove, or modify certain management directions. The analysis of subalternatives in the Draft EIS allowed the BLM to examine concepts that were contained in the alternatives. These examinations provided the responsible official with information that was useful in more fully understanding the alternatives to inform the selection of a proposed RMP for the Final EIS.

Analysis of the subalternatives contained in the draft EIS has not been carried forward into the final EIS.

Table 2-61 below lists the subalternatives that were examined in the draft environmental impact statement.

Table 2-61. Subalternatives Examined In The Draft EIS

Alternative	Subalternative
No Action	None.
Alternative 1	1. Allow no harvesting of stands that are older than 80 years of age. 2. Allow no harvesting of stands that are older than 200 years of age. 3. Allow no regeneration harvesting until thinning opportunities are exhausted. 4. Increase the size of the late-successional management area to include all critical habitat of the northern spotted owl.
Alternative 2	Change the rotation to emulate the timber industry's short rotation.
Alternative 3	Apply the landscape target of 50% in late-successional habitat condition to only those areas where the government land ownership (federal, state, and local) is half or more of the total ownership.

Alternatives Considered but Eliminated from Detailed Study

An environmental impact statement must rigorously explore and objectively evaluate all reasonable alternatives. The range of alternatives is limited by the requirement to fulfill the purpose and need, which is the reason or reasons for the agencies to be proposing action. See *Chapter 1* for the purpose and need.

When an alternative is eliminated from detailed study, it is because it was found to be unreasonable in some way. An alternative may be found to be unreasonable when it:

- does not meet the purpose and need.
- is substantially similar to an alternative being considered in detail, or it would have substantially similar effects to an alternative being considered in detail.
- would not be feasible or practical to implement.
- would be exorbitant to implement.
- cannot be analyzed for its effects because its implementation is remote or speculative.

Alternatives Eliminated from Detailed Study

These alternatives, which were considered but eliminated from detailed study, were the result of proposals received from the public through the scoping process or proposed by agency staff during the process of formulating reasonable alternatives that would meet the purpose and need.

Vary Management Based on High Versus Low Government Ownership

This alternative would vary management objectives at the landscape level and vary management directions based on the checkerboard ownership pattern of the BLM-administered lands.

Landscape-level areas with greater than 50% state and federal ownership would be managed primarily to develop habitat for late-successional forest-related species. These areas would provide the opportunity for creating large blocks of contiguous habitat in the future.

Where the combined state and federal ownership is below 50%, the BLM-administered lands would be managed for early- and mid-successional forests with structural legacies. A majority of the commercial timber harvesting activities would occur in these areas.

This alternative was eliminated from detailed study because it is a variation of Alternative 3, which sets landscape objectives for the development of late-successional forests. A subalternative of Alternative 3 varies these landscape targets in areas relative to a high or low government ownership pattern. Analysis of this subalternative is intended to provide information regarding the ability of the BLM to achieve management objectives given the checkerboard ownership pattern of the BLM-administered lands.

Use Historic Variability, Retention of All Mature and Old-Growth Stands, and Small Tree Harvesting

This alternative would manage within the historic range of variability, would protect mature and old-growth stands, and would harvest only small-diameter trees. It would focus on restoration, fuels reduction, and maintenance of the protections of the Northwest Forest Plan.

This alternative was eliminated from detailed study because it would not meet the purpose and need, which states that the resource management plan revisions must meet all applicable laws. One of the applicable laws is the O&C Act. The O&C Act requires that the O&C lands that are classified as timberlands are to be managed for permanent forest production following the principles of sustained yield, which includes the selling, cutting, and removing of timber.

However, the alternatives that were analyzed in detail contain the essential elements of this alternative. Alternatives 1, 2, and 3 all provide for restoration, the reduction of fuels, and the protection or development of mature or structurally complex forests. Therefore, a redundant detailed analysis is unnecessary.

Protect All Forests That Are Over 80 Years of Age

This alternative would protect all forests that are over 80 years of age and prohibit logging and the building of new roads in all large unroaded areas. In stands that are less than 80 years of age, active restoration would occur, including thinning, road removal, culvert replacement to improve fish passage, trail maintenance, prescribed burns, and riparian restoration.

This alternative was eliminated from detailed study because it would not meet the purpose and need, which states that the resource management plan revisions must meet all applicable laws. One of the laws is the O&C Act. This alternative would exclude timber harvesting on large acreages of O&C lands and would eventually exclude all harvesting on all O&C lands, once their forests reached the age of 80 years. Therefore, this alternative would not meet the O&C Act's requirement to manage the O&C lands that are classified as timberlands for permanent forest production following the principles of sustained yield, which includes the selling, cutting, and removing of timber. Also note that no law exists that requires the protection of forests that are over the age of 80 years.

However, a subalternative of Alternative 1 analyzed the effects of not allowing the regeneration harvesting of older stands until the appropriate thinning of all available younger stands has been accomplished. Additionally, two analyses were completed to evaluate the impacts of the reservation of older stands (i.e., those that are at ages greater than 80 years and those that are at ages greater than 200 years). Since these subalternatives are substantially similar to this alternative, a redundant detailed analysis is unnecessary.

Two-Phased Management Approach

This alternative would focus on the recovery and restoration of habitat for threatened and endangered species. After species recover and are delisted, this alternative would then focus on harvesting.

This alternative was eliminated from detailed study because it would not meet the purpose and need, which states that the resource management plan revisions must meet all applicable laws. Two of the applicable laws are the O&C Act and the Endangered Species Act. The Endangered Species Act does not specifically require that timber harvesting be delayed in the entire classification of older stands in order to allow for the recovery of any one or combination of species. Additionally, it is unknown how long delisting or recovery would take, or even if it would occur for some species. This alternative would indefinitely postpone timber harvesting. Therefore, this alternative would not meet the O&C Act's requirement to manage the O&C land that are classified as timberlands for permanent forest production following the principles of sustained yield, which includes the selling, cutting, and removing of timber.

However, a subalternative of Alternative 1 analyzed the effects of not allowing the regeneration harvesting of older stands until the appropriate thinning of all available younger stands has been accomplished. Since this subalternative is substantially similar to this alternative, a redundant detailed analysis is unnecessary.

Harvest Only Naturally Selected Dead and Dying Trees

This alternative would remove only "naturally selected dead and dying trees, conditioned upon meeting the needs of other species." Timber harvesting of such trees would be accomplished with small equipment from a network of narrow roads.

This alternative was eliminated from detailed study because it would not meet the purpose and need, which states that the resource management plan revisions must meet all applicable laws. One of the applicable laws is the O&C Act. The O&C Act requires that the O&C lands that are classified as timberlands are to be managed for permanent forest production following the principles of sustained yield, which includes determining and declaring the annual productive capacity of such lands with the timber from those lands (not less than the annual sustained yield capacity) being sold annually.

Also, while this management approach may be practical for managing a small woodlot on relatively flat terrain, such an approach is impractical for managing a landscape of the size and ruggedness that is managed by the BLM in western Oregon. The level of roaded access and survey efforts that would be necessary to identify and harvest the trees that die on BLM-administered lands in western Oregon every year would be prohibitively expensive both in financial and environmental terms.

No Old-Growth Harvesting

This alternative would reserve all old-growth stands and focus harvesting on small-diameter trees.

This alternative was eliminated from detailed study because it would not meet the purpose and need, which states that the resource management plan revisions must meet all applicable laws. One of the applicable laws is the O&C Act. In a 1990 opinion by the United States Court of Appeals for the Ninth Circuit (*Headwaters, Inc. v. BLM*), the court ruled that the O&C Act was a dominant use act.

> "*Nowhere does the legislative history suggest that wildlife habitat conservation or conservation of old growth is a goal on a par with timber production, or indeed that it is a goal of the O&C Act at all.*"

Precluding the harvesting of timber from old-growth stands that are not needed to comply with some other law, such as the Endangered Species Act, would violate the O&C Act's requirement to manage the O&C lands that are classified as timberlands for permanent forest production following the principles of sustained yield, which includes the selling, cutting, and removing of timber.

However, a subalternative of Alternative 1 analyzed the effects of not allowing the regeneration harvesting of older stands until the appropriate thinning of all available younger stands has been accomplished. Additionally, two analyses were completed to evaluate the impacts of the reservation of older stands by using two variations of what is considered an older stand (i.e., 80 years per the Northwest Forest Plan for late-successional/old-growth stands, and 200 years per the BLM for old-growth stands). Since these subalternatives are substantially similar to this alternative, a redundant detailed analysis is unnecessary.

No Logging

This alternative would prohibit all timber harvesting and allow only custodial management of the federal forests.

This alternative was eliminated from detailed study because it would not meet the purpose and need, which states that the resource management plan revisions must meet all applicable laws. One of the applicable laws is the O&C Act. The O&C Act requires that the O&C lands that are classified as timberlands are to be managed for permanent forest production following the principles of sustained yield, which includes the selling, cutting, and removing of timber.

However, a reference analysis analyzed the effects of not harvesting. Since this reference analysis is substantially similar to this alternative, a redundant detailed analysis is unnecessary.

Transfer Forested BLM Lands to the USDA Forest Service

This proposal would transfer all BLM-administered lands in the area of the Northwest Forest Plan to the U.S. Forest Service.

This alternative would not be feasible or practical to implement because the BLM does not have the authority to transfer the management of its lands. The transfer of lands from one agency of one federal department to another (in this case, from the BLM under the U. S. Department of the Interior, to the U.S. Forest Service under the Department of Agriculture) would require congressional action.

This alternative is also beyond the scope of the resource management plan revisions because it would not address any of the elements of the purpose and need that are given in *Chapter 1*.

Repeal or Change the O&C Act

This alternative would repeal the O&C Act or change it to a multiple-use act from a timber dominant-use act.

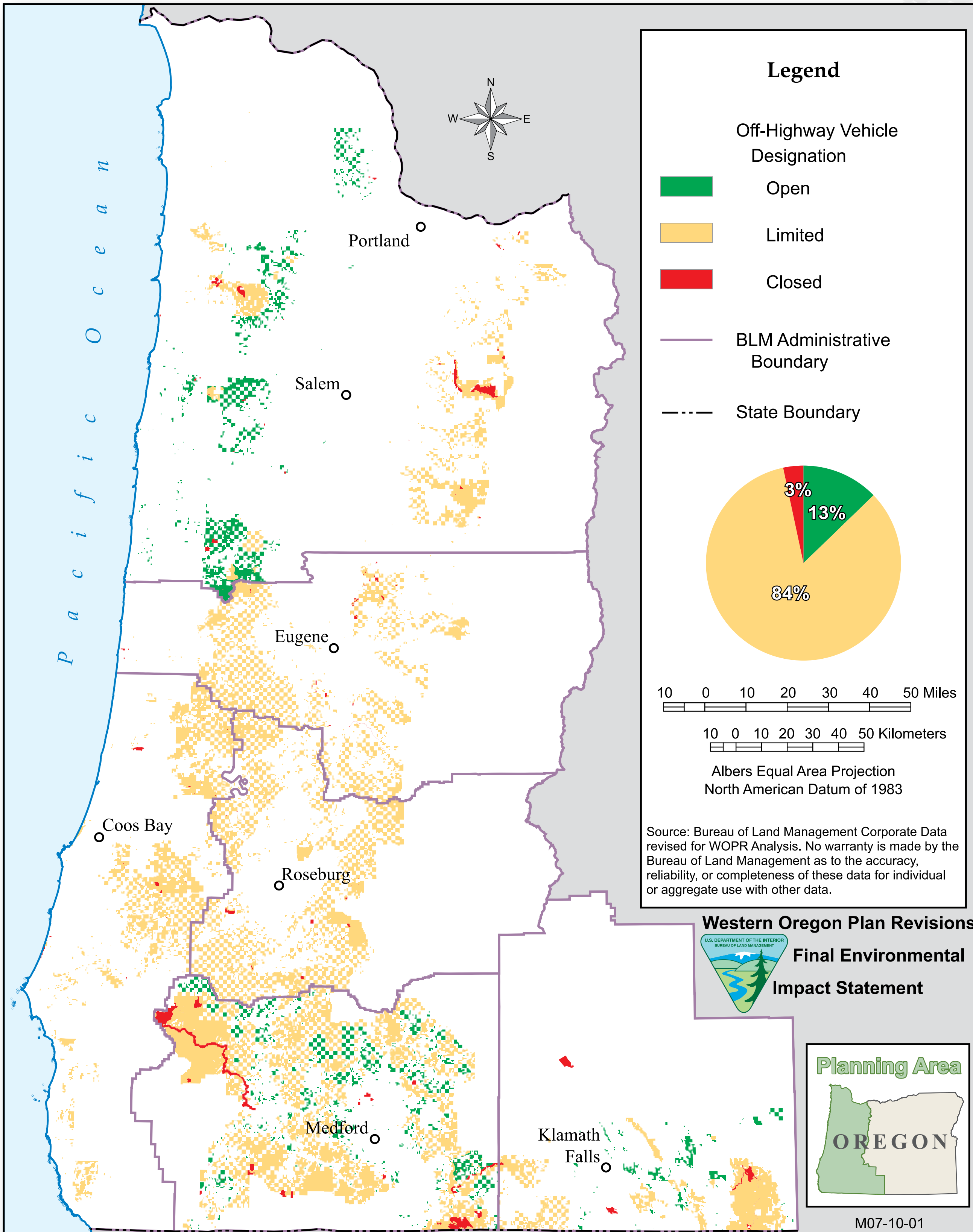
This alternative would not be feasible for the BLM to implement because only Congress can repeal or amend laws.

This alternative is also beyond the scope of the resource management plan revisions because it would not address any of the elements of the purpose and need that are given in Chapter 1.

Maps

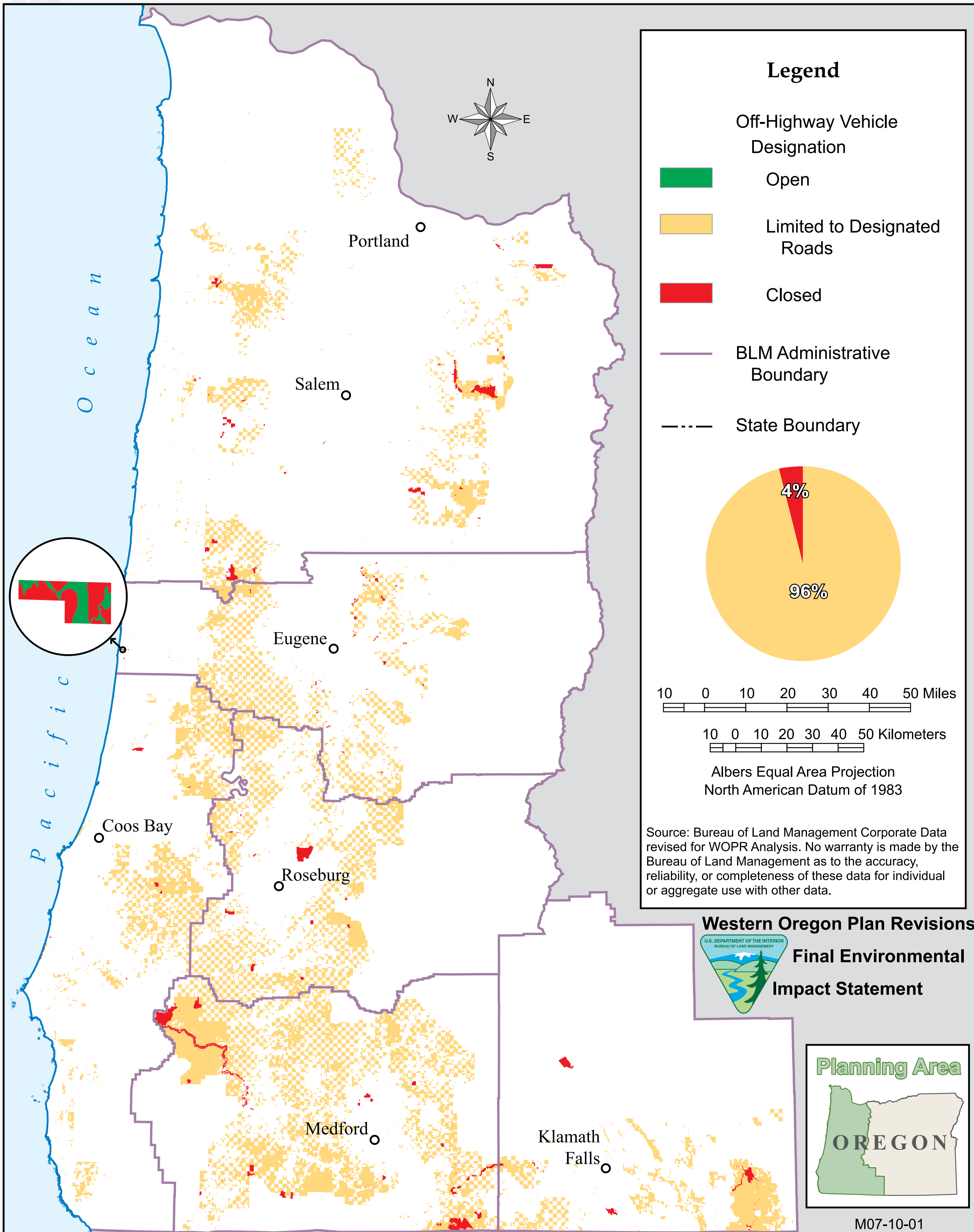
This section provides *Map 2-23* through *Map 2-25* for off-highway vehicle areas under the No Action Alternative and Alternatives 1, 2, and 3; and also *Map 2-26* for areas of critical environmental concern under Alternatives 1, 2, and 3.

Map 2-23. Off-Highway Vehicle Designation Areas Under The No Action Alternative



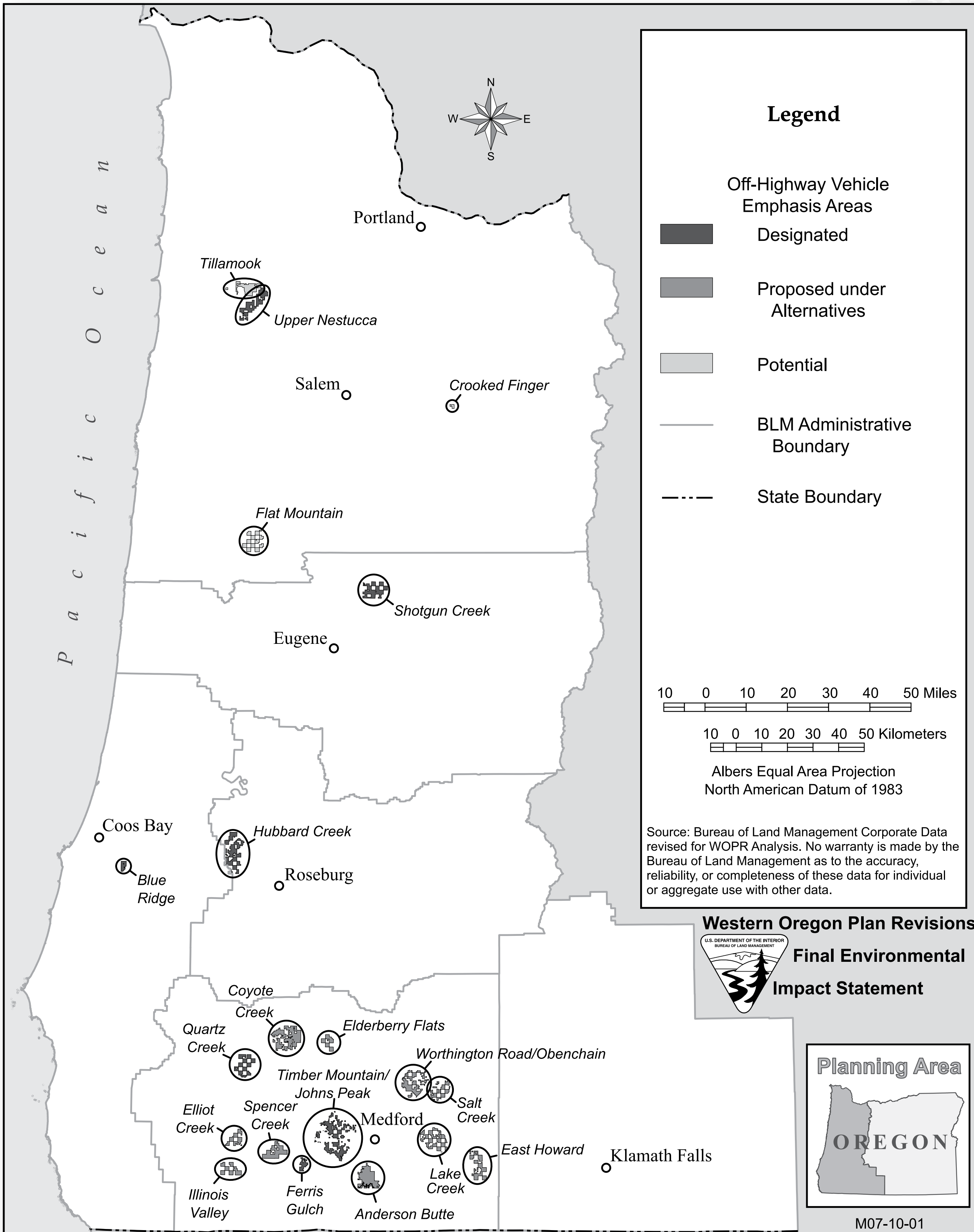
Map 2-24. Off-Highway Vehicle Areas Under Alternatives 1,2, 3

Note: See *Table 2-28* for OHV areas by alternative.

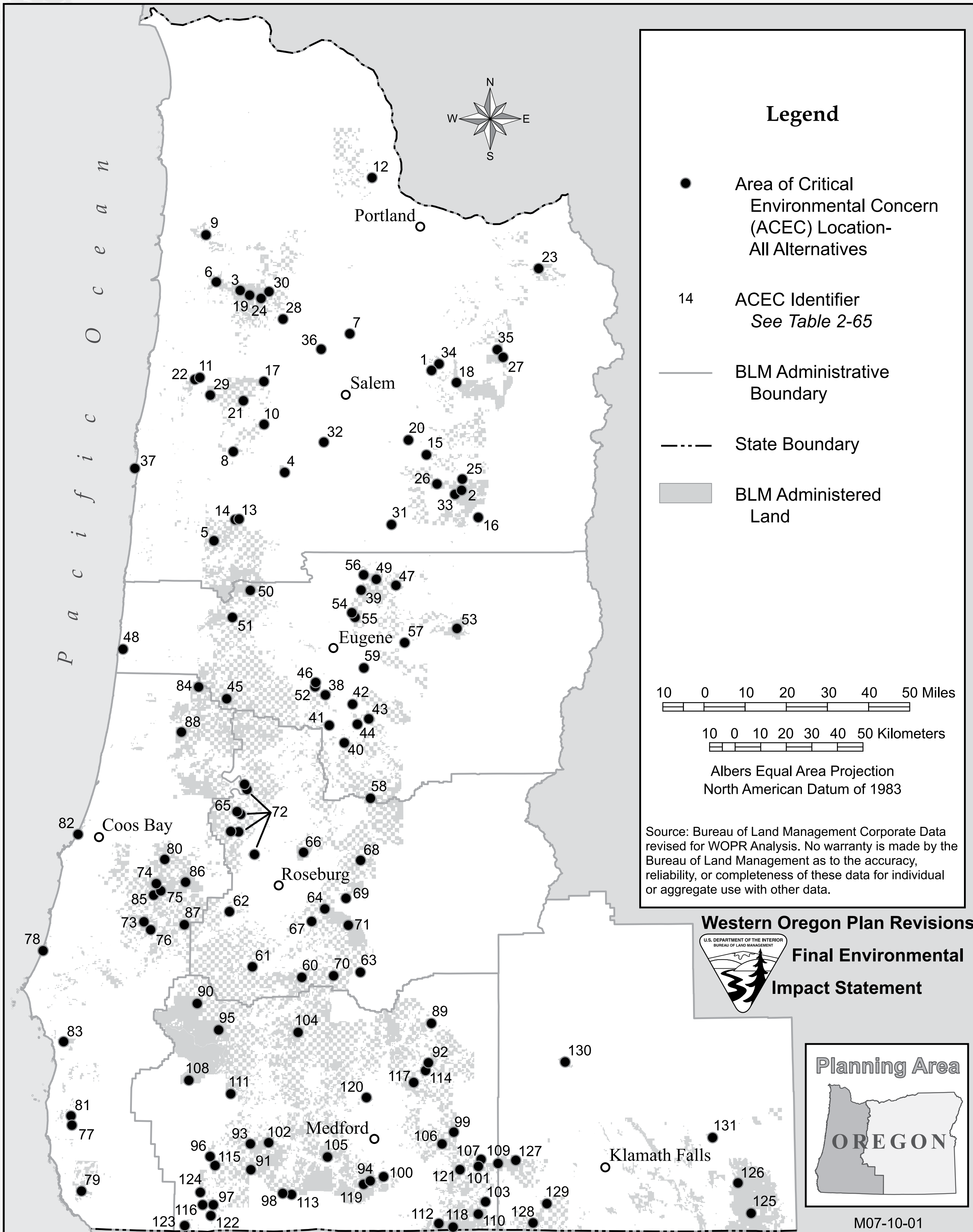


Map 2-25. Off-Highway Vehicle Emphasis Areas Under Alternatives 1, 2, And 3

Note: See *Table 2-30* for OHV emphasis areas by alternative.



Map 2-26. Areas Of Critical Environmental Concern Under Alternatives 1, 2, And 3



Comparison of the Alternatives

This section provides comparison tables. *Table 2-62* provides a comparison of the key features of the five alternatives, focusing on features that vary. *Table 2-63* provides a comparison of the key impacts of these alternatives. For details, refer to the management objectives and management directions provided for each alternative. *Table 2-64* provides a comparison of the land use allocation acres for the five alternatives. *Table 2-65* provides a list of the areas of critical environmental concern designated by alternative.

Table 2-62. Comparison Of The Key Features Of The Five Alternatives

Features	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Late-Successional Vegetation	• Maintain Northwest Forest Plan's late-successional reserve (LSR). • No treatment of stands older than 80 years.	• Establish a late-successional management area (LSMA). • Treat LSMA to promote development of structurally complex forests.	• Establish a late-successional management area (LSMA). • Treat LSMA to promote development of suitable habitat.	• Establish landscape target for regeneration harvest that requires 50% or more of acres in an assessment area (physiographic province within a sustained yield unit) be of the required age for harvesting (90 years roughly north of Grants Pass, and 140 years roughly south of Grants Pass).	• Establish a late-successional management area (LSMA). • Treat LSMA to promote development of suitable habitat.
Critical Habitat Units (CHUs) for the Northern Spotted Owl and the Marbled Murrelet	• CHUs for the marbled murrelet completely match with the LSR. • CHUs for the northern spotted owl partially match the LSR.	• CHUs for the marbled murrelet completely match with the LSMA. • CHUs for the northern spotted owl partially match the LSMA.	• CHUs for the marbled murrelet partially match with the LSMA. • CHUs for the northern spotted owl partially match the LSMA.	• No special management.	• For the marbled murrelet, the primary constituent elements within the CHUs are retained and managed as LSMA. • CHUs for the northern spotted owl completely match the LSMA.
Northern Spotted Owl Activity Centers	• Retain owl activity centers known as of January 1994.	• Retain no owl activity centers in the Timber Management Area (TMA).	• Retain 100-acre owl activity centers in the Timber Management Area (TMA).	• Retain 215-acre owl activity centers in the General Landscape Area. • Manage the owl activity centers until the landscape target is reached.	• Retain no owl activity centers in the Timber Management Area (TMA).
Marbled Murrelet Sites	• Retain existing sites.	• Retain existing sites.	• Retain existing sites.	• Retain sites until the landscape target is reached.	• Retain existing & future sites.
Rotation Age for Regeneration Harvesting	• Approximately 80 to 100 years.	• Approximately 80 to 100 years.	• Approximately 80 to 100 years.	• 360 years in the Western hemlock, and 240 years in the Douglas fir and tanoak zones.	• Approximately 80 to 100 years, except establish an Uneven-Age Timber Management Areas on portions of the Medford District and the Klamath Falls Resource Area which have no fixed rotation age.
Green Tree Retention	• North of Grants Pass: 6 to 8 trees per acre. • South of Grants Pass: 18 to 25 trees per acre. • In connectivity diversity blocks: 12 to 18 trees per acre.	• None.	• None.	• 6 to 9 trees per acre, depending on vegetation series.	• None, except in the Uneven-age Timber Management Areas where overstory trees would be retained as needed within regeneration harvest areas for shade, frost protection, natural seeding, or other silvicultural needs.

Table 2-62. (Continued)

Features	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Snag Retention	• 1.1 snags per acre	• In the LSMA: - 2 to 6 snags per acre depending on vegetation series • In the TMA: - Noncommercial only	• In the LSMA: - 2 to 6 snags per acre depending on vegetation series • In the TMA: - Noncommercial only	• 2 to 4 snags per acre. depending on vegetation series	• In the LSMA: - 2 to 6 snags per acre depending on vegetation series • In the TMA: - Noncommercial only
Down Wood	• 120 to 240 feet/acre	• In the LSMA: - 120 to 240 feet/ acre for stands with QMD > 14 inches - 60 to 120 feet/ acre for stands with QMD ≤ 14 inches • In the TMA: - Noncommercial only	• In the LSMA: - 40 to 240 feet./ acre for stands with QMD > 14 inches - 20 to 120 feet/ acre for stands with QMD ≤ 14 inches • In the TMA: - Noncommercial only	• In the Western hemlock zone: - 240 feet/acre • In the Douglas fir/true fir and Tanoak zones: - 120 feet/acre	• In the LSMA: - 120 to 240 feet/ acre for stands with QMD > 14 inches - 60 to 120 feet/ acre for stands with QMD ≤ 14 inches • In the TMA: - Noncommercial only
Salvaging	• Allow salvaging in the LSR reserves when a disturbance is greater then 10 acres. • Allow salvaging in the matrix land use allocations for economic purposes.	• Allows no salvaging in the LSMA, except to reduce hazards in the wildland urban interface areas. • Allow salvaging in the wildland urban interface areas to reduce hazards. • Allow salvaging in the TMA for economic purposes.	• Allow salvaging in the LSMA for economic purposes with retention of legacy. • Allow salvaging in the wildland urban interface areas to reduce hazards. • Allow salvaging in the TMA for economic purposes.	• Allow salvaging after stand- replacing events for economic purposes with retention of legacy.	• After a stand-replacing event, allow salvaging in the LSMA for economic purposes with retention of legacy. • Allow salvaging in the wildland urban interface areas to reduce hazards. Allows salvaging in the TMA for economic purposes
Zones for Riparian Management Areas	• For all fish-bearing streams: - 2 site-potential tree height - For all non-fish-bearing streams: - 1 site-potential tree height	• For all but intermittent non-fish-bearing streams: - 1 site-potential tree height • For intermittent non-fish-bearing streams: - 1/2 site-potential tree height	• For all but intermittent non-fish-bearing streams: - 0 to 25 feet no harvest - 25 to 60 ft. 80% shade retention - 60 to 100 feet 50% canopy retention • For non-debris-flow prone intermittent non-fish-bearing streams: - 0 to 25 feet noncommercial vegetation • For debris-flow prone intermittent streams: - 0 to 25 feet no harvest - 25 to 100 ft. managing for mature or structurally complex forests	• For all but intermittent non-fish-bearing streams: - 0 to 25 feet no harvest - 25 to 60 feet 80% shade retention - 60 to 100 feet 50% canopy retention • For all intermittent non-fish-bearing streams: - 0 to 25 feet no harvest	• For all but intermittent non-fish-bearing streams: - 1 site-potential tree height - 0 to 60 feet no silvicultural or fuels treatments - 61 feet to 1 site-potential tree. Retain 50% canopy closure • For intermittent non-fish-bearing streams: - 1/2 site-potential tree height - 0 to 35 feet no silvicultural or fuels treatments

Table 2-62. (Continued)

Features	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Timber Management of Riparian Management Areas	• Manage timber to meet Aquatic Conservation Strategy objectives.	• Manage timber to promote development of mature or structurally complex forests.	• Manage timber to promote development of mature or structurally complex forests.	• Manage timber to promote development of mature or structurally complex forests.	• Outside of the 60 and 35 feet zones: manage timber to develop large trees to provide an eventual source of large woody debris.
Restoration Priority	• Key watersheds.	• Streams with a high intrinsic potential and high-priority populations (per recovery plans).	• Streams with a high intrinsic potential and high-priority populations (per recovery plans).	• Streams with a high intrinsic potential and high-priority populations (per recovery plans).	• Emphasis placed on streams that have high intrinsic potential for fish, high priority fish populations (such as those defined in recovery plans), or high levels of chronic sediment inputs.
Fire and Fuels	• Suppress all wildfires. • Apply treatments to reduce fuel hazards.	• Suppress all wildfires. • Apply treatments to reduce fuel hazards.	• Suppress all wildfires • Apply treatments to reduce fuel hazards.	• Suppress all wildfires • Apply treatments to reduce fuel hazards. • South of Grants Pass: apply prescription of partial harvest with no final regeneration harvesting.	• Suppress all wildfires. • Apply itreatments to reduce fuel hazards. • Establish an Uneven-Age Timber Management Area on portions of the Medford District and the Klamath Falls Resource Area.
Areas of Critical Environmental Concern	99	93	94	83	100

LSMA - late-successional management area LSR - late-successional reserve QMD - quadratic mean diameter TMA - timber management area CHU – Critical habitat unit

Table 2-63. Comparison Of The Key Impacts Of The Five Alternatives

<table>
<tr><th colspan="2">Resource</th><th>No Action Alternative</th><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>PRMP</th></tr>
<tr><td colspan="7">Socioeconomics</td></tr>
<tr><td colspan="2">Change in Cumulative Jobs
(8,948 current)</td><td>- 3,768</td><td>- 525</td><td>3,442</td><td>- 1,288</td><td>1187</td></tr>
<tr><td colspan="2">Annual County Payment ($ million)</td><td>42</td><td>69</td><td>108</td><td>52</td><td>75</td></tr>
<tr><td colspan="2">(percentage of 2005 payment) (%)</td><td>37</td><td>60</td><td>94</td><td>45</td><td>65</td></tr>
<tr><td colspan="2">BLM Annual Budget ($ million)</td><td>173</td><td>202</td><td>238</td><td>192</td><td>210</td></tr>
<tr><td colspan="2">(increase from 2006 Budget) (%)</td><td>18</td><td>37</td><td>62</td><td>31</td><td>43</td></tr>
<tr><td colspan="2">Present Net Value of Timber
(in 50 years) ($ million)</td><td>108</td><td>343</td><td>962</td><td>46</td><td>465</td></tr>
<tr><td colspan="7">Timber</td></tr>
<tr><td colspan="2">Annual Sale Quantity (ASQ) (mmbf)</td><td>268</td><td>456</td><td>727</td><td>471</td><td>502</td></tr>
<tr><td colspan="2">Annual Non-ASQ Volume (mmbf)</td><td>87</td><td>81</td><td>40</td><td>2</td><td>86</td></tr>
<tr><td colspan="2">10-Year Revenues ($ billion)</td><td>0.84</td><td>1.37</td><td>2.15</td><td>1.04</td><td>1.50</td></tr>
<tr><td colspan="7">Special Forest Products</td></tr>
<tr><td colspan="2">Availability</td><td colspan="5">Abundant relative to demand</td></tr>
<tr><td colspan="7">Invasive Plants</td></tr>
<tr><td colspan="2">Risk of Introduction or Spread</td><td>Lowest</td><td>Low</td><td>High</td><td>Highest</td><td>Moderate</td></tr>
<tr><td colspan="7">Special Status Species</td></tr>
<tr><td colspan="2">Populations or Occurrences</td><td>Maintain or increase</td><td>Decrease</td><td>Decrease</td><td>Decrease</td><td>Maintain or increase</td></tr>
<tr><td colspan="7">Wildlife</td></tr>
<tr><td rowspan="2">MAMU Habitat Creation
(Coast Range & Klamath Provinces)</td><td>100 years</td><td colspan="5">Increases</td></tr>
<tr><td>50 years</td><td colspan="2">Increase</td><td colspan="2">Slight decrease</td><td>Increase</td></tr>
<tr><td colspan="2">Northern Spotted Owl Suitable Habitat (Large block distribution & spacing) (>50yrs)</td><td colspan="2">Sufficient</td><td>Not sufficient</td><td>Spacing not sufficient</td><td>Sufficient</td></tr>
<tr><td colspan="2">Northern Spotted Owl (Movement and survival)</td><td colspan="5">Improved</td></tr>
<tr><td colspan="7">Fish</td></tr>
<tr><td colspan="2">Large Wood Contribution</td><td>Most increase</td><td colspan="3">Less increase</td><td>Most increase</td></tr>
<tr><td colspan="7">Water</td></tr>
<tr><td colspan="2">Susceptibility of Peak Flows</td><td colspan="2">Lowest</td><td colspan="3">Low</td></tr>
<tr><td colspan="2">Temperature</td><td colspan="2">Maintains or improves shade</td><td colspan="2">Maintains or improves shade (except on BLM-administered lands adjacent to the Coquille Forest)</td><td>Maintains or improves shade</td></tr>
<tr><td colspan="2">Fine Sediment</td><td colspan="5">Increases < 1%</td></tr>
<tr><td colspan="2">Landslide sediment</td><td colspan="5">No increase over natural levels.</td></tr>
<tr><td colspan="7">Fire and Fuels</td></tr>
<tr><td colspan="2">Hazard and Severity
(All except Klamath Falls Resource Area)</td><td colspan="5">Reduces hazard and severity</td></tr>
<tr><td colspan="2">Hazard and Severity
(Klamath Falls RA)</td><td>Decrease</td><td colspan="3">Increase</td><td>Decrease</td></tr>
<tr><td colspan="2">Resiliency
(Medford District & Klamath Falls RA)</td><td colspan="3">Reduce resiliency</td><td colspan="2">Increase resiliency</td></tr>
</table>

Table 2-63. (Continued)

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	PRMP
Air					
Quality	Air quality, Class 1 visibility areas, and air quality maintenance areas protected.				
Recreation					
Demand and Experiences	Meets recreational demand and improves quality of visitor experiences.				
Wilderness Characteristics					
Maintained (%)	59	55	52	53	57
Visual Resource Management					
Class II Maintained (%)	73	64	55	46	71
Class III Maintained (%)	69	57	43	39	62
Soils					
Residual Soil Disturbance in 2016 (acres)	8,400	10,700	10,800	15,300	15,000
Soil Productivity	Maintains				
Grazing					
Authorizations (acres)	560,000	419,000 (Reductions: Medford/Klamath Falls = inactive permits/leases Coos Bay = 16 acres active leases)			
Forage Production in Year 2106 (in AUMs)	28,950	19,673	19,867	22,805	20,447
Wild Horses					
Herd Management Level	Maintained				
Areas of Critical Environmental Concern					
Some Relevant and Important Values Degraded or Lost	No	Yes	Yes	Yes	Yes
Cultural					
Number Damaged	≤ 2% of the number of sites damaged per decade				
Energy and Minerals					
Availability and Quantity	Maintains similar levels of availability and quantity of energy and mineral resources.				

Table 2-64. Comparison Of The Land Use Allocation Acres Of The Five Alternatives

Land Use Allocation	No Action	Alternative 1	Alternative 2	Alternative 3	PRMP
National Landscape Conservation System (NLCS)[a]	89,200	177,100	177,100	177,100	148,600[b]
Administratively Withdrawn Area	362,300	473,200	477,000	471,800	588,300
Late-Successional Management Area (LSMA)[a]	905,100	704,700	484,500	0	566,400
Riparian Management Area (RMA)[a]	362,900[c]	221,600	163,000	186,200	242,300
Eastside Forest Management Areas	14,300	14,300	14,300	14,300	14,300
Timber Management Area (TMA)[a]	623,000	959,200	1,220,600	0	990,200[d]
General Management Area	0	0	0	1,684,800	0
Adaptive Management Area	193,300	0	0	0	0
Coquille Management Area	0	0	13,600	15,900	0
Totals	**2,550,100**	**2,550,100**	**2,550,100**	**2,550,100**	**2,550,100**

[a] In the 1994 Resource Management Plan and Northwest Forest Plan (No Action Alternative in this FEIS):

- NLCS was called Congressional Reserve
- LSMA was called Late-Successional Reserve
- RMA was called Riparian Reserve
- TMA was called General Forest Management Area or Matrix

[b] The decreased acreage under the PRMP is because eligible Wild and Scenic rivers in the Medford District that were determined not suitable as Wild and Scenic rivers were included in the Draft EIS in error; they are not in the PRMP.

[c] In Draft EIS, non-suitable woodlands were in Timber Management Areas although no allowable sale quantity harvest was modeled. In PRMP, non-suitable woodlands are in the Administratively Withdrawn Area to better reflect their status.

[d] Includes Deferred Timber Management Area, Uneven-Age Timber Management Area, and Timber Management Area.

Table 2-65. Areas Of Critical Environmental Concern Designated By Alternative

(*Note:* An "x" is placed for those alternatives proposing designation of an area as an ACEC. An area with no "x" under an alternative would not be designated an ACEC.)

Location # on Map 2-26	ACEC Name	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Salem District						
1	Beaver Creek					
2	Crabtree Complex RNA/ONA	X	X	X	X	X
3	Elk Creek	X		X		X
4	Forest Peak RNA	X	X	X	X	X
5	Grass Mountain RNA	X	X	X	X	X
6	High Peak - Moon Creek RNA	X	X	X	X	X
7	Jackson Bend	X	X	X	X	X
8	Little Grass Mountain[a]	X				
9	Little North Fork Wilson River		X	X	X	X
10	Little Sink	X	X	X	X	X
11	Lost Prairie	X	X	X	X	X
12	Lower Scappoose Eagle		X			
13	Marys Peak ONA	X	X	X		X
14	Marys Peak B		X	X	X	X
15	McCully Mountain					
16	Middle Santiam Terrace	X	X	X	X	X
17	Mill Creek Ridge		X	X		X
18	Molalla Meadows		X	X	X	X
19	Nestucca River	X		X		X
20	North Santiam	X				
21	Rickreall Ridge	X	X	X	X	X
22	Saddlebag Mountain RNA	X	X	X	X	X
23	Sandy River Gorge ONA	X	X	X	X	X
24	Sheridan Peak[a]	X				
25	Silt Creek		X	X	X	X
26	Snow Peak					
27	Soosap Meadows	X	X			X
28	The Butte RNA	X	X	X	X	X
29	Valley of the Giants ONA	X	X	X		X
30	Walker Flat	X	X	X	X	X
31	Waterloo		X	X	X	X
32	Wells Island					
33	White Rock Fen	X	X			
34	Wilhoit Springs	X				
35	Williams Lake	X				
36	Yampo	X	X	X	X	X
37	Yaquina Head ONA	X	X	X	X	X

Table 2-65. (Continued)

Location # on Map 2-26	ACEC Name	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Eugene District						
38	Camas Swale RNA	X	X	X	X	X
39	Coburg Hills RFI	X				
40	Cottage Grove Lake RFI	X		X		X
41	Cottage Grove Old Growth[a]	X				
42	Cougar Mountain Yew Grove	X				X
43	Dorena Lake RFI	X				
44	Dorena Prairie	X	X	X	X	X
45	Esmond Lake			X	X	X
46	Fox Hollow RNA	X	X	X	X	X
47	Grassy Mountain	X	X	X	X	X
48	Heceta Sand Dunes ONA	X	X	X	X	X
49	Horse Rock Ridge RNA	X	X	X	X	X
50	Hult Marsh	X	X	X	X	X
51	Lake Creek Falls[a]	X				
	Long Tom[b]	X	X	X	X	X
52	Lorane Ponderosa Pine	X	X	X	X	X
53	Low Elevation Headwaters of the McKenzie River	X				
54	McGowan Meadow		X	X	X	X
55	Mohawk RNA	X	X	X	X	X
56	Oak Basin Prairies		X	X	X	X
57	Taylor Creek					
58	Upper Elk Meadows RNA	X	X	X	X	X
59	Willamette Valley Prairie/Oak and Pine Area		X	X	X	X
Roseburg District						
60	Bear Gulch RNA	X	X	X	X	X
61	Beatty Creek RNA	X	X	X	X	X
62	Bushnell-Irwin Rocks RNA	X	X	X	X	X
63	Callahan Meadows		X	X	X	X
64	China Ditch					
65	Myrtle Island RNA	X	X	X	X	X
66	North Bank	X	X	X	X	X
67	North Myrtle Creek RNA	X	X	X	X	X
68	North Umpqua River[a]	X				
69	Red Pond RNA	X	X	X	X	X
70	Stouts Creek					
71	Tater Hill RNA	X	X	X	X	X
72	Umpqua River Wildlife Area	X				

Table 2-65. (Continued)

Location # on Map 2-26	ACEC Name	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
Coos Bay District						
73	Brownson Ridge					X
74	Cherry Creek RNA	X	X	X	X	X
75	China Wall	X	X	X	X	X
76	Euphoria Ridge					X
77	Hunter Creek Bog	X	X	X	X	X
78	New River	X	X	X	X	X
79	North Fork Chetco	X	X	X	X	X
80	North Fork Coquille River	X	X	X		X
81	North Fork Hunter Creek	X	X	X	X	X
82	North Spit	X	X	X	X	X
83	Rocky Peak		X	X	X	X
84	Roman Nose		X	X	X	X
85	Steel Creek		X	X		X
86	Tioga Creek	X	X	X		X
87	Upper Rock Creek	X	X			X
88	Wassen Creek	X	X			X
Medford District						
89	Baker Cypress	X				
90	Bobby Creek RNA	X	X	X	X	X
91	Brewer Spruce RNA	X	X	X	X	X
92	Cobleigh Road		X	X	X	X
93	Crooks Creek	X		X		X
94	Dakubetede Wildland		X	X	X	X
95	East Fork Whiskey Creek			X		X
96	Eight Dollar Mountain	X	X	X	X	X
97	French Flat	X	X	X	X	X
98	Grayback Glades RNA	X	X	X	X	X
99	Hole-In-The-Rock	X				
100	Holton Creek RNA	X	X	X	X	X
101	Hoxie Creek	X				
102	Iron Creek[a]	X				
103	Jenny Creek[a]	X				
104	King Mountain Rock Garden	X	X	X	X	X
105	Long Gulch					
106	Lost Lake RNA	X	X	X	X	X
107	Moon Prairie	X				
108	North Fork Silver Creek RNA	X	X	X	X	X
109	Old Baldy RNA	X	X	X	X	X
110	Oregon Gulch RNA	X	X	X	X	X

Table 2-65. (Continued)

Location # on Map 2-26	ACEC Name	No Action	Alt. 1	Alt. 2	Alt. 3	PRMP
111	Pickett Creek		X	X	X	X
112	Pilot Rock[a]	X				
113	Pipe Fork RNA	X	X	X	X	X
114	Poverty Flat	X	X	X	X	X
115	Reeves Creek					
116	Rough and Ready	X	X	X	X	X
117	Round Top Butte RNA	X	X	X	X	X
118	Scotch Creek RNA	X	X	X	X	X
119	Sterling Mine Ditch[a]	X				
120	Table Rocks ONA	X	X	X	X	X
121	Tin Cup	X				
122	Waldo-Takilma		X	X	X	X
123	Whiskey Creek[c]	X	X	X	X	X
124	Woodcock Bog RNA	X	X	X	X	X
Klamath Falls Resource Area[d]						
125	Bumpheads		X	X	X	X
126	Miller Creek	X	X	X	X	X
109	Old Baldy RNA[e]	X	X	X	X	X
127	Tunnel Creek		X	X	X	X
128	Upper Klamath River	X	X	X	X	X
129	Upper Klamath River Addition	X	X	X	X	X
130	Wood River Wetland	X	X	X	X	X
131	Yainax Butte	X	X	X	X	X
Total Number of ACECs/Alternative		**99**	**93**	**94**	**83**	**100**

[a]This ACEC did not meet relevance and importance criteria, and/or do not need special management attention, and therefore was not further analyzed for designation under the action alternatives. Management direction for this area would only be applied under the No Action Alternative.

[b]This ACEC was carried over from the previous RMP. It was inadvertently left off tables in the Draft EIS.

[C] This potential ACEC was not analyzed in the Draft EIS, and therefore cannot be designated as an ACEC at this time. It will receive interim management until it is evaluated during a future plan amendment or revision.

[d]At the time of publication of the DEIS, the Bureau of Reclamation (BOR) was considering a proposal to relinquish a withdrawal of public lands known as the Four Mile Wetland. Anticipating that relinquishment, this property was included in the analysis of the DEIS. However in January 2008, the BOR decided to drop the proposed relinquishment. Thus, the administration over the Four Mile Wetland remains with the BOR and as such would not be subject to management direction by the BLM's resource management plan. The Four Mile ACEC, therefore, has been removed from analysis in the FEIS.

[e]Some of this ACEC is in the Medford District and some is in the Klamath Falls Resource Area of the Lakeview District. Therefore, it is only counted as one ACEC and given the same map reference number.

Chapter 3
Affected Environment

Chapter 3 of this final environmental impact statement describes the affected environment for the six resource management plans of the planning area that are being revised.

In this chapter:

Summary of Major Changes between Draft and Final EIS/RMP

Forest Structure and Spatial Pattern

- The section (formerly called Ecology) was re-titled to better reflect the content of the analysis.
- Additional discussion of average historic conditions was added to clarify the historic period being referenced.
- Additional discussion of hardwood-dominated stands was added to describe available data.
- Explanation of the threshold value for the connectance index was added.

Carbon Storage

- A section describing carbon storage on BLM-administered lands was added.

Socioeconomics

- A discussion of non-market and non-timber related economics was added.

Timber

- Additional explanation regarding changes in timber inventory over time was added.

Botany

- Changes to special status species category names, species rankings, and additions and removals of species to the BLM special status species list were made based on revisions by Oregon BLM to the special status species policy.
- 82 of the 324 species listed in the Draft EIS were removed from the special status species list, and 49 new species were added to the list.

Invasive Plants

- The representative invasive plant species distributions and invasive plant distribution categories were updated.

Wildlife (Northern Spotted Owl)

- The narrative for the northern spotted owl was revised for consistency with the revised analyses in Chapter 4.
- The evaluation of suitable habitat was augmented to show the actual locations, sizes, and spatial arrangements of habitat blocks.
- The scale for evaluating dispersal between and within habitat blocks was modified according to current science.
- The analysis of “areas of concern” was refined.
- Evaluations were added to address the impact of wildfire to habitat and risks associated with the declining spotted owl population.

Wildlife (other than Northern Spotted Owl)

- The range of the marbled murrelet was modified to reflect a needed correction in the Medford District. Also, discussion related to structurally complex forest greater than 200 years of age was included to differentiate this habitat component from overall nesting habitat.

- The definition of potential bald eagle nesting habitat was modified to include only those forested stands within 2 miles of, and within line-of-sight of, foraging habitat.
- The narrative describing fisher natal habitat was revised to include a discussion of those structurally complex stands greater than 200 years of age, separate from the overall discussion of natal habitat.
- The land bird narrative was revised to better incorporate information from the Partners-in-Flight conservation strategies for land bird habitat in westside forests, nonforested habitat, and habitat in Eastside Management Lands. Also, the discussion of legacy components (i.e., snags, coarse woody debris, and green tree retention) was expanded.
- The special status species narrative was revised to facilitate effect analysis based on five broad categories of habitat types: (1) westside forest habitats; (2) habitat on the Eastside Management Lands (i.e., east side of the Klamath Falls Resource Area); (3) non-forested habitats; (4) riparian habitats; and (5) forest floor habitats.
- The cover discussion in the deer and elk narrative was revised to discuss hiding cover, not thermal cover.

Water

- Adjustments were made to the peak flow analysis.

Fish

- National Marine Fisheries Service Critical Habitat Analytical Review Team (CHART) information and maps were added.
- A comparison of fish distribution and high intrinsic potential streams was added.
- A comparison of high intrinsic potential stream locations and CHART watersheds was added.
- Adjustments were made to the large wood delivery model.
- A correlation between forest stand conditions and nutrient input was added.
- The description of current scientific information regarding the thresholds at which the effects of fine sediment occur for aquatic habitat and fish species was expanded to include sub-lethal effects and thresholds.
- Additional information on the current amount of fine sediment in stream channels in the planning area and on BLM-administered lands was added.
- The amount of turbidity impaired streams was updated for BLM-administered lands.
- The description of stream temperature standards was expanded to include ODEQ's Cold Core Water Habitat criterion.
- A summary of aquatic restoration that occurred from 1995-2004 was added.

Fire and Fuels

- Discussions of Fire Regime and Fire Regime Condition Class were expanded
- Information about Fire Regimes and Fire Regime Condition Classes was updated with the latest available Landfire information.
- Wildland Urban Interface mapping and information were updated and adjusted to include those areas under approved Community Wildfire Protection Plans as of January 1 2008.
- The discussions about weather effects and Burning Index were updated.

Air

- Terminology and mapping for Air Quality Management Areas were changed to incorporate changes in the State Air Quality Management Implementation Plan that took effect on January 1 2008.
- A graph showing past emissions by all landowners (both PM 10 and PM 2.5) was added.
- Estimated treatment acres were updated.

Recreation

- The total number of eligible wild and scenic rivers was reduced from the 101 river segments reported in the draft EIS to 57 in this final EIS. The draft EIS, in error, listed 44 rivers as eligible for designation that had already been studied and found not suitable for designation.
- The number of existing recreation sites and trails was refined to reflect a more accurate listing of the recreation features in the planning area. This resulted in the addition of 14 recreation sites and 5 trails.

Soils

- An estimate of the number of acres of residual compaction in the planning area was added.
- A section describing soil heating caused by wildfire or prescribed burning was added.
- The section on soil productivity was updated to include definitions of soil productivity and long-term impairment. The relationship of soil carbon and soil nitrogen was expanded to better describe their importance to long-term soil productivity.

Grazing

- The results of rangeland health assessments were updated.

Areas of Critical Environmental Concern

- Tables were modified to correct omissions and errors in the draft EIS.

Cultural Resources

- Cultural site occurrence was changed from district-based, to physiographic and drainage-based to more accurately show how humans used resources and land in the prehistoric period.
- Coastal shelf site types and presence of significant sites on BLM-administered land were added.
- Historic logging and mining site location predictors were added.
- Site numbers in the table were updated. Sites identified as historic sites in Klamath Falls Resource Area were reassigned to the archaeological sites category.

Lands, Realty, Access, and Transportation

- Data about land tenure zones and communication sites was corrected.
- Information about the proposed Palomar and Rub gas pipelines was included.

Energy and Minerals

- The description of geologic terrains was improved, and errors in the district-specific and summary tables of known and inferred mineral and energy occurrence potential were corrected.

Introduction

Chapter 3 describes the affected environment. The description of the affected environment is designed to support and facilitate the understanding of the analysis of environmental consequences presented in *Chapter 4*. The amount of information provided in this chapter is proportionate to the importance, scope, and sensitivity of the environmental consequences and is no longer than necessary to understand the analysis.

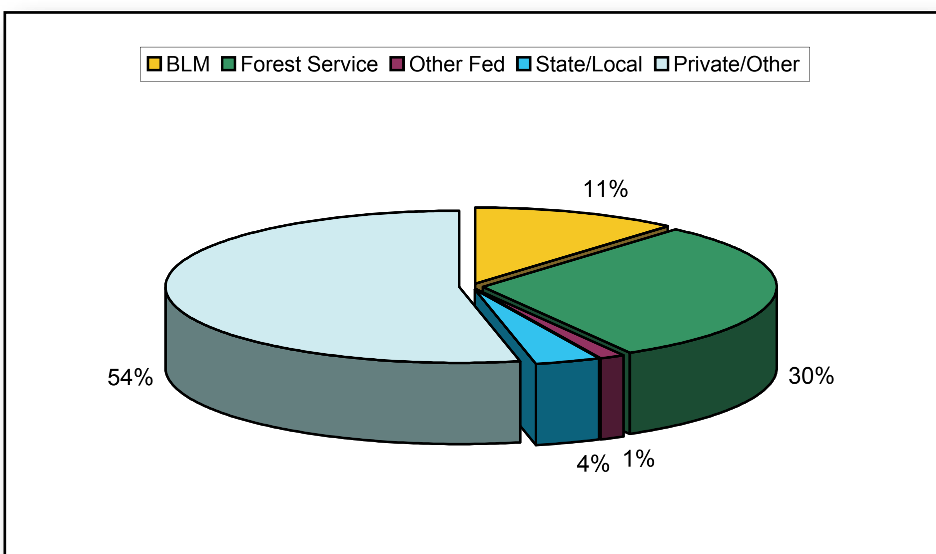
Planning Area

The planning area for the six resource management plans that are being revised includes the public lands and resources administered by the Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District. See *Map 3-1 (BLM-administered lands within the planning area)*.

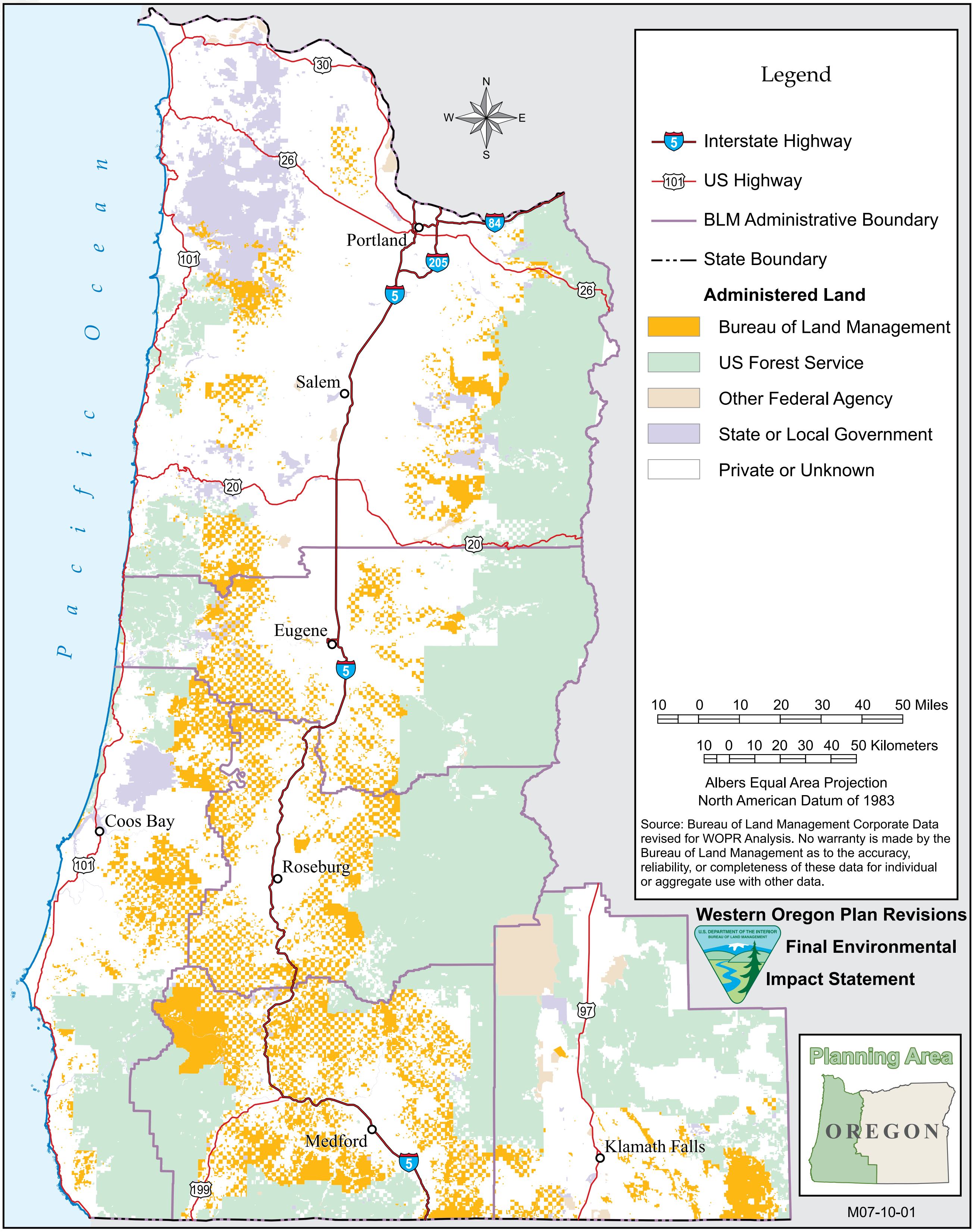
The entire planning area includes approximately 22 million acres, but only approximately 2.6 million acres are public lands administered by the BLM. The BLM-administered lands represent only about 11% of the planning area. The majority of lands within the planning area are owned and managed by private landowners and other government agencies. See *Figure 3-1 (Major ownerships within the planning area)*.

There are five physiographic provinces within the planning area. See *Figure 3-2 (Physiographic provinces within the planning area)*. Physiographic provinces vary by the type and structure of their vegetation and the differences in their hydrology, geology, and other processes (e.g., fire-return intervals) (FEMAT 1993).

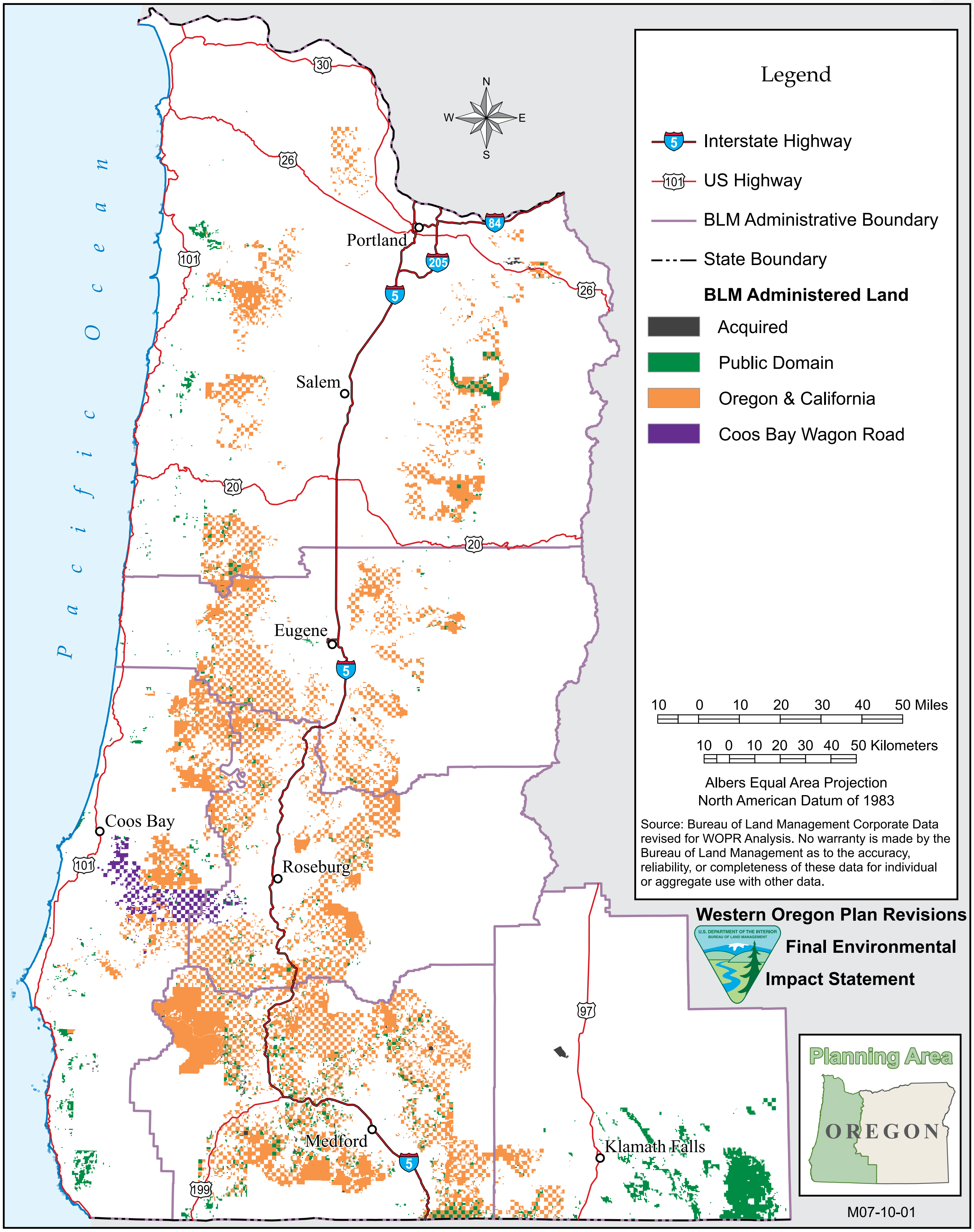
Figure 3-1. Major Ownerships Within The Planning Area



Map 3-1. BLM-Administered Lands Within The Planning Area



Map 3-2. Public Domain And O&C Lands Within The Planning Area



Land Ownerships Within the Planning Area

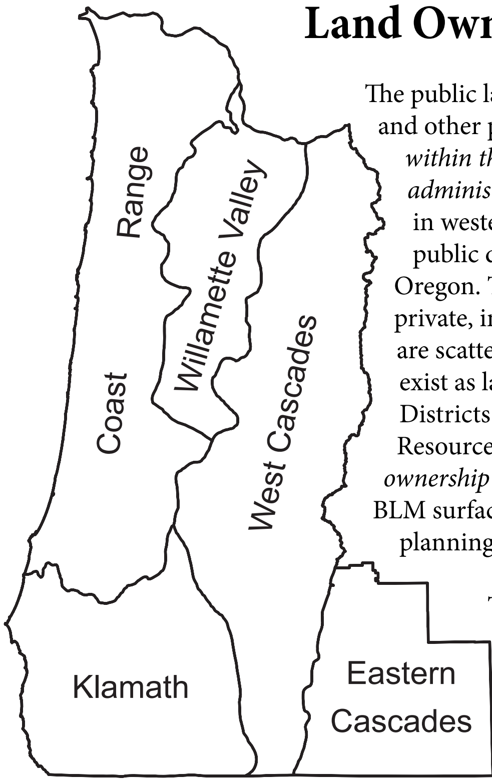


Figure 3-2. Physiographic Provinces Within The Planning Area

The public lands in Oregon include the O&C lands, public domain lands, and other public lands. See *Map 3-2 (Public domain and O&C lands within the planning area)* and *Table 3-1 (Legal status of the lands administered by the BLM within the planning area)*. The O&C lands in western Oregon are managed differently than the other public and public domain lands of Oregon that are located mostly in eastern Oregon. The O&C lands are mostly scattered and intermingled with private, industrial forest lands. About half of the public domain lands are scattered and intermingled with O&C lands, and the other half exist as larger blocks in the Salem, Coos Bay, and Lakeview BLM Districts (with the majority being concentrated in the Klamath Falls Resource Area of the Lakeview District). See *Figure 3-3 (BLM surface ownership by legal authority within the planning area)* for the amount of BLM surface ownership by source of administrative authority within the planning area.

The O&C land pattern has a checkerboard character that results from the grid of the Public Land Survey System. The O&C lands are generally located in the odd-numbered sections, and the intermingled private lands are in the even-numbered sections. A section in the checkerboard is normally one mile on a side and encloses approximately 640 acres. The BLM administers approximately 2.6 million acres of these checkerboard parcels of public land within the approximately 22 million acres that comprise the planning area.

Figure 3-4 illustrates the intermingled checkerboard pattern of the BLM and private land ownerships. The BLM-administered lands in the figure are within the squares that contain the small polygons. Note that many parcels of BLM-administered lands are smaller than a square mile and are disconnected and isolated from other BLM-administered lands. The dark green areas in the image are older forests, and the brown areas are recently harvested units.

Public Land Survey System

For details about this system of subdividing and identifying public domain lands, see the following website: http://nationalatlas.gov/articles/boundaries/a_plss.html

Table 3-1. Legal Status Of Lands Administered By BLM Within The Planning Area

BLM District	O&C Lands and Coos Bay Wagon Road Lands	Public Domain Lands	Other Public Lands	Total
		(acres)		
Salem	349,300	51,600	2,100	403,000
Eugene	304,200	10,500	400	315,100
Roseburg	406,500	19,800	0	426,300
Coos Bay	279,400	41,800	1,500	322,700
Medford	764,900	96,100	4,800	865,800
Klamath Falls Resource Area (Lakeview District)	46,900	174,800	3,200	224,900
Totals	**2,151,200**	**394,600**	**12,000**	**2,557,800**

[a]Federal lands acquired by purchase or donation under an authorization other than the Federal Land Policy and Management Act.

Figure 3-3. BLM Surface Ownership By Legal Authority Within The Planning Area

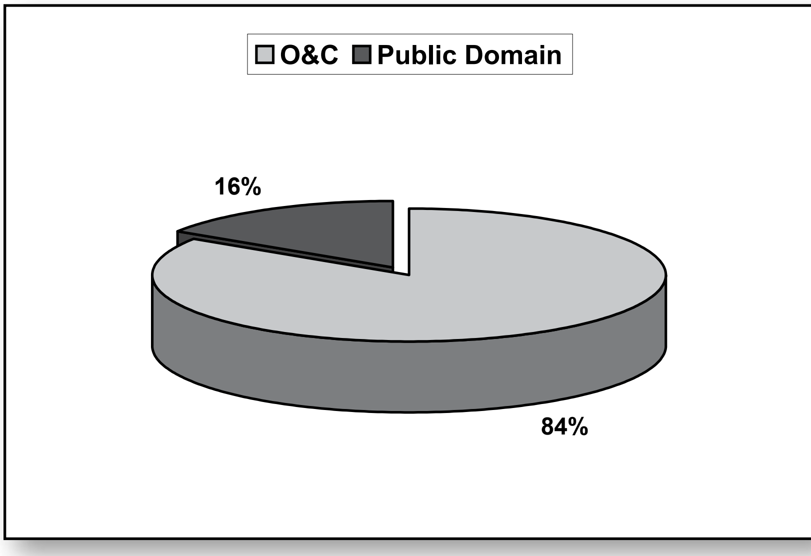
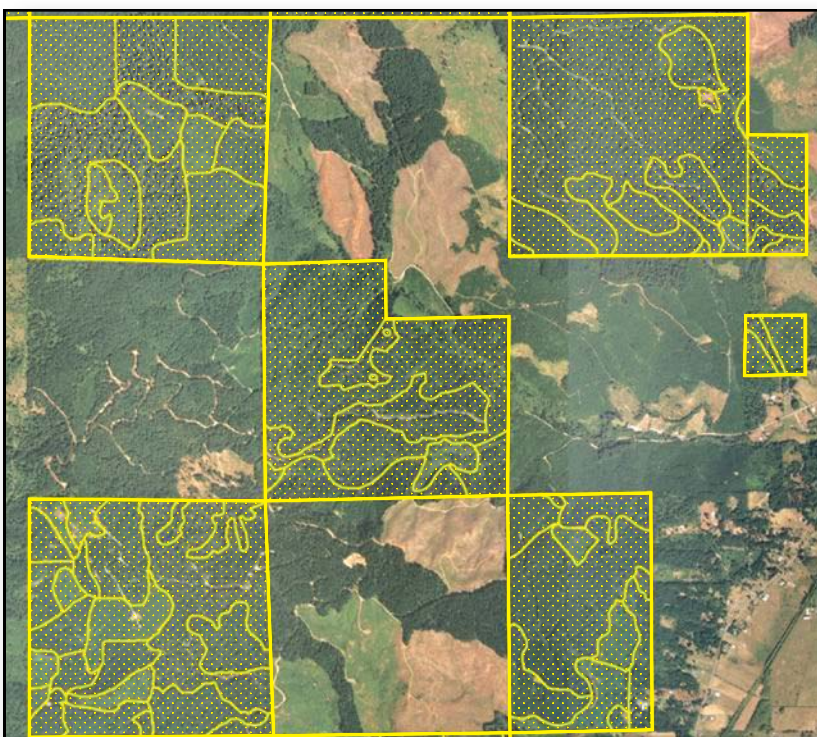


Figure 3-4. Sample Portion Of The Intermigled Checkerboard Of Private And BLM-Administered Lands



Land Management

The existing land management plans for the individual national forests and BLM districts (including the six districts within the planning area) that are west of the Cascade Range in Washington, Oregon, and northern California incorporate the management direction contained in the Northwest Forest Plan. Most, but not all, of the planning area falls within the Northwest Forest Plan area. See *Figure 3-5 (Areas of the Northwest Forest Plan and the planning area)*.

The current vegetation condition of the private, state, and federal lands within the planning area was calculated using the 1996 satellite data from the Interagency Vegetation Mapping Project. This data includes the major fire and regeneration harvesting data that is available as of 2002. The vegetative condition of non-BLM lands varies from nonforest, to all four of the forest structural stage classifications (stand establishment, young, mature, and structurally complex).

Figure 3-5. Areas Of The Northwest Forest Plan And The Planning Area

The intensity of the land management activities across all ownerships within the planning area is partly indicated by the number of miles of roads that exist per square mile (i.e., road density). See *Figure 3-6 (Road density across all land ownerships within the planning area)*.

The BLM has also developed a geospatial database of the lands and resources it administers. This geographic information system contains data regarding various resources, including forests, streams, roads, recreation, and wildlife. This information was captured from on-the-ground surveys and aerial and satellite photography. See *Figure 3-7 (Example of geospatial data from the Forest Operations Inventory database)*.

Figure 3-7 shows aggregated sections within individual forest stands. Non-BLM lands are not mapped. The areas mapped in the figure represent a

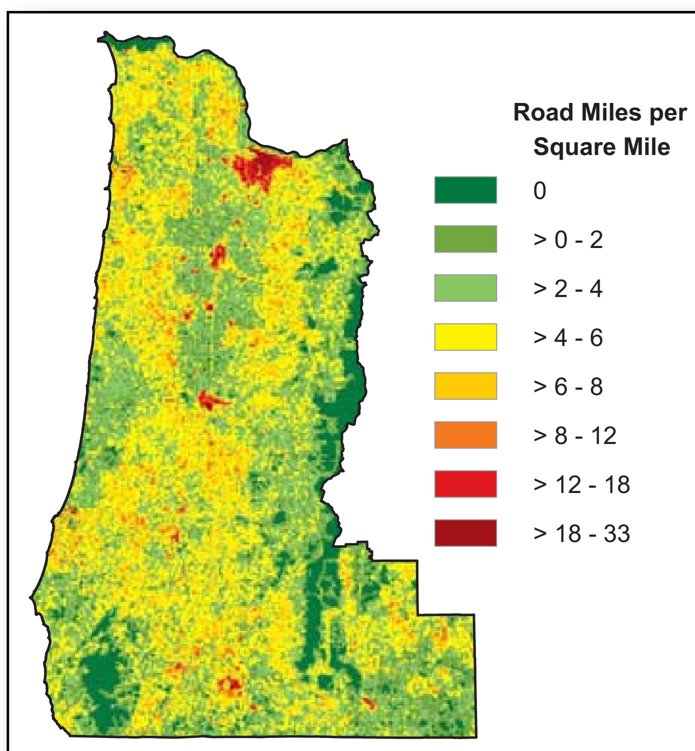
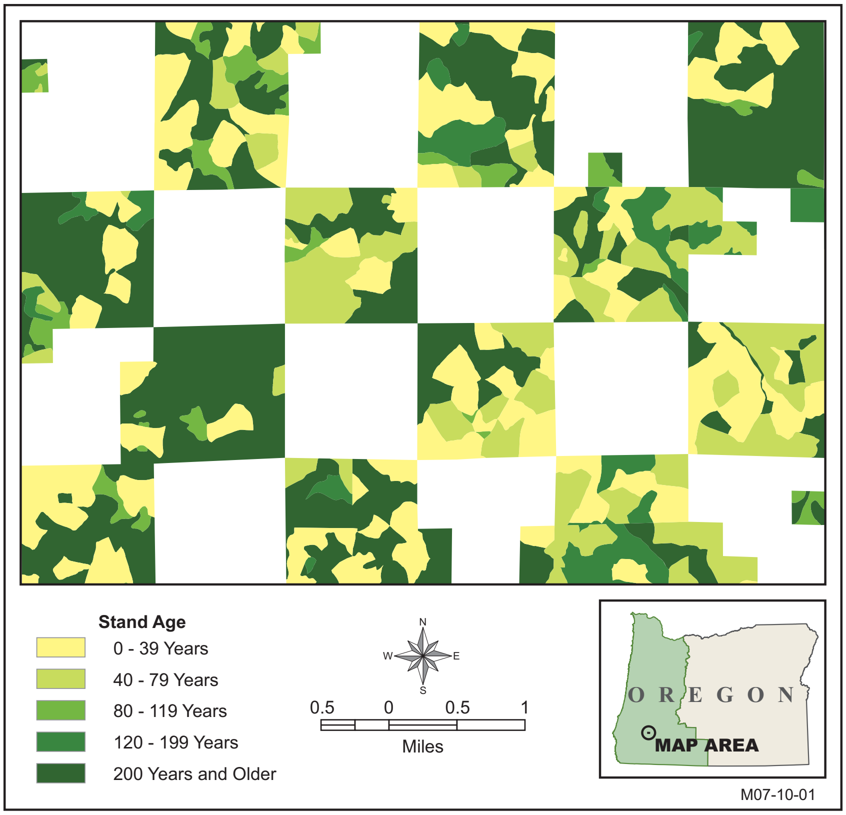


Figure 3-6. Road Density Across All Land Ownerships Within The Planning Area

Figure 3-7. Example Of Geospatial Data From The Forest Operations Inventory Database



somewhat typical BLM landscape, which is a mixture of older stands and younger stands that that have been harvested and replanted. These stands are intermixed on a larger landscape with private timber management, agriculture, and urbanization. The BLM manages more than 80,000 mapped individual stands.

Watersheds are also useful as a unit of measure for summarizing certain natural resources. There are 260 fifth-field watersheds, each averaging 87,000 acres in size, located all or partially within the planning area. For a discussion of watersheds, see the *Water* section in *Chapter 3*. See *Figure 3-8 (Fifth-field watersheds within the planning area)* for the size and distribution of these watersheds within the planning area.

The BLM in western Oregon is rarely the predominant landowner within a fifth-field watershed. See *Figure 3-9 (Two example watersheds showing various BLM ownership patterns)*. *Figure 3-9* shows that BLM ownership at the fifth-field watershed level ranges from a few scattered parcels to large areas. Therefore, activities on adjacent lands have implications for the management of BLM lands. The BLM's ability to influence resource outcomes often depends on the amount and location of its land ownership in relation to a particular resource. In this example, management of BLM-administered lands is more likely to affect fish populations in the Evans Creek watershed than in the Eagle Creek watershed.

More than half of the BLM lands are located within fifth-field watersheds where the BLM-administered lands comprise less than one-third of the watershed. By contrast, most of the lands managed by the Forest Service are in large, contiguous blocks. See *Figure 3-10 (BLM, Forest Service, and private ownership as a percent of the fifth-field watersheds within the planning area)*, which illustrates the comparative proportion of land ownership at the fifth-field watershed scale for the BLM, Forest Service, and private landowners. In only 8 of the 260 fifth-field watersheds within the planning area do the BLM-administered lands comprise the majority of the watershed.

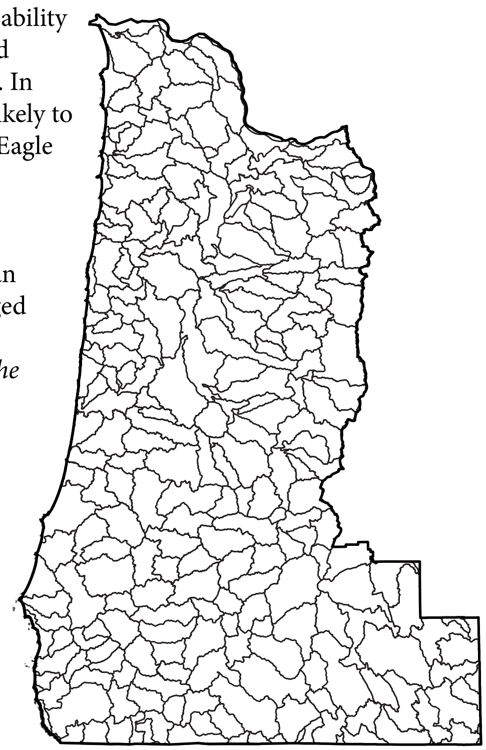


Figure 3-8. Fifth-Field Watersheds Within The Planning Area

Figure 3-9. Two Example Watersheds Showing Various BLM Ownership Patterns

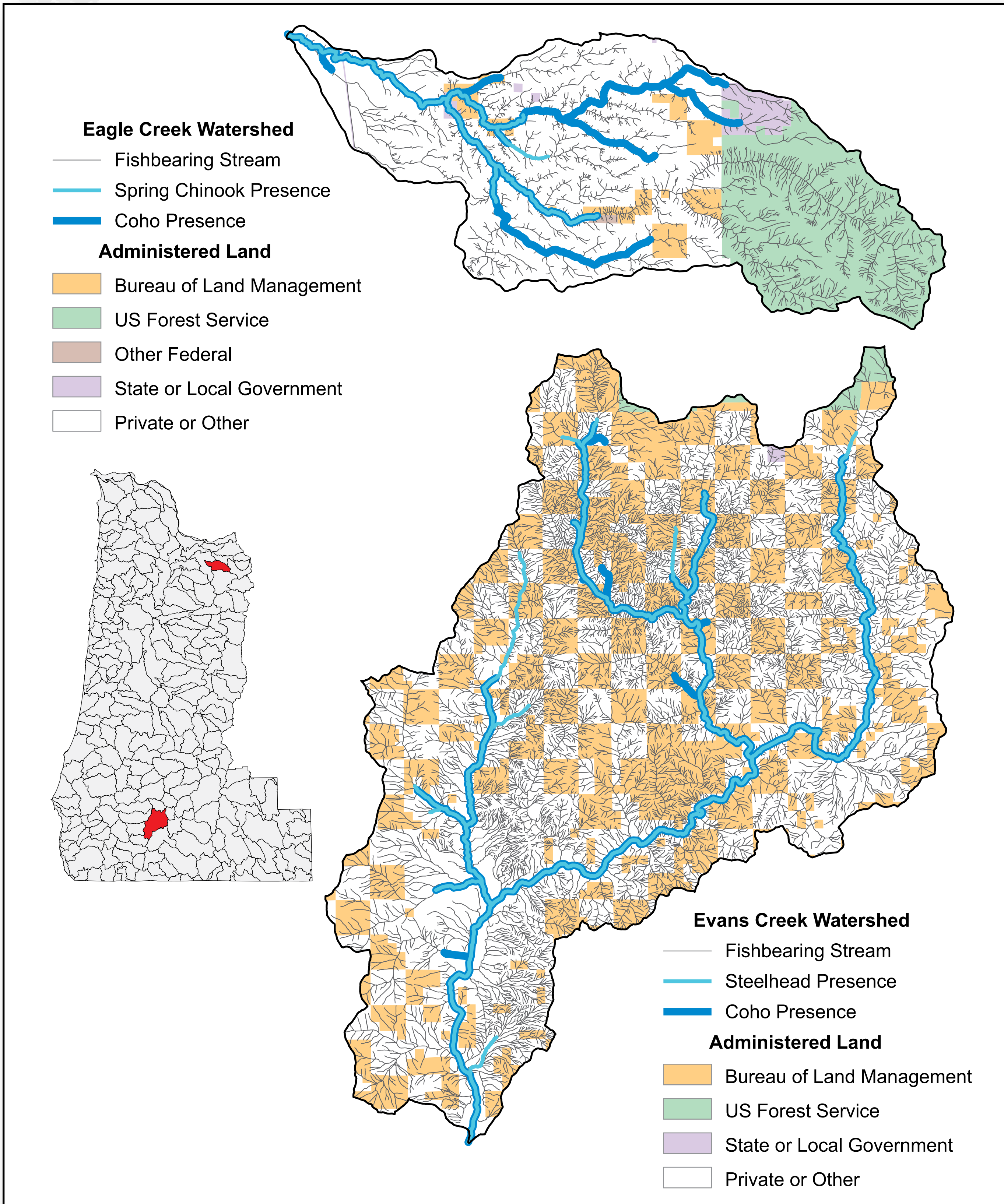
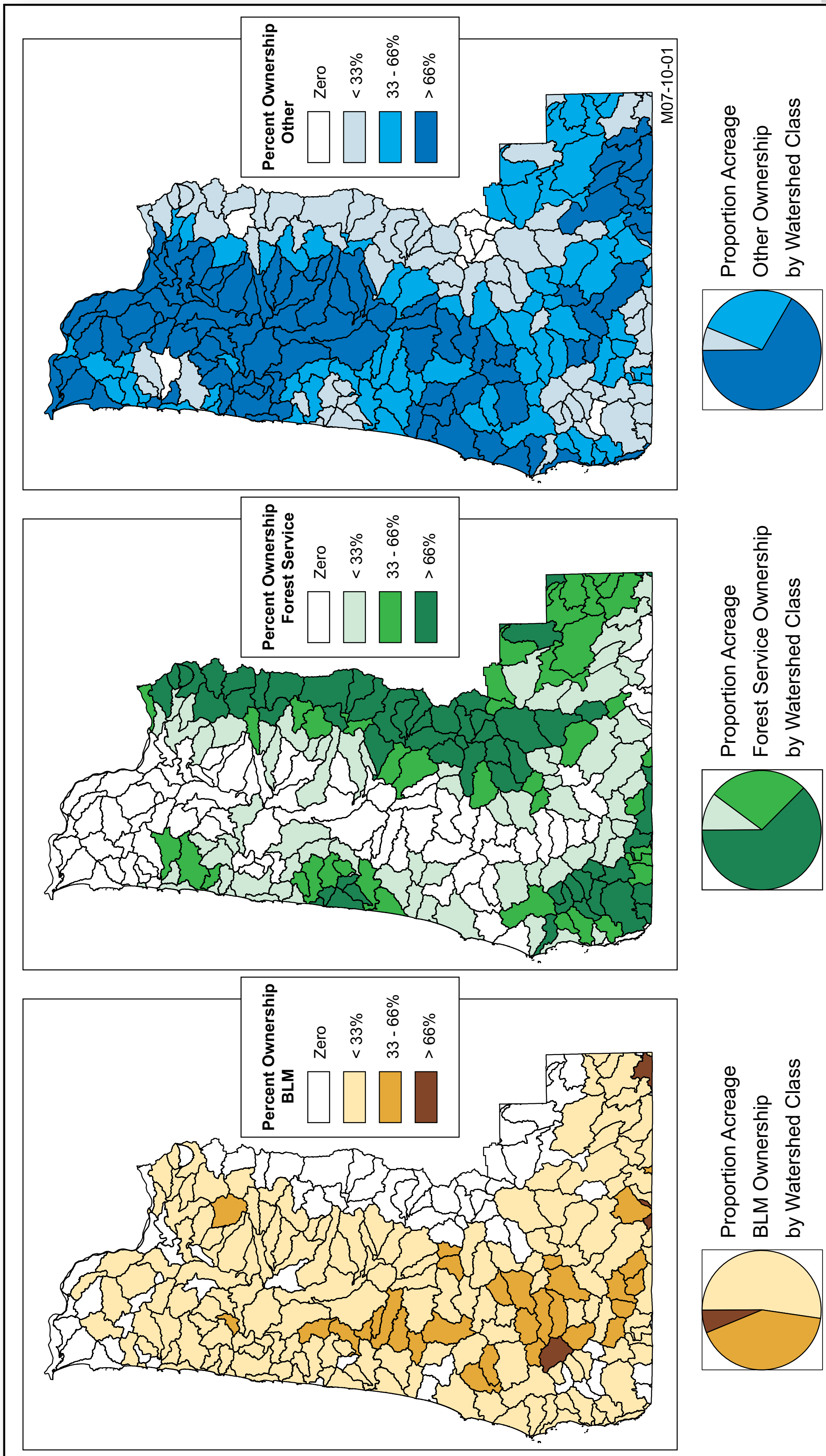


Figure 3-10. BLM, Forest Service, and Private Ownership as a Percent of the Fifth-Field Watersheds Within the Planning Area



Forest Structure and Spatial Pattern

Key Points

- The abundance of stand establishment forests is above the average for historic conditions.
- Stand establishment forests created by timber harvesting usually lack the habitat complexity and legacy components typical of stand establishment forests following natural disturbances.
- Stand establishment forests have declined on federally managed forests over the past decade and are becoming restricted to nonfederal lands.
- The abundance of young forests is above the average for historic conditions.
- Young forests on BLM-administered lands are predominately high-density, even-aged stands that are developing along a trajectory fundamentally different from that experienced by most of the existing structurally complex forests on BLM-administered lands.
- The abundance of mature and structurally complex forests within the planning area is below the average for historic conditions.
- The growth of forests into a mature and structurally complex forested condition has far outpaced the loss of mature and structurally complex forests from harvesting and wildfires within the planning area over the past 10 years.

This section of *Chapter 3* analyzes the ecological condition of conifer forests. Forest stands can be described by their structure, composition, and function. This analysis will focus on forest structure, because structure is the most easily analyzed, responds most predictably and apparently to management actions, and is closely related to many of the issues for analysis.

Structural development of conifer stands in the Pacific Northwest is a complex and continuous process. Pacific Northwest conifer forests are notable for the potential longevity and massive size of live trees and the enormous accumulations of coarse woody debris. Forest structure in the Pacific Northwest continues to develop for tremendously long time spans, perhaps even a millennium in the absence of stand-replacing disturbances (Spies 2004, Franklin et al. 2002). Therefore, there is more complexity in classifying the later stages of structural development in the conifer forests of the Pacific Northwest than in most forested regions.

The report titled *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment* (FEMAT 1993) described ecological conditions throughout the range of the northern spotted owl. The FEMAT report described the history of forest management in the region (pp. II-2 and II-3), the terrestrial forest ecosystems with an overview of biological communities and ownership patterns (pp. IV-3 to IV-8), and the current forest conditions with an emphasis on the structure, composition, and processes of late-successional forests (pp. IV-8 to IV-12, IV-27 to IV-31). Those descriptions are incorporated by reference and the following paragraphs summarize them.

FEMAT (Forest Ecosystem Management Assessment Team)

The 1993 presidentially assigned team of scientists, researchers, and technicians from seven federal agencies that created the report used as the basis for the Northwest Forest Plan.

The final supplemental environmental impact statement (FSEIS)(USDA USFS and USDI BLM 1994b) for the Northwest Forest Plan also analyzed ecological conditions within the range of the northern spotted owl.

The Northwest Forest Plan FSEIS relied partly on the FEMAT report, which was included as an appendix to the Northwest Forest Plan FSEIS. The Northwest Forest Plan FSEIS provided some additional discussion within each of the descriptions incorporated below, and those analyses are incorporated by reference (pp. 3&4-11 to 3&4-29).

The FEMAT report and the Northwest Forest Plan focused on "late-successional and old-growth forest" (USDA USFS and USDI BLM 1994b, pp. I-4 to I-6). As defined in the FEMAT report and the Northwest Forest Plan, the concept of late-successional forest included both mature and old-growth forests (FEMAT p. IX-19, USDA USFS and USDI BLM 1994b, Glossary 9). The FEMAT report and the Northwest Forest Plan developed a management plan that was "based on returning the federal landscape toward an extent of old-growth forest more in line with what was here before widespread logging on federal lands. The historical extent was assumed to be adequate to sustain the native biological diversity associated with older forest" (Spies 2006, p. 83).

Late-successional forests are heterogeneous in structure and diverse in composition and function (FEMAT, pp. IV-28 to IV-31). Since publication of the FEMAT report in 1993, research has continued to refine scientific understanding of the development of existing late-successional forests. There are multiple developmental pathways to late-successional forest structure and composition across the region (Franklin and Van Pelt 2004, Spies 2004, Franklin et al. 2002). Research reconstructing the stand development of late-successional forests on BLM-administered lands in western Oregon suggests that large, old-growth trees generally developed under low stand densities (Spies 2006, Poage and Tappeiner 2002, Sensenig 2002, Tappeiner et al. 1997). In contrast, research done by Winter et al. (2002) that involved reconstructing a late-successional stand in western Washington concluded that the stand initiated under high-density conditions. Although the research by Winter et al. (2002) represents only a single stand, its contrasting finding to the above research suggests there may be strong regional differences in development of late-successional forest conditions. The large data set from BLM-administered lands within the planning area makes the conclusions from Poage and Tappeiner (2002) and Tappeiner et al. (1997) more relevant to this analysis.

The FEMAT report and the Northwest Forest Plan FSEIS described the role of silviculture, including the use of stand thinning, to accelerate development of late-successional forest structural characteristics and to reduce the risk of stand-replacing fire (FEMAT, pp. IV-33 to IV36; USDA USFS and USDI BLM 1994b, pp. 3&4-45, 3&4-47, 3&4-49). The Northwest Forest Plan FSEIS observed that late-successional forest development in young, managed stands may be retarded, or not occur at all, without silvicultural treatment (USDA USFS and USDI BLM 1994b, p. 3&4-49). Research in the last decade has reinforced the potential roles of silviculture and has provided a more detailed understanding of the effects of thinning on forest resources (Franklin et al. 2006, Spies 2006, Hayes et al. 2003, Muir et al. 2002, and Carey 2000). The monitoring report titled *Northwest Forest Plan–The First Ten Years (1994-2003): A Synthesis of Monitoring and Research Results* (commonly known as the *Monitoring Synthesis Report*) affirmed conclusions in the FEMAT report and the Northwest Forest Plan that thinning would restore ecological diversity and reduce the potential for loss from high-severity fires (Spies 2006:110-111).

Forest Structure and Spatial Pattern at the Regional Scale

The analysis in this section of *Chapter 3* (*Forest Structure and Spatial Pattern*) will not provide a new analysis of forest conditions at the scale of the Northwest Forest Plan, which is the range of the northern spotted owl. The discussions below will summarize previous analyses and monitoring results and provide the context for this analysis, which is conducted at the scale of the planning area and physiographic provinces. The discussions below at the regional scale use the forest stage terminology (e.g., late-successional forest) of the original analyses rather than the structural stage classification terminology that was developed in this analysis.

The Northwest Forest Plan FSEIS evaluated the abundance of late-successional forest by comparing abundance under each alternative to estimates of historic conditions (USDA USFS and USDI BLM 1994b, pp. 3&4-36, 3&4-37):

- a "long-term average" of 65% of the region in late-successional forest, and
- a "long-term average low" of 40% of the region in late-successional forest.

The Northwest Forest Plan FSEIS estimated that there were 8.55 million acres of late-successional forest (described as medium and large conifer), which is approximately 35% of the 24.5 million acres of federally managed lands within the range of the northern spotted owl in 1994 (USDA USFS and USDI BLM 1994b, p. 3&4-27). The monitoring report titled *Northwest Forest Plan–The First Ten Years (1994-2003): Status and Trend of Late-Successional and Old-Growth Forest* (commonly known as the *Late-Successional Forest Monitoring Report*), using a similar definition but a remotely sensed data source, concluded that there were 7.87 million acres of late-successional forest on federally managed lands in 1994, and concluded that the plan was founded on valid assumptions about the extent of the remaining older forests (Moeur et al. 2005). The *Late-Successional Forest Monitoring Report* contains detailed descriptions of the abundance and distribution of late-successional forest by different measures, and those descriptions are incorporated by reference (Moeur et al. 2005, pp. 44-110).

Physiographic province

A region of the landscape with distinctive geographical features. There are five within the planning area:

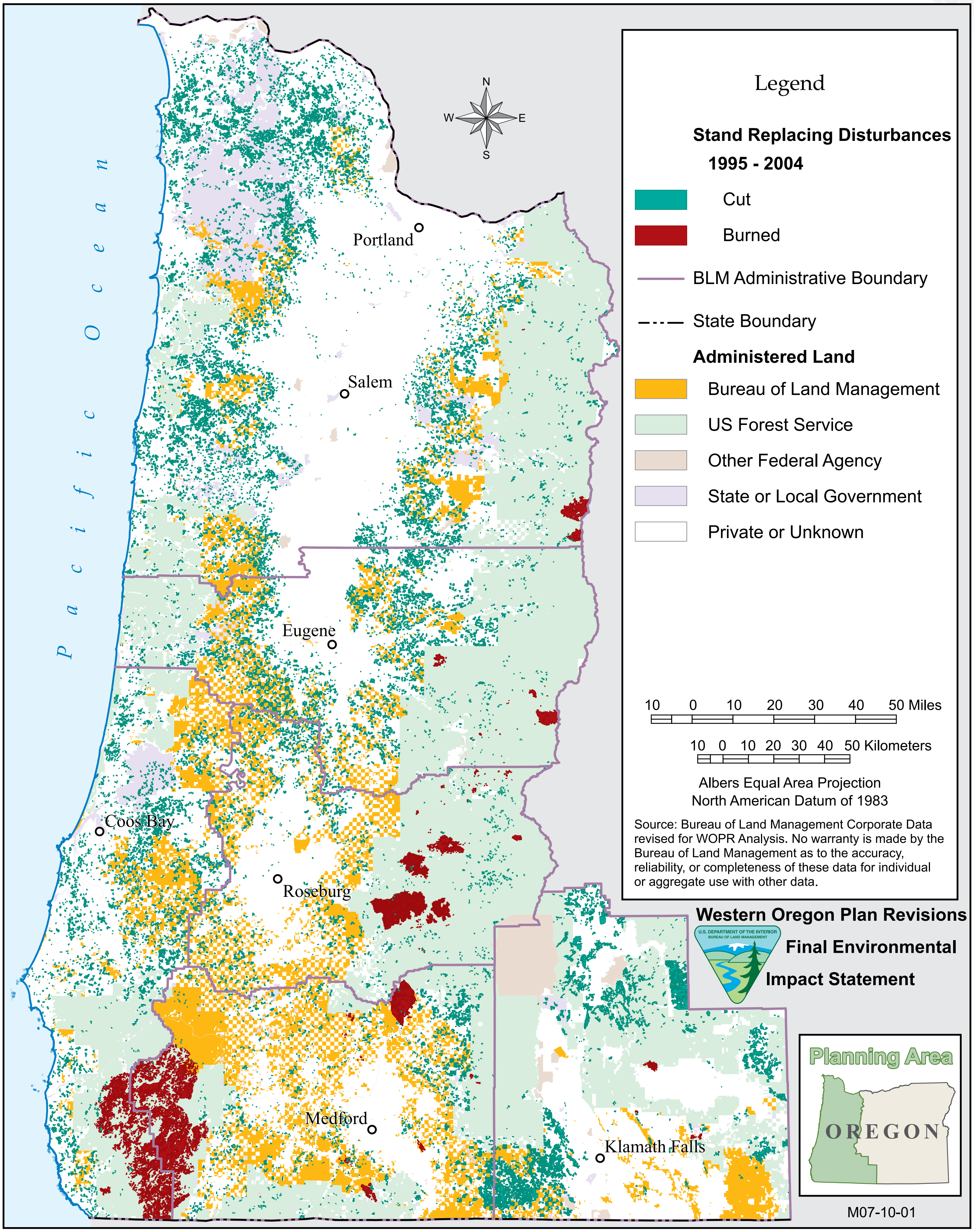
- Coast Range
- Eastern Cascades
- Klamath
- West Cascades
- Willamette Valley

Since 1994, there has been a net increase of late-successional forest approximately twice the increase anticipated in the Northwest Forest Plan FSEIS (Spies 2006; Moeur et al. 2005, pp. 39, 85-100, 104-106; USDA USFS and USDI BLM 1994b, p. 3&4-42). Growth of forests into the lower size range of late-successional forests has far outpaced losses of late-successional forest from harvesting and wildfire. See *Map 3-3 (Stand Replacing Disturbances, 1995-2004).* Harvesting of late-successional forest has been far below the amount anticipated in the Northwest Forest Plan FSEIS: 0.2% of late-successional forest was harvested over the past decade, compared to 3% anticipated in the Northwest Forest Plan FSEIS (Moeur et al. 2005, p. 106). Loss of late-successional forest from wildfire in total has also been less than the amount anticipated in the Northwest Forest Plan FSEIS: 1.8% of late-successional forest was lost to wildfire over the past decade, compared to 2.5% anticipated in the Northwest Forest Plan FSEIS (Spies 2006, pp. 84, 89). However, losses from wildfire have been higher in the Klamath Province. For additional discussion of wildfire, see section *Introduction - Incomplete or Unavailable Information - Natural Disturbance and Salvage* in *Chapter 4*.

At least 1.7 million acres of existing late-successional forests are in fire-adapted vegetation types that are characterized by high fire frequency and low fire severity in the Eastern Cascades and Klamath Provinces, and up to 1 million acres are in dry mixed conifer types in the West Cascades Province. The *Late-Successional Forest Monitoring Report* and the *Monitoring Synthesis Report* identified that this large acreage of late-successional forest that is susceptible to catastrophic wildfire may be a concern, and concluded that the possibility of major losses of late-successional forest in fire-prone ecosystems cannot be ignored (Spies 2006; Moeur et al. 2005, pp. 100-102, 107-108).

Nonfederal forests within the range of the northern spotted owl are predominately young, even-aged, managed stands, and provide mostly early and mid-successional forest habitat. The Northwest Forest Plan FSEIS characterized typical management on nonfederal forest lands as including timber harvesting in a stand's fifth or sixth decade (USDA USFS and USDI BLM 1994b, pp. 3&4-5 - 3&4-8). Since 1994, harvest rotations on forest industry lands have generally shortened (Nonaka and Spies 2005; Kennedy 2005, pp. 110-117; Alig et al. 2000, p. 9). The Northwest Forest Plan assumed that nonfederal forests would contribute

Map 3-3. Stand Replacing Disturbances, 1995-2004



little to late-successional goals, but the *Monitoring Synthesis Report* acknowledged that this assumption may not have been correct, and that nonfederal lands, especially state lands, provide substantial late-successional forest (Spies 2006, p. 108).

The implementation of the Northwest Forest Plan reduced harvest levels on federally managed forests from recent historic levels. The vast majority of harvests and subsequent creation of early successional habitat is now occurring on nonfederal lands. The *Monitoring Synthesis Report* acknowledged that the Northwest Forest Plan did not explicitly provide for the biological diversity that is associated with early successional habitats. The *Monitoring Synthesis Report* observed that nonfederal lands cannot be assumed to provide for these elements of biological diversity because of the lack of diverse, early successional habitat with structural legacies on nonfederal lands (Spies 2006, p. 109).

The FEMAT report and the Northwest Forest Plan FSEIS provided a brief, qualitative evaluation of the existing spatial patterns of late-successional forests. Those analyses stated that what little late-successional forest remained on private and state lands occurred in small, isolated patches, and that most late-successional forests on federal forests are highly fragmented by harvested areas and young stands (FEMAT, p. IV-12; USDA USFS and USDI BLM 1994b, p. 3&4-29). The Northwest Forest Plan FSEIS evaluated the spatial patterns of alternatives by the connectivity of late-successional forest—measuring the distances between late-successional forested patches (USDA USFS and USDI BLM 1994b, pp. 3&4-38 to 3&4-40). The Northwest Forest Plan FSEIS concluded that implementation of the Northwest Forest Plan would likely result in “moderate to strong” connectivity among late-successional forests (Spies 2006; USDA USFS and USDI BLM 1994b, pp. 3&4-44 and 3&4-46). However, that analysis did not project the retention or development of late-successional forests within the harvest land base unless explicitly reserved through the standards and guidelines (USDA USFS and USDI BLM 1994b, pp. 3&4-42 and 3&4-43).

Forest Structure and Spatial Pattern at the Planning Area Scale

Forest conditions at the scale of the planning area are discussed in terms of the structural stages of forests and physiographic provinces. See *Figure 3-11 (Percent of BLM-administered land within each of the physiographic provinces within the planning area)* and *Figure 3-12 (Physiographic provinces and BLM lands within the planning area)*.

Forests are classified in this analysis by four structural stage classifications:

- stand establishment
- young
- mature
- structurally complex

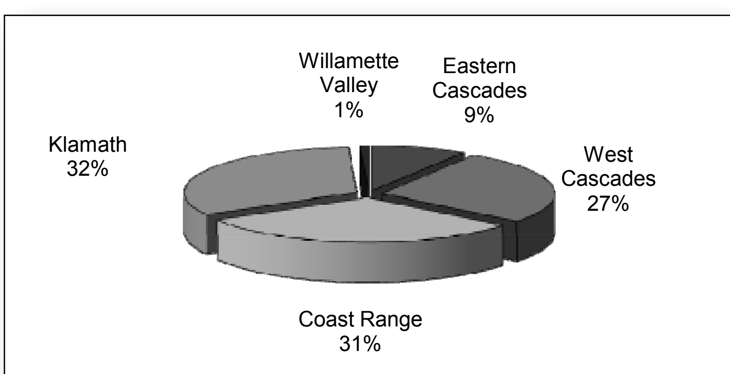
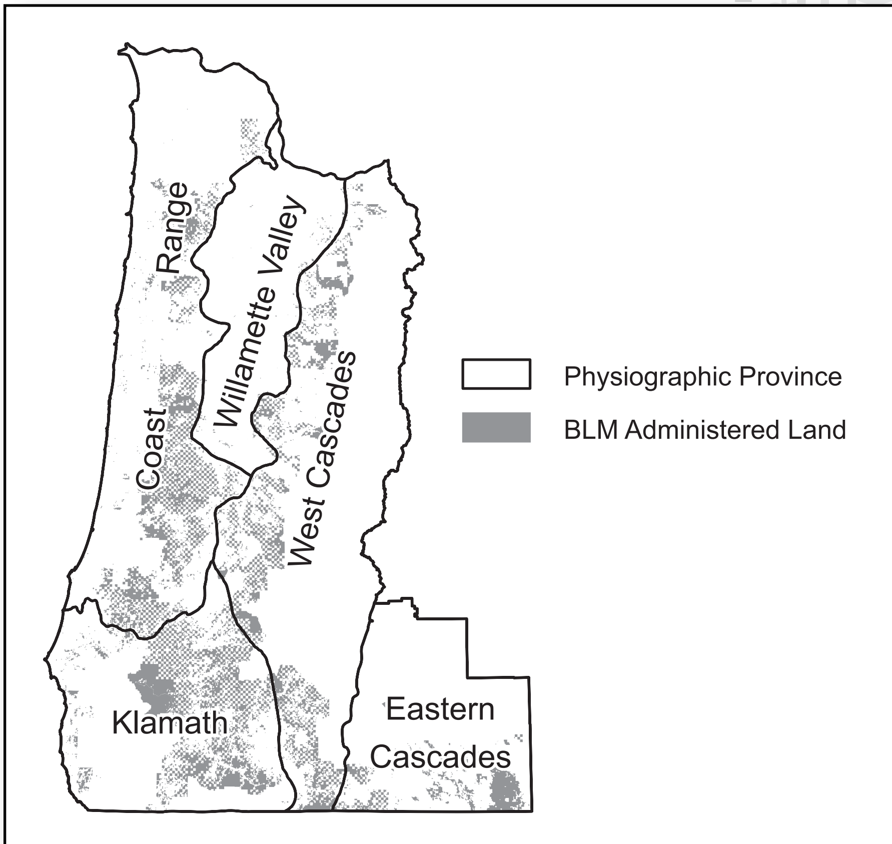


Figure 3-11. Percent Of BLM-Administered Land Within Each Of The Physiographic Provinces Within The Planning Area.

Figure 3-12. Physiographic Provinces And BLM Lands Within The Planning Area



These four structural classes are further subdivided by additional structural descriptors. See *Table 3-2 (Structural stage subdivisions)*. Most discussions in this section will only use the four classes described above. The subdivisions are applied only to BLM-administered lands and are used in this section only where needed to address specific analytical questions. A detailed description of the structural classifications is provided in *Appendix B - Forest Structure and Spatial Pattern*.

This classification uses only measures of live trees. The dynamics of coarse woody debris and snags are integral to ecological definitions of late-successional forests, and there is an increasing understanding of the importance of dead wood in early-successional forests (Franklin et al. 2002, Spies and Franklin 1988). However, this classification does not include measures of dead wood because there is an inadequate inventory of dead wood (Spies 2006), a high variability of dead wood levels in unmanaged forests (Spies and Franklin 1991), and difficulty in modeling future creation of dead wood from such disturbances as fire or wind (Kennedy 2005: 97-160).

The stand establishment structural stage describes the early-successional conditions of a forest following such disturbances as timber harvesting or wildfires. This classification is comparable to the cohort establishment stage in Franklin et al. (2002). This classification is subdivided based on whether the new forest includes trees from the previous forest (with or without structural legacies). See *Figure 3-13 (Stand establishment forest with structural legacies)*. Natural disturbances within the planning area typically do not kill all trees within a stand, and surviving trees have important influences on stand development (Franklin et al. 2002, Aber et al. 2000).

Table 3-2. Structural Stage Subdivisions

Structural Stages	Subdivisions	Descriptions
Stand Establishment	Stand Establishment without Structural Legacies	Very young forest (< 50 feet tall) without larger trees
	Stand Establishment with Structural Legacies	Very young forest (< 50 feet tall) with some larger trees
Young	Young without Structural Legacies	Taller than stand establishment, but still small (< 20 inches dbh) and without larger trees
	Young with Structural Legacies	Taller than stand establishment, but still small (< 20 inches dbh) and with some larger trees
Mature	Mature with Single-Layered Canopy	Larger trees (> 20 inches dbh) with little variation in tree size
	Mature with Multi-layered Canopy	Larger trees (> 20 inches dbh) with more than one canopy layer
Structurally Complex	Existing Old Forest[a,b]	Stands currently 200 years or older
	Developed Structurally Complex[c]	Larger trees (> 20 inches dbh) with some very large trees (> 40 inches dbh) and more than one canopy layer

Notes:

[a]Stands identified in the current inventory as 200 years or older remain in this subdivision in the future unless harvested.

[b]A subset of this subdivision (Existing Very Old Forest, which represents stands that are 400 years or older) is also identified based on current inventory. The assignment of ages to these unmanaged stands is imprecise, but represents the only available data across BLM-administered lands within the planning area.

[c]Forests are classified in this subdivision if they have the structural attributes identified but are not 200 years or older in the current inventory. It includes stands that currently have the attributes of structurally complex stands and those stands that develop the attributes of structurally complex stands in the future.

Young forests approximate small conifer forests as used in the FEMAT report and the Northwest Forest Plan. This classification is subdivided, like stand establishment, based on whether the young forest includes trees from the previous forest. See *Figure 3-14 (Young forest without structural legacies)*. Young forests with structural legacies develop from stand establishment forests that have structural legacies. Young forests with structural legacies typically develop directly into mature forests with multi-layered canopies, whereas young forests without structural legacies typically develop into mature forests with a single-layered canopy.

Mature forests are defined similarly to mature forests as described in the FEMAT report and the Northwest Forest Plan

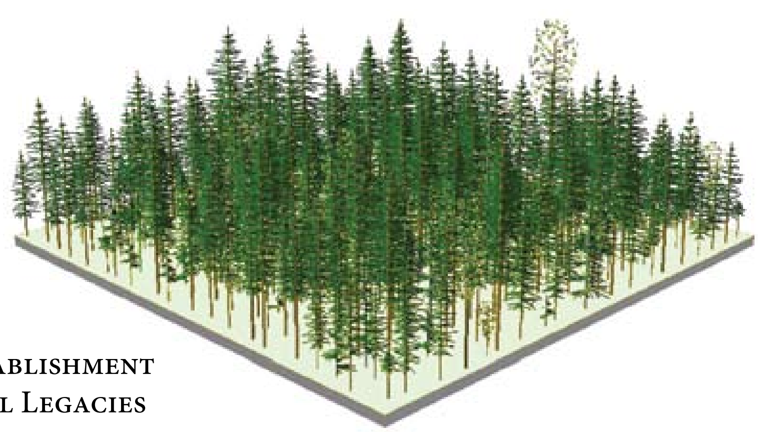


Figure 3-13. Stand Establishment Forest With Structural Legacies

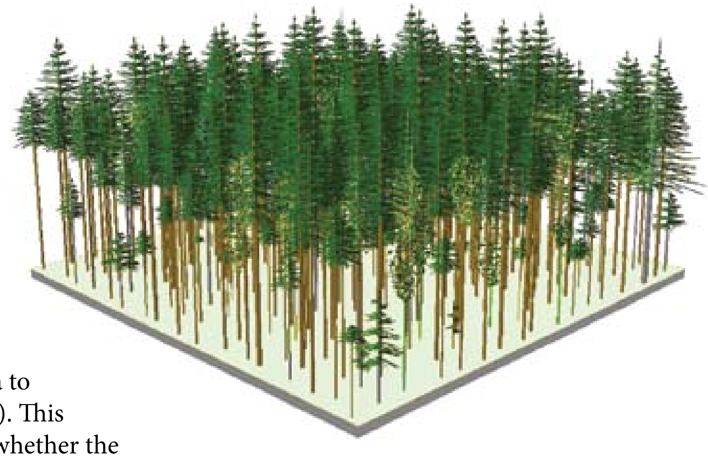


Figure 3-14. Young Forest Without Structural Legacies

(although the definition in this analysis uses a lower threshold for the density of large trees in the southern portion of the planning area to reflect the generally lower site quality). This classification is subdivided based on whether the forest has a single-layered or multi-layered canopy. See *Figure 3-15 (Mature forest with multi-layered canopies)*. Development of multiple canopy layers may arise from development of a new cohort of shade-tolerant trees below an older overstory, or from prolonged or continuous tree regeneration in open young forests. This classification uses the diversity of tree diameters as a surrogate for direct modeling of tree crowns. (Development of continuous tree canopies may also arise from canopy trees re-establishing lower branches as the stand becomes more open. This process would not be detected by the subdivision in this classification. However, this process is typically associated with later stages of stand development, and therefore is part of the structurally complex structural stage in this classification scheme,)

Mature forests with single-layered canopies typically must develop into mature forests with multi-layered canopies first, before developing into structurally complex forests. This is because one of the defining characteristics of structurally complex forests is multiple canopy layers. Mature forests with multi-layered canopies provide the precursors to structurally complex forests, ensuring a replacement of structurally complex forests that are removed by timber harvesting or natural disturbances. Mature forests with multi-layered canopies would provide more of the functions that are associated with structural complex forests, such as habitat for species that are associated with late-successional forests, than would mature forests with single-layered canopies (Spies 2006, p. 93; Washington State DNR 2005, pp. 9, 10).

Together, mature and structurally complex forests approximate what is termed late-successional forest in the FEMAT report, the Northwest Forest Plan, and the district resource management plans. Structurally complex forests approximate what is termed:

- old-growth forests in many analyses (e.g., district resource management plans and environmental impact statements);
- medium and large conifer multistory forests in the FEMAT report; and
- large, multi-storied older forest in the *Late-Successional Forest Monitoring Report* (Moeur et al. 2005).

See *Figure 3-16 (Structurally complex forest)*.

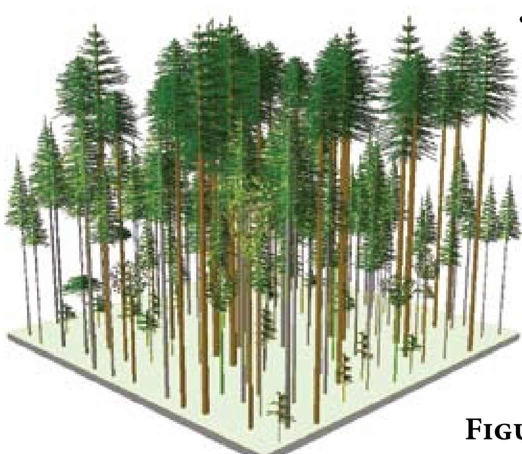
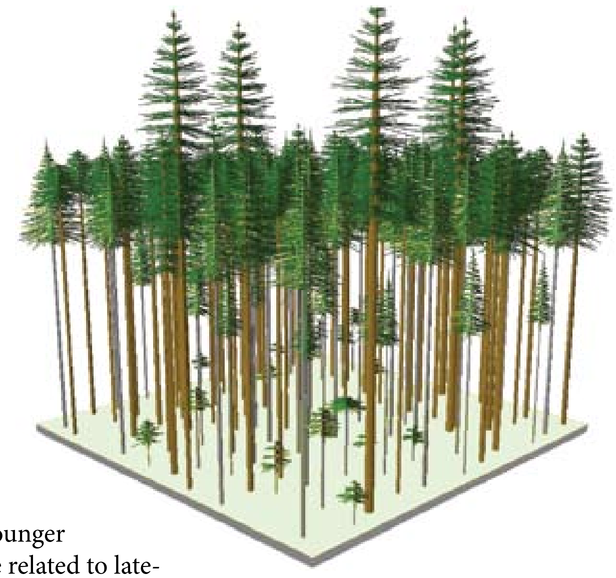


Figure 3-15. Mature Forest With Multi-Layered Canopies

Figure 3-16. Structurally Complex Forest



The structural development of structurally complex forests is a continuous and variable process, and the structure and composition of very old stands is not equivalent to those of the younger, less developed forests classified as structurally complex (Spies 2006, Washington State DNR 2005, Franklin and Van Pelt 2004, Spies 2004, Franklin et al. 2002). The structural complexity of forests continues to develop for many centuries after meeting the minimum criteria for a structurally complex forest (Franklin et al. 2002). The older, more complex forests provide superior habitat for some species, such as *Nephroma occultum* and *Pseudocyphellaria rainierensis*, that are slow to colonize habitats, are highly sensitive to disturbance, or prefer highly complex canopy structure (USDA USFS and USDI BLM 2004a). However, there is inadequate information to evaluate whether older structurally complex forests would provide superior habitat to younger structurally complex forests for most species that are related to late-successional forests.

This analysis does not classify forests by age alone (though some parts of the analysis use stand age), because stand age alone does not reliably describe the structural conditions of stands (Franklin et al. 2006, Spies 2006, Moeur et al. 2005, Spies and Franklin 1991, Spies and Franklin 1988). The rate of development of several forest structural characteristics that are relevant to the issues in this analysis, such as large individual trees and multiple canopy layers, depends partly on the forest management actions that would differ among the alternatives. This differential rate of structural development would be masked by classifying the forest solely by age. Furthermore, classifying stands by age is problematic in mixed-aged stands. Stand age is used here to distinguish between existing old forest and existing very old forest within the broader classification of structurally complex forests.

There is inadequate information on existing stands to distinguish among levels of complexity among structurally complex forests. Current structurally complex forests are mostly or exclusively unmanaged stands, and the BLM has less stand-level inventory information regarding these stands than for managed stands. Therefore, this classification describes a subdivision of structurally complex forest as existing old forest (stands identified in the current inventory as 200 years or older), and a further subset of this subdivision of existing very old forest (stands identified in the current inventory as 400 years or older). The assignment of ages to these unmanaged stands is imprecise and was usually made based on qualitative and subjective evaluation, but this represents the only available data on stand age across the BLM-administered lands within the planning area. The existing old forest subdivision and existing very old forest subset labels do not directly describe structurally complex stands with the greatest structural complexity. However, without more detailed stand structural information, these forests are most likely to have the most developed structure and the longest time since a disturbance of the structurally complex forests.

Some analyses have evaluated forest structural complexity using an index approach rather than discrete thresholds for classifications (Washington State DNR 2005, Spies and Franklin 1991, Spies and Franklin 1988). An index approach can be effective and informative when used to classify existing conditions at the stand level, if there is an abundance of stand-level data (Spies and Franklin 1991). However, an index approach would produce an analysis of bewildering complexity if used to analyze multiple alternatives modeled into the future.

The structural stages for all lands other than the BLM-administered lands are classified using data from the Interagency Vegetation Mapping Project (IVMP), which uses satellite imagery to classify attributes of forest vegetation. See *Appendix B - Forest Structure and Spatial Pattern. Moeur et al. (2005) discuss the accuracy of mapping forest vegetation from IVMP data and conclude that it provides the best practice for classifying forest vegetation across all ownerships in a region* (Moeur et al. 2005, pp. 18-30, 108, 109, 123-128). Those discussions are incorporated by reference. The BLM-administered lands are classified for both the current and future conditions based on the OPTIONS model outputs rather than IVMP data. For analyses across all ownerships, the four classes of structural stages defined above are reduced to three classes—combining structurally complex and mature, which is equivalent to late-successional forest in other analyses. The IVMP data cannot reliably distinguish between mature and structurally complex forests (Spies 2006; Moeur et al. 2005, pp. 103-104). This analysis will refer to this combined class as mature & structurally complex forest.

Average Historic Conditions

This analysis compares the abundance and spatial patterns of the structural stages to average historical conditions, as did the FEMAT report and the Northwest Forest Plan FSEIS.

The FEMAT report estimated that 60 to 70% of the region was historically in mature and structurally complex forests (FEMAT, p. IV-51). At the scale of the physiographic provinces (e.g., the Coast Range), the amount of mature and structurally complex forests probably fluctuated between approximately 50% to 85% of the landscape (Spies 2006, Nonaka and Spies 2005, Wimberly 2002, Wimberly et al. 2000, Rasmussen and Ripple 1998). The FEMAT report (with its focus on late-successional forest) did not characterize the abundance or spatial patterns of forest conditions other than for late-successional forests.

This analysis uses descriptions of average historic conditions from Nonaka and Spies (2005) and the draft Rapid Assessment Reference Condition Model (USDA USFS and USDI BLM 2005a). Historic landscape conditions were dynamic, and the abundance of structural stages varied over time. Spies (2006) noted further that "no single point or short period can realistically be used to characterize this dynamic system." However, comparing effects over time under multiple alternatives to a range of conditions would have the following problems:

- There are no existing characterizations of the range of historic conditions that match the geographic scale of the planning area.
- The magnitude of the range of historic conditions is highly dependent upon the spatial scale of analysis, and the range is so wide at fine scales as to be uninformative (Wimberly et al. 2000).
- A comparison to a range of conditions would not provide for a clear comparison of the alternatives.

See *Appendix B - Forest Structure and Spatial Pattern* for the average historical conditions and the historic range of variability). Therefore, this analysis uses average historic conditions rather than a historic range of variability as a benchmark for comparing the effects of the alternatives.

For the entire planning area, this analysis uses average structural stage abundance and spatial patterns from Nonaka and Spies (2005), which modeled historic conditions in the Coast Range. This modeling of historical conditions was parameterized to historical fire regimes prior to Euro-American settlement around the mid-1800s (Nonaka and Spies 2005). Although this research was conducted on only a portion of the planning area, it presents the only available description of historic spatial patterns at a broad scale, and the abundance results are consistent with the region-wide estimates of late-successional forest in the FEMAT report. The age classes in Nonaka and Spies were combined for comparison to the structural stages in this analysis. Average historic conditions adapted from Nonaka and Spies approximately correlate to 5% stand establishment, 15% young, 25% mature, and 55% structurally complex.

Wimberly (2002) also modeled historical ranges of variability in the Coast Range and found slightly different median average values, which would correlate to 17% stand establishment; 21% young; 16% mature; 42% structurally complex. Forest classes were defined differently in Wimberly. Notably, Wimberly defined the early successional forests that correlate to stand establishment forests in this analysis more broadly than Nonaka and Spies defined them. Also, Wimberly assumed that both high-severity and moderate-severity fires reestablished early successional forests, whereas Nonaka and Spies assumed that only high-severity fires reestablished early successional forests (Nonaka and Spies 2005, p. 1737). Finally, comparison of mean averages from one model to median averages from another model is inherently problematic. Neither of these characterizations of average historic conditions is definitive, and this analysis is attempting to make use of average values rather than a range describing the variability of a dynamic system. Using the average historic conditions from Wimberly as a benchmark for the comparison of alternatives would necessarily yield different conclusions about the absolute relationship of the effects of a specific alternative to average historic conditions. However, using a different benchmark for average historic conditions would not alter conclusions about the relative effects of the alternatives.

For individual physiographic provinces, this analysis uses the description of structural stage abundance from the draft Rapid Assessment Reference Condition Model (USDA USFS and USDI BLM 2005a). These models derive historic abundances by modeling disturbance probabilities that are generated from mean fire-return intervals combined with the probabilities of other disturbances (such as wind, insect, and pathogens). These models describe the average amount of the landscape that would be expected in each of the broad vegetation classes, which are roughly equivalent to the structural stages used in this analysis. The Coast Range and West Cascades Provinces are compared to the Douglas fir hemlock wet-mesic model. (Note: Analysis of structural stage abundance by physiographic province splits the small acreage of BLM-administered lands in the Willamette Valley Province at Interstate 5 and combines the resultant portions with the Coast Range and West Cascades Provinces.)

The Klamath Province is compared to the mixed conifer-southwest Oregon model. The Eastern Cascades Province is compared to the dry ponderosa pine-mesic model. These reference condition models provide representative descriptions of common conditions in each province. However, the provinces include other models, some of which describe other patterns of abundance. For example, the Coast Range and West Cascades Provinces include the Douglas fir Willamette Valley foothills model, which describes more stand establishment and young forest (15% and 25%, respectively). The Klamath Province includes the Oregon coastal tanoak model, which describes more young forest (60%).

Abundance of Structural Stages

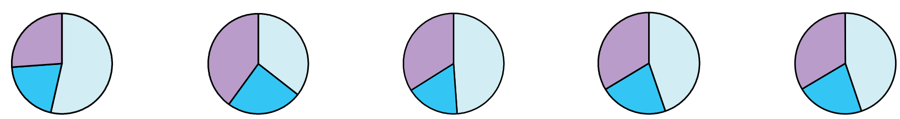
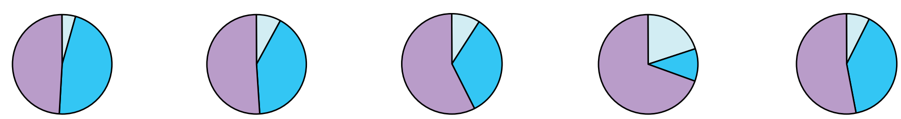
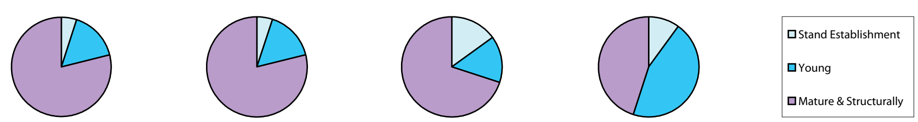
Stand establishment forests currently comprise 48% of the forested lands within the planning area across all ownerships. See *Table 3-3 (Current structural stage abundance on forested lands)*.[1]

Stand establishment forests have declined on BLM-administered and Forest Service lands and are becoming restricted to nonfederal lands. Despite the decline on federal forests, stand establishment forests across all ownerships are still above average historical conditions. Intensive forest management practices on forest industry lands (including site preparation, rapid and dense replanting, and herbicide application) simplify the structure and composition of stand establishment habitat and shorten the time until canopy closure. As a result, stand establishment forests created by timber harvesting lack the habitat complexity and legacy components typical of stand establishment forests following natural disturbances (Spies 2006, Ohmann et al. 2007, Cohen et al. 2002, Franklin et al. 2002, Aber et al. 2000, and Perry 1998).

On BLM-administered lands, stand establishment forests currently comprise 7% of forest-capable lands, which is close to average historical conditions. These forests are predominately (79%) stand establishment forests without structural legacies, resulting from regeneration harvesting before the Northwest Forest Plan.

[1]Current condition structural stage abundance differs slightly among the alternatives because of differences in how the inventory information is assembled for modeling under each alternative. The structural stage classification is made based on the Organon growth and yield curve attributes. The assignment of groupings of stands to specific yield curves varies among the alternatives, which results in slightly different current conditions. In addition, the classification for Alternatives 2 and 3 and the PRMP improved the identification of open water as non forest. The classification for Alternatives 2 and 3 and the PRMP for 2006 are largely similar, except that the classification for the PRMP resulted in the shift of acreage from young with structural legacy to stand establishment with structural legacy in the Medford District and the Klamath Falls Resource Area as a result of new growth curves developed for uneven-aged management. The following descriptions of current conditions use the 2006 data from Alternative 3.

Table 3-3. Current Structural Stage Abundance On Forested Lands

	Coast Range	West Cascades	Klamath	Eastern Cascades	Total
Stand Establishment (1,000 acres) All (BLM only)	3,393 (34)	2,362 (48)	1,812 (68)	209 (5)	7,776 (155)
Young (1,000 acres) All (BLM only)	790 (340)	1,295 (274)	441 (278)	159 (11)	2,685 (902)
Mature & Structurally Complex (1,000 acres) All (BLM only)	1,487 (370)	2,694 (311)	1,225 (427)	211 (32)	5,617 (1,140)
Total (1,000 acres) All (BLM only)	5,670 (743)	6,352 (633)	3,478 (773)	578 (49)	16,078 (2,197)
Current Condition Percentage – all ownerships					
Current Condition Percentage – BLM-administered lands only					
Historical Average Condition of Forested Lands[a]					

[a]Source: USDA USFS and USDI BLM 2005a

Young forests currently comprise 17% of the forested lands within the planning area across all ownerships. See *Table 3-3 (Current structural stage abundance on forested lands)*, which is above average historical conditions. Young forests on BLM-administered lands are predominately high-density, even-aged managed stands. Most of these stands were established following timber harvesting and intensive site preparation practices. This management history has created stands with a homogeneous structure, uniform tree composition, and high tree density. These young forests are developing along a trajectory that is fundamentally different from that experienced by most of the existing structurally complex forests on BLM-administered lands (Muir et al. 2002, Poage and Tappeiner 2002, Sensenig 2002, and Tappeiner et al. 1997).

On BLM-administered lands, young forests currently comprise 41% of forest-capable lands. These are predominately (78%) young forests without structural legacies.

Mature and structurally complex forests together currently comprise 35% of forested lands within the planning area across all ownerships. See *Table 3-3 (Current structural stage abundance on forested lands)*. The abundance of mature and structurally complex forests within the planning area is well below the average historical condition of 80%.

On BLM-administered lands, mature and structurally complex forests together currently comprise 52% of forest-capable lands. Mature forests comprise 27% and structurally complex forests comprise 25% of forest-capable lands. Mature forests are predominately (82%) mature forests with multi-layered canopies. Structurally complex forests are predominately existing old forest (60%) with a smaller amount of developed structurally complex (37%) (i.e., stands that meet the defining attributes of structurally complex but are identified as less than 200 years old in the current inventory), and only a very small amount of existing very old forest (3%). While establishing accurate stand ages for unmanaged stands is problematic, as described above, structurally complex forests on BLM-administered lands are dominated by stands that are less than 400 years old. This is in contrast to the extensive acreage of structurally complex forest in national forests in the West Cascades Province (most of which is 400 to 500 years old) (Weisberg and Swanson 2003).

Hardwood stands are typically dominated by red alder or big-leaf maple in the Coast Range and West Cascades Provinces, by madrone and oaks in the Klamath Province, and by tanoak in the coastal portion of the Klamath Province. Hardwood stands provide many ecological functions that are distinct from conifer stands and are hotspots for biological diversity (Kennedy and Spies 2005). Red alder stands are particularly noted for nitrogen fixation and high-nitrogen litter (Harrington 2006, Compton et al. 2003). The nitrogen levels in alder stands generally contribute to high growth rates for trees, but nitrogen inputs by alder stands on sites that are already nitrogen rich may lead to nutrient imbalances, which may predispose coastal Douglas fir stands to intensification of Swiss needle cast disease (Perakis et al. 2006, Compton et al. 2003, Maguire et al. 2000). Other hardwood stands (especially dry upland sites dominated by oaks, madrone, or tanoak) are characterized by lower soil fertility and have nitrogen levels that are more limited.

It is not possible to quantify the abundance or to map the location of hardwood stands at this scale of analysis. Hardwood stands are often interspersed with conifer stands throughout the planning area. For example, red alder-dominated riparian stands are typically classified in the forest inventory together with the adjacent upland conifer stand as “northern hardwood mixed.” In southwestern Oregon, oak, madrone, or tanoak stands are typically finely interspersed with conifer stands without discrete boundaries. Both cases generally result in classifying the hardwood stand together with mixed or conifer-dominated stands in the forest inventory. Therefore, the acres identified in the forest inventory as “northern hardwood mixed” or “southern hardwood” over-estimate the abundance of hardwood stands. The current abundance of “northern hardwood mixed” or “southern hardwood” acres on BLM-administered lands is 8% of forest-capable acres across the planning area: 14% of forest-capable acres in the Coast Range; 8% in the West Cascades; 4% in the Klamath; and 1% in the Eastern Cascades. In the Coast Range Province, Ohmann et al. (2007) modeled hardwood stand abundance as approximately 7% of the landscape across all ownerships. Hardwood abundance across all ownerships is likely lower in the West Cascades and Eastern Cascades Provinces, and higher in the Klamath Province.

Spatial Patterns of Structural Stages

The spatial arrangement of forest structural stages influences fundamental ecosystem processes, such as the flows of energy, materials, and organisms (Nonaka and Spies 2005, Forman 1995). In addition to the abundance of structural stages, this analysis describes the spatial patterns of structural stages to evaluate forest fragmentation and connectivity.

Fragmentation is the breaking up of large habitat areas into smaller patches. Fragmentation is often coupled with habitat loss. The two processes together have a cumulative effect that can result in an overall reduction in biological diversity. The populations of species that are associated with mature & structurally complex forests are more likely to decline in a fragmented landscape because of the smaller patches of suitable habitat and the greater isolation from neighboring populations (Jules 1998; Forman 1995; USDA USFS and USDI BLM 1994b, pp. 3&4-29 to 3&4-31). As habitat is fragmented, the connectivity of the habitat decreases. Beyond some threshold, fragmentation disrupts connectivity of the habitat and contributes to population declines. Such thresholds are poorly understood for most species and depend on the scale at which a species interacts with its habitat (With and Crist 1995).

Larger habitat patches can support greater species diversity. For many species that are associated with mature & structurally complex forests, patches below a certain size are no longer suitable habitat. However, these minimum patch sizes are highly species-specific (to the limited extent they have been quantified). For example, Carey et al. (1992) suggest that a breeding pair of northern spotted owls requires a mature & structurally complex forest patch of about 2,000 acres in mixed conifer forests, whereas marbled murrelets use much smaller patches for nesting (ranging from 7 to 368 acres) (Ralph et al. 1995). Smaller patch size leads to increased amounts of edge habitat and decreased amounts of interior forest habitat. Edge habitats are created where contrasting habitat types abut. Edges between mature & structurally complex forests and stand establishment or young forests are characterized by altered microclimate and altered biological interactions (Forman 1995, pp. 412-415). The depth of edge habitat varies for specific biophysical characteristics and ecological processes, and is strongly influenced by the degree of contrast between habitat types and such physical conditions as slope and aspect. This analysis examines spatial patterns of the forested landscape using FRAGSTATS, a spatial patterns analysis program for categorical maps. See *Appendix B - Forest Structure and Spatial Pattern*. FRAGSTATS quantifies the aerial extent and spatial configuration of patches within a landscape. The user defines and scales the landscape (including the extent and grain of the landscape) and the scheme upon which patches are classified and delineated.

For a given landscape mosaic, FRAGSTATS computes several metrics for:

- each patch in the mosaic
- each patch type (class) in the mosaic
- the landscape mosaic as a whole

For this analysis, patches are delineated as stand establishment, young, or mature & structurally complex forest. As noted above, the IVMP data used to classify non-BLM-administered lands cannot reliably distinguish between mature and structurally complex forest, and therefore these structural stages are combined for this portion of the analysis. Additionally, the contrast between mature and structurally complex forest patches is too low to constitute an edge for many important ecological processes (such as the habitat for the northern spotted owls). Nonforest is not included in the spatial analysis.

The FRAGSTATS produces a wealth of metrics, many of which are highly correlated. For any given analysis of spatial patterns, many of the metrics do not reveal clear patterns. This analysis uses the following metrics:

- mean patch size (mean average of the distribution of patch sizes); and
- connectance index (number of functional joinings between patches of the same structural stage; this analysis defines patches as functionally joined if they are within 1,969 feet [600 meters]). This threshold distance represents the approximate distance within which northern spotted owls are expected to be able to move freely between stands of suitable habitat (Lint 2007 *personal communication*). This threshold distance does not provide an analysis of how well-connected habitat patches are for all species, because the effects of habitat fragmentation are highly species-specific. However, this threshold distance provides analysis directly applicable to northern spotted owls and generally relevant for highly mobile species associated with mature and structurally complex forests.

Results for additional metrics are included in the *Appendix B -Forest Structure and Spatial Pattern*.

Spatial patterns are analyzed by province for BLM-administered lands, because the entire planning area comprises too large a database for computing many of the metrics. For all ownerships, even the province comprises too large a database for computing most metrics, including connectance. Therefore, only mean patch size is computed for all ownerships at the province scale. See *Table 3-4 (Current mean patch size by structural stage by province)*.

The changes in spatial patterns over time from this analysis can be compared to the measures of spatial patterns from other studies or estimates of average historic conditions of spatial patterns to provide a qualitative evaluation of overall trends. However, a direct comparison of the absolute values of the spatial pattern measures should be made with caution. Measures of spatial patterns are highly dependent on the spatial extent of the analysis, the resolution of the data (i.e., the grain size), and the classification scheme (in this analysis, the structural stage classification). As these factors differ, the absolute values in the results will differ. For example, connectance is higher in the Eastern Cascades Province than in other provinces for all structural stages partly because the spatial extent of this province is much smaller than the other provinces. See *Table 3-5 (Current connectance on BLM-administered lands by structural stage by province)*. The spatial extent, grain size, and classification scheme in this analysis differ from studies of historic spatial patterns within the planning area (Nonaka and Spies 2005, Wimberly 2002). Therefore, the results from this analysis should be compared to the results from those studies only to evaluate relative trends in spatial patterns, not to make a direct comparison of the absolute values of the specific spatial pattern measures.

Forest Structure and Spatial Pattern at the Province Scale

The FEMAT report and the Northwest Forest Plan FSEIS provided general descriptions of the existing conditions at the province scale (FEMAT, pp. IV-6 to IV-11; USDA USFS and USDI BLM 1994b, pp. 3&4-16 to 3&4-28), but did not explicitly analyze the effects of the alternatives at the province scale. The six resource management plans and environmental impact statements (RMPs/ EISs) for the six districts within the planning area described the vegetation communities, the characteristics of the stages of forest development, and the biological diversity and ecological health of the forest ecosystems within each BLM district. Each district analysis concluded, consistent with the FEMAT report and Northwest Forest Plan FSEIS, that late-successional forests have been reduced in abundance and highly fragmented by past timber harvesting and other land management activities (USDI BLM 1994a, pp. 3-23 to 3-39; USDI BLM 1994b, pp. 3-34 to 3-46; USDI BLM 1994c, pp. 3-18 to 3-45; USDI BLM 1994d, pp. 3-30 to 3-57; USDI BLM 1994e, pp. 3-17 to 3-42; USDI BLM 1994f, pp. 3-21 to 3-41, 3-63 to 3-66, 3-79 to 3-82). Those analyses are incorporated by reference. Current conditions across the Coast Range, West Cascades, and Klamath Provinces generally reflect the structural stage abundance and spatial patterns described for the planning area as a whole. The Eastern Cascades Province differs from the other provinces in many measures of structural stage abundance and spatial patterns partly because of its differing ecological conditions and management history. However, these different patterns have little effect on the overall pattern for the planning area, because the Eastern Cascades Province comprises only 2% of the BLM-administered forest lands modeled within the planning area.

Coast Range

The natural disturbance regime in much of the Coast Range Province is characterized by infrequent, high-intensity fires and windstorms. Average historic forest conditions were 79% mature & structurally complex forests, 16% young forests, and 5% stand establishment forests (USDA USFS and USDI BLM 2005a). Currently, the Coast Range Province has more stand establishment forests and less mature & structurally complex forests than it did historically. The Coast Range Province has little remaining mature & structurally

Table 3-4. Current Mean Patch Size By Structural Stage By Province

Structural Stages	Current Mean Patch Size (acres)	Physiographic Provinces			
		Coast Range	West Cascades	Klamath	Eastern Cascades
Stand Establishment	BLM only	25.5	29.2	30.2	44.4
	All ownerships	44.3	21.5	41.9	14.5
Young	BLM only	104.4	82.1	65.0	49.3
	All ownerships	5.8	8.0	6.2	11.1
Mature & Structurally Complex	BLM only	110.8	106.6	137.3	182.8
	All ownerships	15.3	28.4	28.8	28.2

Note: Because the 2006 data differs slightly for the alternatives (as explained in the text), the spatial configuration differs among the alternatives. As with the abundance data above, the spatial pattern results for 2006 use the data from Alternative 3.

Table 3-5. Current Connectance On BLM-Administered Lands By Structural Stage And Province

Structural Stages	Physiographic Provinces			
	Coast Range	West Cascades	Klamath	Eastern Cascades
Stand Establishment	0.13	0.13	0.10	2.42
Young	0.09	0.10	0.08	1.22
Mature & Structurally Complex	0.09	0.11	0.10	1.64

complex forests, most of which are mature forests with highly fragmented patches of structurally complex forests, primarily on BLM-administered lands (USDA USFS and USDI BLM 1994b, pp. 3&4-21, 3&4-25, 3&4-27). The mature & structurally complex forests together currently comprise 26% of all forest lands in the province (50% of BLM-administered lands). Stand establishment forests currently comprise 60% of all forest lands in the province (5% of BLM-administered lands). See *Table 3-3 (Current structural stage abundance on forested lands).*

The spatial pattern of structural stages in the Coast Range Province has been strongly altered from historic conditions (Nonaka and Spies 2005, Wimberly 2002). Current spatial patterns in the Coast Range are characterized by small, scattered patches of mature & structurally complex forest set in a matrix of young and stand establishment forests. Mean patch size and connectance of mature & structurally complex forest are lower than average historic conditions (Nonaka and Spies 2005).

On BLM-administered lands, stand establishment forests are in fewer and smaller patches than young or mature & structurally complex forest, which is consistent with the overall abundance of structural stages.

Red alder stands in the Coast Range have increased in abundance since the 1930s (Wimberly and Ohmann 2004), but it is unknown how current hardwood abundance compares with the historical range of variability (Ohmann et al. 2007, Long et al.1998). The current distribution and abundance of red alder stands in the Coast Range have been considered by some to be an unnatural artifact of past timber harvesting practices (FEMAT, p. V-25). The increase in red alder stands is not continuing throughout the Coast Range. The abundance of red alder stands in the central Coast Range has been declining in recent decades, in contrast to the southern Coast Range (Kennedy and Spies 2005, Wimberly and Ohmann 2004). Forest management practices will likely reduce the abundance of red alder stands within the planning area (Spies 2006, Alig et al. 2000).

Swiss needle cast, caused by the native fungus *Phaeocryptopus gaeumannii,* has recently caused substantial growth loss of Douglas fir, primarily in young plantations within 30 miles of the coast (Kanaskie et al. 2005; Maguire et al. 2000; USDI BLM 1994a, p. 3-27). Possible reasons for the increased effects of Swiss needle cast include shifting plantation composition to pure Douglas fir on sites that previously supported Sitka spruce, western red-cedar, and western hemlock; past planting of off-site Douglas fir; climate changes; and soil nutrition changes (Perakis et al. 2006, Campbell and Liegel 1996).

In the southern part of the Coast Range, Port-Orford cedar root disease (caused by the introduced pathogen, *Phytophthora lateralis*) has been killing Port-Orford cedar (*Chamaecyparis lawsoniana*). Port-Orford root disease is discussed further under the Klamath Province below.

West Cascades

The natural disturbance regime in the West Cascades is complex with moderate or highly variable fire frequencies and intensities. Average historical conditions are similar to the Coast Range (USDA USFS and USDI BLM 2005a). Like the Coast Range and Klamath Provinces, the West Cascades Province currently has more stand establishment forest and less mature & structurally complex forest than average historical conditions. Nevertheless, the West Cascades Province currently has greater amounts of mature

& structurally complex forests than other provinces, especially on Forest Service lands (USDA USFS and USDI BLM 1994b, pp. 3&4-19, 3&4-20, 3&4-25, 3&4-27). Mature & structurally complex forests currently comprise 43% of all forest lands in the province (49% of BLM-administered lands). Stand establishment forests currently comprise 37% of all forest lands in the province (8% of BLM-administered lands). See *Table 3-3 (Current structural stage abundance on forested lands)*.

There are no studies modeling the historic spatial patterns in the West Cascades comparable to those done in the Coast Range, which approximated a range of historic patch sizes (Cissel et al. 1999). The overall comparison to current conditions is likely similar to the Coast Range with a current mean patch size and connectance of mature & structurally complex forest that is lower than average historic conditions.

As in the Coast Range, stand establishment forests on BLM-administered lands are in fewer and smaller patches than young or mature & structurally complex forest, which is consistent with the overall abundance of structural stages.

Klamath

The natural disturbance regime in much of the Klamath Province is characterized by frequent, low-intensity fires. Forests in the Klamath Province are highly fragmented by natural factors, and past cutting has resulted in many mixed-age stands (USDA USFS and USDI BLM 1994b, pp. 3&4-22, 3&4-25, 3&4-27). Average historic forest conditions in most of the province were 70% mature & structurally complex forests, 15% young forests, and 15% stand establishment forests (mixed conifer southwest Oregon reference condition model; USDA USFS and USDI BLM 2005a). Other reference condition models are applicable in smaller portions of the province. For example, the Oregon coastal tanoak model, applicable to the coastal portions of the province, describes average historical forest conditions as 30% mature & structurally complex forests, 60% young forests, and 10% stand establishment forests (USDA USFS and USDI BLM 2005a). The dry ponderosa pine-mesic model (applicable to dry sites in the eastern portion of the province) describes average historical forest conditions as 45% mature & structurally complex forests, 45% young forests, and 10% stand establishment forests (USDA USFS and USDI BLM 2005a).

Like the Coast Range and West Cascades, the Klamath Province currently has more stand establishment forests and less mature & structurally complex forests than it did historically. Mature & structurally complex forests currently comprise 35% of all forest lands in the province (55% of BLM-administered lands). Stand establishment forests currently comprise 52% of all forest lands in the Klamath Province (9% of BLM-administered lands). See *Table 3-3 (Current structural stage abundance on forested lands)*.

There are no studies modeling the historic spatial patterns in the Klamath Province comparable to those done in the Coast Range. Historic spatial patterns were likely more variable and difficult to characterize, because of the complex interaction of highly variable geology and climate with the highly variable disturbance regimes. Therefore, comparisons to the historic spatial patterns for the province would be speculative.

As in the Coast Range and West Cascades Provinces, stand establishment forests on BLM-administered lands in the Klamath Province are in fewer and smaller patches than young or mature & structurally complex forests. The disparity in the patch size between stand establishment forests and young forests is less. The patch size of mature & structurally complex forests is larger in the Klamath province than in the Coast Range or West Cascades, which is consistent with the overall abundance of structural stages.

In the western part of the Klamath Province, Port-Orford cedar root disease caused by the introduced pathogen *Phytophthora lateralis*, has been killing Port-Orford cedar (*Chamaecyparis lawsoniana*). The supplemental environmental impact statement for management of Port-Orford cedar in southwest Oregon (USDA USFS and USDI BLM 2004b) described the ecological role of Port-Orford cedar, the spread of the disease, and the effects of different management actions to control the disease. That analysis concluded that the rate of the spread of the disease is decreasing, and that Port-Orford cedar is not in danger of extirpation (USDA USFS and USDI BLM 2004b, pp. 3&4-19 to 3&4-52). That analysis is incorporated by reference.

In the Klamath Province, fire exclusion has shifted fuel loads and tree species composition, which has made these stands more susceptible to drought-induced mortality, insect and disease mortality, and high-intensity, stand-replacing fires (Taylor and Skinner 2003; Frost and Sweeney 2000; USDA USFS and USDI BLM 1994b, pp. 3&4-22; and USDI BLM 1994f, pp. 3-24 to 3-26).

Eastern Cascades

Forests in the Eastern Cascades are highly fragmented by natural factors. The natural disturbance regime in much of the region is characterized by frequent, low-intensity fires (USDA USFS and USDI BLM 1994b, pp. 3&4-20, 3&4-21, 3&4-25, 3&4-27). The average historic forest conditions in the province were 45% mature & structurally complex forests, 45% young forests, and 10% stand establishment forests (USDA USFS and USDI BLM 2005a).

The Eastern Cascades Province currently has slightly less mature & structurally complex forests, less young forests, and more stand establishment forests than it did historically. The mature & structurally complex forests currently comprise 36% of all forest lands in the province (66% of BLM-administered lands). Young forests currently comprise 27% of all forest lands in the province (23% of BLM-administered lands). Stand establishment forests currently comprise 37% of all forest lands in the province (11% of BLM-administered lands). See *Table 3-3 (Current structural stage abundance on forested lands)*.

The classification of structural stages in the Eastern Cascades Province and the characterization of average historic conditions are more challenging than in any other province. The prevailing frequent, low-intensity fire regime produced stands that are difficult to classify. Most descriptions of the average historic abundance, including the estimates used above, would estimate greater abundance of stand establishment forest if all stands that were partially disturbed (such as by moderate- or low-severity fires) were classified as stand establishment forest.

There are no studies modeling the historic spatial patterns in the Eastern Cascades Province comparable to those done in the Coast Range. The historic spatial patterns were likely very different from the Coast Range, because the frequent, low-intensity fire regime in the Eastern Cascades Province would have produced a more fine-grained mosaic of structural stages.

The total acreage of the Eastern Cascades Province within the planning area is far less than in the other provinces, which complicates the direct comparison of the measures of spatial patterns with other provinces. The extent of the landscape analyzed alters the absolute values of spatial pattern metrics, as explained above. As in the other provinces, stand establishment forests on BLM-administered lands in the Eastern Cascades Province are in fewer and smaller patches than mature & structurally complex forests. However, unlike other provinces, the spatial patterns of young forests are similar to stand establishment forests, which is consistent with overall abundance. The Eastern Cascades has the lowest percentage of young forest on BLM-administered lands of all the provinces within the planning area.

In the Eastern Cascades Province, as in the Klamath Province, fire exclusion has shifted fuel loads and tree species composition, which has made these stands more susceptible to drought-induced mortality; insect and disease mortality; and high-intensity, stand-replacing fires (USDA USFS and USDI BLM 1994b, pp. 3&4-20 and 3&4-21; USDI BLM 1994f, pp. 3-24, 3-63 to 3-66, 3-79 to 3-82).

Carbon Storage

Key Points

- Carbon stored on BLM-administered lands in the planning area and in wood harvested from BLM-administered lands in the planning area currently totals 427 million tonnes. This represents 1% of the total carbon stored in forests and harvested wood in the United States, and 0.02% of the global carbon storage in vegetation, soil, and detritus.

Forests store carbon, which affects atmospheric concentrations of carbon dioxide, and thereby affects global climate (Forster et al. 2007, p. 135; and Denman et al. 2007, pp. 514-518). Forest management can provide a source of carbon dioxide (e.g., through deforestation and conversion to non-forest land uses), or it can provide a sink of carbon dioxide (e.g., through forest growth or afforestation). In the United States, forests have represented a carbon sink throughout the last century (Birdsey et al. 2006). Forests and harvested wood in the United States currently represent a carbon pool of 43.9 billion tonnes (U.S. EPA 2007, p. 7-7). (Note: Most scientific literature on carbon storage at the scale of this analysis reports carbon amounts in tonnes [also known as metric tons, which are equal to approximately 2,205 pounds]. See, for example, DOE 2007, Smith et al. 2006, and Brown et al. 2004a.)

Forest management in the United States currently represents an annual accumulation of 191 million tonnes of carbon, which represents an offset of approximately 11% of total carbon emissions in the United States (U.S. EPA 2007). Globally, the vegetation, soil, and detritus currently store 2.3 trillion tonnes of carbon (Denman et al. 2007, p. 515). Atmospheric carbon in the form of carbon dioxide is increasing at a rate of 3.2 to 4.1 billion tonnes of carbon per year (Denman et al. 2007, p. 512).

It is not possible to describe precisely and accurately the total storage of carbon in forests on BLM-administered lands or in wood harvested from BLM-administered lands, because there is incomplete and unavailable information on the current inventory of carbon storage and the effect of forest management on carbon storage, as described below. However, it is possible to approximate the current condition of these pools of carbon storage using some broad generalizations and assumptions that are consistent with current theoretical approaches. Additional information on this analysis is provided in *Appendix C- Carbon Storage Modeling*.

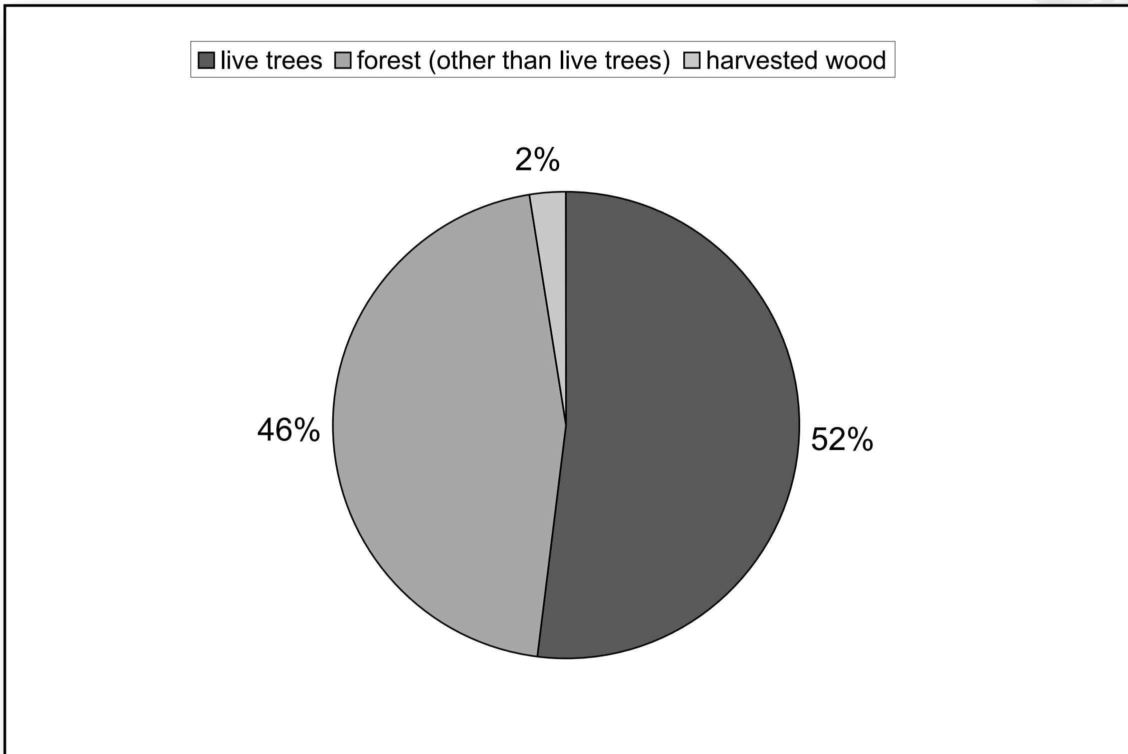
Currently, a total of 427 million tonnes of carbon is stored in BLM-administered lands in the planning area and wood previously harvested from BLM-administered lands in the planning area. This represents 1% of the total carbon currently stored in forests and harvested wood in the United States, and 0.02% of the total carbon stored in vegetation, soil, and detritus globally.

Carbon storage related to forest management can be divided into three pools:

- live trees
- forest carbon other than live trees
- harvested wood

Live trees include the carbon in foliage, branches, stems, bark, and live roots of all trees, regardless of whether the trees are merchantable as timber. Live tree carbon is derived in this analysis using outputs from the OPTIONS model (described in *Introduction, Analytical Methodologies and Models* in *Chapter 4*) for tree volume over time for each alternative. Species-specific conversion factors convert cubic-foot tree volume to carbon mass. An expansion factor is then applied to the carbon mass to account for the entire tree, including branches, bark, and roots. See *Appendix C - Carbon Storage Modeling*.

Figure 3-17. Current Carbon Storage



Estimations of carbon in live trees generally involve the least uncertainty of all carbon pools associated with forest management. Forest inventory data on live trees is more detailed and reliable than data on other forest carbon pools. This analysis derives live tree volumes from the OPTIONS modeling results, which are based on detailed forest inventory data specific to the planning area and site-specific growth and yield curves (see *Appendix R – Vegetation Modeling*). The site-specific data yields results with greater precision and accuracy than the regional averages in Smith et al. (2006), which provided confidence intervals for the values for live trees carbon of plus or minus 1.7% (Smith et al. 2006, p. 41). Using an expansion factor to account for the entire tree introduces more uncertainty into the estimations. The correlation between above-ground and below-ground biomass in trees is variable among species, stand age, and stand structure (Litton et al. 2007, Lehtonen et al. 2004). For example, carbon inventories in a series of stands in the Coast Range and West Cascades (Smithwick et al. 2002) reported carbon values in different tree components that would reflect expansion factors ranging from 1.66 to 2.00 (with a median average of 1.85, which is consistent with the expansion factor used in this analysis). However, there is no inventory information on which to base more refined expansion factors for trees in the planning area.

There are 222 million tonnes of carbon currently stored in live trees on BLM-administered lands in the planning area. Live trees represent the largest pool of carbon in forests. See *Figure 3-17 (Current carbon storage)* and *Figure 3-18 (Historical and current carbon storage).*

The amount of carbon stored in live trees calculated in this analysis is lower than if calculated from the regional averages in Smith et al. (2006). Although the values in Smith et al. (2006) are generally consistent with the values in this analysis for future development of managed stands on highly productive sites, they are much higher than the values in this analysis for unmanaged stands or stands on low productivity sites, which cover the majority of the planning area. As explained above, the values derived from the OPTIONS modeling in this analysis provide a more reliable analysis of carbon stored in live trees than the regional average values in Smith et al. (2006).

Table 3-6. Carbon In Forests (Other Than Live Trees) By Structural Stage

Structural Stage	Tonnes of Carbon/Acre
Stand establishment	67.8
Young	70.3
Mature	88.2
Developed Structurally Complex	94.8
Existing Old Forest	130.9

The pool of forest carbon other than live trees includes:

- dead wood (snags, coarse woody debris, stumps, and dead roots)
- plants other than trees (shrubs and other plants)
- litter (fine organic debris on the soil surface)
- soil organic carbon

The biomass in dead wood, shrubs and other plants, and litter, and soil organic carbon likely vary tremendously within the planning area (Page-Dumroese and Jurgensen 2006, Smithwick et al. 2002, Harmon 2001). However, inventory information for dead wood is poor, and inventory information for shrubs and litter levels and soil organic carbon on BLM-administered lands is unavailable.

Smith et al. (2006) and DOE (2007) provide regional averages for carbon stored in dead wood, plants other than trees, litter, and soil organic carbon. These values quantify the amount of carbon in each of these pools for Pacific Northwest Douglas-fir forests of different ages. This analysis uses these regional average values to calculate a total amount of carbon for forests (other than live trees) for each of the following structural stages: stand establishment, young, mature, and developed structurally complex. The values in Smith et al. (2006) and DOE (2007) only estimate carbon pools for stands up to 125 years of age. The values for a 125-year old forest would likely under-estimate the carbon in older forests (Harmon et al. 2004, Smithwick et al. 2002). Therefore, this analysis uses values for existing old forest from Smithwick et al. (2002) derived from empirical measurements in old-growth stands. The values from Smithwick et al. (2002) for stands in the Oregon Coast Range and Oregon West Cascades were averaged to obtain a value for forests classified in this analysis as existing old forest. See *Table 3-6 (Carbon in forests [other than live trees] by structural stage)*.

The carbon storage on BLM-administered non-forest lands is calculated using regional average carbon values from Brown et al. (2004b) for shrublands and woodlands. Carbon storage in forests on BLM-administered lands in eastern Klamath Falls Resource Area is calculated using regional average carbon values from Smith et al. (2006) for Pacific Northwest east-forest types.

There are 195 million tonnes of carbon currently stored in forests (other than live trees) on BLM-administered lands in the planning area.

As noted by Smith et al. (2006), estimates of these carbon pools are based on regional averages and reflect the current best available data for developing regional estimates. These values do not account for variation among forest stands within these structural stages. Empirical data from Smithwick et al. (2002) demonstrates the high variability of carbon amounts among stands that would be classified with the same value in this analysis. Quantitative expressions of uncertainty are not available for most of these estimations (Smith et al. 2006, p. 17). However, Smith et al. (2006) provided confidence intervals for the values for carbon in standing dead trees of plus or minus 18.5% (Smith et al. 2006, p. 41). Uncertainty associated with soil carbon is not quantifiable, but is likely higher than the uncertainty associated with standing dead trees.

Carbon is also stored in harvested wood (Ruddell et al. 2007). Quantifying the storage of carbon in harvested trees is challenging because of the variability in the product life of harvested wood, the amount of product recycling, and the fate of disposed harvested wood (Skog and Nicholson 2000). Some of the carbon in harvested wood is lost in processing and some is lost through disposal, such as burning and decay. However, disposal in landfills results in only partial loss of carbon, and some portion of the carbon in land-filled products continues to be stored (U.S. EPA 2007, Smith et al. 2006). Calculating the carbon stored in wood products from previous harvests is even more challenging than calculating the carbon stored in wood products from current harvests, because all of the variables described above have changed over time. For example, harvesting and processing have become more efficient, resulting in a greater portion of harvested wood in products. Disposal in open dumps previously resulted in rapid decay and loss of carbon, whereas current disposal in landfills results in slower decay and longer carbon storage (Woodbury et al. 2007, U.S. EPA 2007). Considering these factors, the currently published values for the portion of carbon in harvested wood that is in products in use, landfills, burned for energy, and emitted that are derived from DOE (2007) and Smith et al. (2006) may not be accurate for past harvesting. Because of incomplete and unavailable information on the product life of harvested wood, the amount of product recycling, and the fate of disposed harvested wood from past harvests, it is not possible to quantify precisely or accurately the amount of carbon currently in storage from past harvests on BLM-administered lands in the planning area. Some estimation can be made using very broad generalizations, including the following three assumptions:

- using values from DOE (2007) and Smith et al. (2006) for the carbon stored in wood harvested from 1962 – 2005 (which over-estimates current storage from the harvests in the early part of that period)
- no carbon storage in wood harvested before 1962 (which under-estimates current storage from those harvests)
- no carbon storage from past harvest of pulpwood or chips (which under-estimates current storage from those harvests), because the fate of carbon in pulpwood or chips from past harvests is speculative, given the changes in disposal over the past decades (Woodbury et al. 2007, U.S. EPA 2007)

There are 11 million tonnes of carbon currently stored in wood harvested from past timber harvests on BLM-administered lands in the planning area. This represents approximately 2% of the amount of total carbon currently stored in forests and harvested wood in the planning area, which is lower than the national proportion. Carbon stored in harvested wood represents 5% of the total carbon currently stored in forests and harvested wood and forests nationally (U.S. EPA 2007, p. 7-7). The proportion in this analysis may be lower than the proportion nationally because of the following:

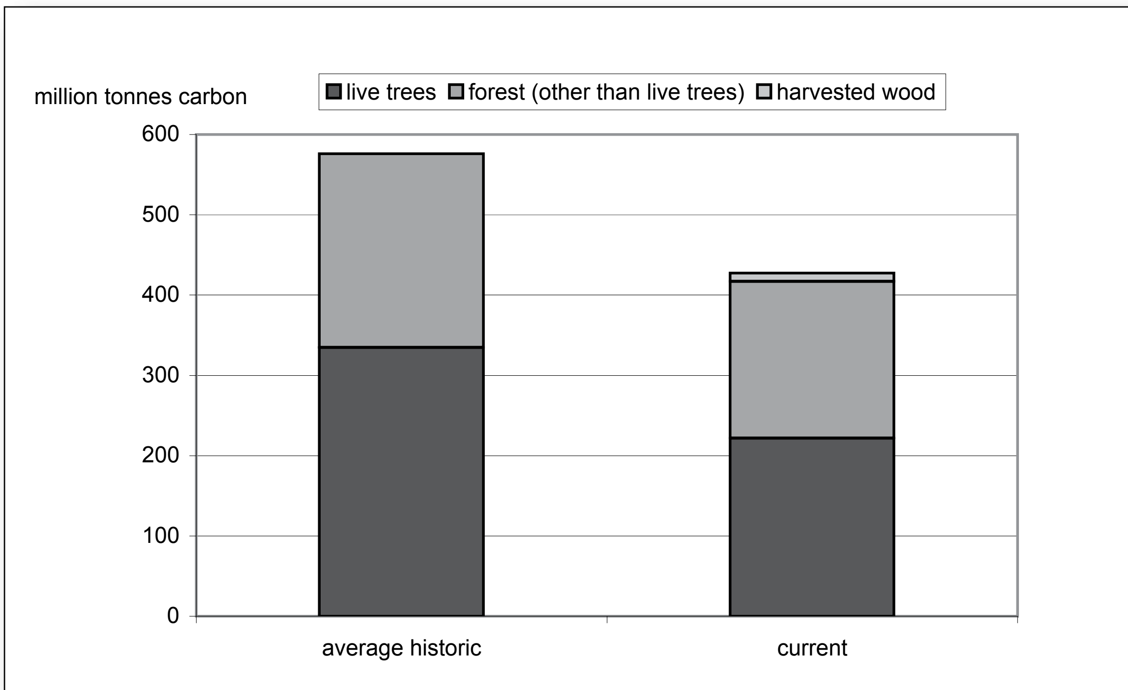
- This analysis may under-estimate the carbon stored in wood products from past harvests, as explained above.
- There is more unharvested forest in the planning area than nationally (Moeur et al. 2005).
- Forests in the planning area typically accumulate more carbon than forests nationally (Smith et al. 2006, Smithwick et al. 2002).

Quantitative expressions of uncertainty are not available to estimate carbon stored in harvested wood using the regional values from Smith et al. (2006, pp. 17-18). As noted by Smith et al. (2006, p. 18), the variabilities over time and within a region are more important sources of uncertainty than the values for partitioning the carbon in harvested wood into different pools. The Environmental Protection Agency (U.S. EPA 2007) calculated the uncertainty associated with analyzing the change in carbon stored in harvested wood products nationally at 24% to 26%.

Current carbon storage can be compared to the carbon stored in forests on BLM–administered lands under average historic conditions. Unlike current conditions, live tree carbon under average historic conditions cannot be modeled directly using inventory data and OPTIONS outputs. However, live tree carbon values from DOE (2007) and Smith et al. (2006) over-estimate carbon in live tree for the planning area based on comparison to site-specific inventory data. The values from DOE (2007) and Smith et al. (2006) would be particularly inappropriate for calculating live tree carbon under average historical conditions, because those values are intended to represent managed stands (Smith et al. 2006, p. 11). For this analysis, live tree carbon values for each structural stage are based on average values of carbon stored in live trees per acre for each structural stage in current inventory. The values for carbon stored in forests (other than live trees) for each structural stage are derived from DOE (2007) and Smith et al. (2006) as described above. The abundance of structural stages under average historic conditions is derived from Nonaka and Spies (2005), as described in *Forest Structure and Spatial Pattern* in *Chapter 3*.

Under average historic conditions, BLM-administered lands in the planning area stored 576 million tonnes of carbon, which is 35% more carbon than is currently stored in forests and harvested wood in the planning area. See *Figure 3-18 (Historical and current carbon storage)*. These results are consistent with other studies that found the harvest of mature and structurally complex forest in this region would generally result in a net loss of carbon storage that would not be offset by storage in harvested wood or regained by forest growth for more than a century (Krankina and Harmon 2006, Janisch and Harmon 2002).

Figure 3-18. Historical And Current Carbon Storage



Socioeconomics

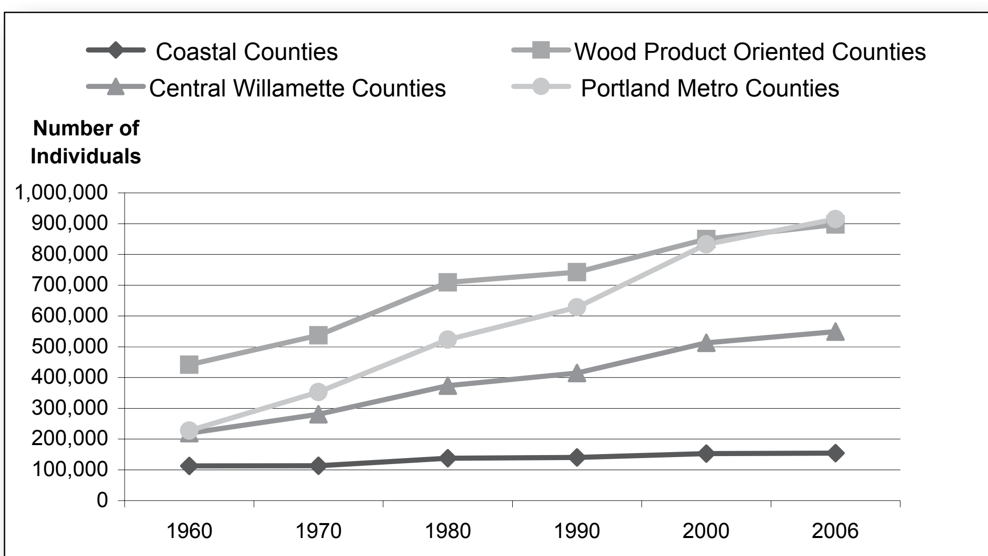
Key Points

- A comprehensive measure of community health and resiliency does not exist.
- The Oregon primary wood products sector employs 51,900 workers who earn $1.9 billion annually, which is about 3.2% of Oregon's total wages.
- In total, the counties rely on BLM-associated revenues for about 2.7% of their budgets. The BLM revenues, however, account for 9.2% of their discretionary revenue ranging from less than 1% for larger metropolitan counties, to up to 70% for rural counties.
- Without funding under the Secure Rural Schools Act, the BLM payments to counties would fall about 90%.
- There is currently a strong market for wood products in western Oregon. There is adequate capacity to process larger logs that would come from BLM-administered lands.

Management of BLM-administered lands contributes to the economic activity in western Oregon communities and can be measured. For example, timber harvesting and manufacture of wood products creates jobs and income in these sectors, which in turn stimulates economic activity in other sectors of local and regional economies. The BLM employees and BLM management expenditures also contribute to local economies. Approximately 50% of revenues received from timber harvesting on O&C lands, furthermore, flow directly to the county governments and is used to fund a variety of social services and investments.

The BLM-administered lands contribute to employment and income in industries other than those related to lumber and wood products. Dispersed and developed recreation, commercial fishing, hunting, special forest products, mining, and grazing all contribute to the region's economies. The BLM's receipts from these activities in western Oregon are relatively minor compared to the timber program. Annual receipts from recreation are $1,200,000, from special forest products are $300,000, and from grazing are $30,000 to $40,000. Except for leasable minerals, non-timber resources and programs are not based on what the market will pay for these goods, opportunities, or services but are rather meant to augment appropriated funds to

Figure 3-19. Oregon Population Growth By County Group



support the administration of the programs. Recreation on BLM-administered lands in western Oregon provides economic benefits to the planning area. However, detailed information regarding the economics of recreation is not provided here because none of the alternatives would have a material effect on recreation.

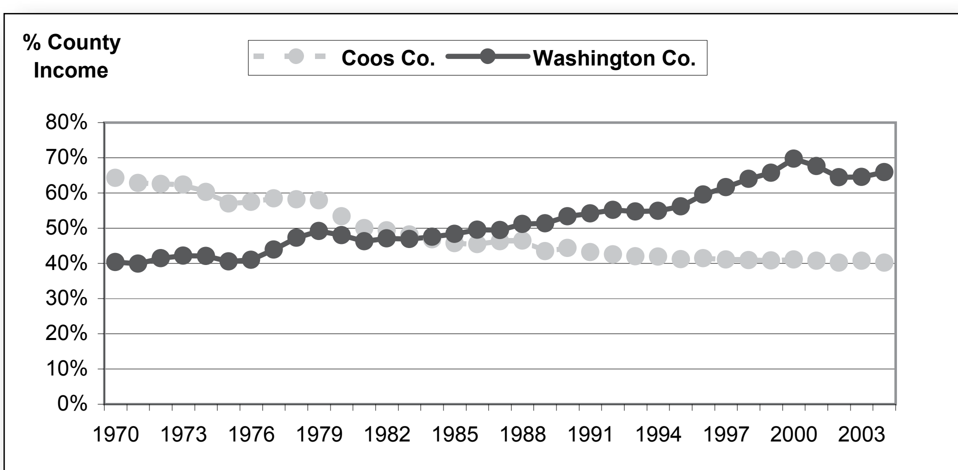
Oregon is a growth state with a history of relatively steady in-migration. The 2006 state population of 3.7 million has slightly more than doubled (109%) since 1960. In western Oregon, population growth is spatially concentrated and rates vary considerably by the nature of the economic base. See *Figure 3-19 (Oregon population growth by county group)*. Portland's metro counties (Clackamas, Columbia, and Washington, excluding Multnomah) started from a relatively low base, but grew three times more rapidly than the state (302%) during the same era. The central Willamette Valley counties (Benton, Marion, Polk, and Yamhill) grew 151%. Counties focused on wood products (Douglas, Jackson, Josephine, Klamath, Lane, and Linn) kept pace with state growth (103%). Only the coastal county group (Coos, Curry, Lincoln, and Tillamook) had population growth (37%) that was significantly below the state average.

County Economies

The economies of counties within the planning area typically had a resource-based history (agriculture and wood products). A dominance of public land ownership gave federal forest policy shifts large influences over the evolution of those economies. Through most of the twentieth century, increasing federal harvests expanded local wood products industries. Since World War II, technological progress gradually decreased worker/output ratios. During the 1990s, federal harvest reductions under the Northwest Forest Plan led to a reduction in wood products sector jobs, wages, and salaries in most of the county economies.

Changes in county economies vary by county. There are differences in timber substitution capacity, contemporary economic diversity, and opportunities for alternative economic development. See *Figure 3-20 (Coos and Washington county wage and salary income as a percent of total income)*. Both Coos and Washington counties experienced declining wage and salary income from the wood products sector but differed in the nature of income replacement. In Coos County, the percentage of income attributable to wages and salaries declined continuously due to decreasing wood products manufacturing and an increasing share of unearned income derived from retirement. Growth in the diversified Washington County economy, on the other hand, replaced resource sector incomes with increased wages in other developing sectors. The comparison in *Figure 3-20* is presented in proportional terms to normalize the fact that the Washington County economy is 25 times larger than that of Coos County.

Figure 3-20. Coos And Washington Counties' Wage And Salary Income As A Percent Of Total Income



In most cases, these new trajectories become permanent redirections. Because returning these economies to their historic structures is unlikely, this analysis considers the 2005 base year structure as a stable reference point for evaluating any new economic changes.

The economies of the O&C counties vary in the magnitude, type, and diversity of their economic activity. These differences influence how new external effects might change the patterns of each economy. The initial size of each county economy can be profiled with three primary indicators: industrial output, total employment, and earnings. See *Table 3-7 (2005 county economy indicators)*.

These measures show a wide range of differences between the county economies. Curry County has a small economy with the region's lowest output, employment, and earnings. Washington County, on the other hand, has 49 times more industrial output, 25 times more employment, and 45 times more earnings than Curry County. More detailed indicators (not shown) reveal quality-of-life implications as well. For example, Curry County's average annual wage is $26,200 compared to $46,400 for Washington County.

The economic impact analysis (see *Chapter 4*) estimates the implications of three large external effects on each county economy between the base reference year of 2005 and the impact year of 2009.

These large external effects on each county are (Adams and Latta 2007):

- loss of Secure Rural School payments to counties
- the BLM's selection and implementation of one of the management alternatives in the plan revision
- structural changes in the plywood industry projected by the Western Oregon model described in *Chapter 4*.

Table 3-7. County Economy Indicators (2005)

County	Industrial Output ($1,000)	Employment (total jobs)	Earnings ($1,000)
Benton	4,208,367	37,603	1,416,139
Clackamas	19,046,826	197,405	6,994,767
Columbia	1,708,099	14,182	390,413
Coos	2,171,795	28,792	797,151
Curry	762,355	10,726	281,937
Douglas	4,732,462	52,770	1,469,009
Jackson	8,364,619	103,612	3,247,024
Josephine	2,676,289	37,253	1,033,446
Klamath	2,719,816	34,179	1,024,239
Lane	15,445,518	178,924	5,729,986
Lincoln	1,797,597	21,560	606,118
Linn	5,010,081	50,568	1,619,544
Marion	14,249,826	157,199	5,782,895
Polk	1,682,760	22,499	624,709
Tillamook	1,170,965	10,985	306,070
Washington	37,563,913	272,210	12,626,678
Yamhill	3,492,580	37,928	1,129,303
Region Total	**126,803,868**	**1,268,395**	**45,079,428**

By artificially isolating the first two policy-driven effects, the county-level input-output models can estimate the roles of each effect in these county economies. *Table 3-8 (2005 county economy dependence on Secure Rural Schools and BLM effects)* shows the relative influence of combined Secure Rural School payments and current BLM harvest levels as of 2005. Using current employment as an indicator of impact, *Table 3-8 also* shows that the Secure Rural School funding and BLM expenditures account for a very small portion of the jobs in Washington County and up to 4.18% of the jobs in Douglas County. Counties with small portions of their economies dependent on Secure Rural School and BLM activities (less than 0.5%) would likely experience little overall impact from projected changes.

Higher percentages in *Table 3-8* typically reflect a higher dependence on Secure Rural Schools funding, an economic concentration in woods products industries, and the location of BLM administrative units. Even though influence percentages appear small, their effects would be concentrated in specific sectors, which could intensify the effects of any changes.

Together, the three external effects are expected to cause somewhat countervailing impacts spread to different sectors. The loss of the Secure Rural School payments would reduce jobs and income in county government. Increased BLM timber harvesting would increase wood products employment, but industrial contractions in the plywood sector would reduce jobs there. As a result, the economic response in any county depends as much on the internal economic structure of the county as well as its overall size. *Table 3-9 (2005 county economy grouped income patterns)* classifies each county into one of four indicative types defined by their general economic structure and diversity. Each type would react to changes differently.

The indicative types that the counties fit into are described as follows:

- **Coastal.** Counties on the coast have a relatively small percent of income derived from wage and salary employment. Seasonal home spending is proportionately larger than the rest of Oregon, particularly nearer Portland on the northern coast. Curry County has relatively larger property income and transfers, indicating retirees with higher incomes.

Table 3-8. 2005 County Economy Dependence On Secure Rural Schools And BLM Effects

County	Industrial Output (%)	Employment (%)	Earnings (%)
Benton	0.23	0.31	0.28
Clackamas	0.18	0.13	0.16
Columbia	0.29	0.37	0.46
Coos	1.63	1.42	1.80
Curry	1.83	2.19	2.39
Douglas	4.33	4.18	4.70
Jackson	1.69	1.56	1.70
Josephine	1.40	1.26	1.57
Klamath	2.12	1.67	2.13
Lane	1.18	1.11	1.35
Lincoln	0.50	0.66	0.70
Linn	0.84	0.78	0.99
Marion	0.20	0.17	0.23
Polk	0.24	0.24	0.30
Tillamook	0.49	0.72	0.81
Washington	0.01	0.01	0.01
Yamhill	0.23	0.16	0.21
Region Total	**0.65**	**0.71**	**0.71**

Table 3-9. 2005 County Economy Grouped Income Patterns

Counties by Indicative Type	Sources of Income (%)					
	Wage and Salary	Business Profits	Unearned DIR	Unearned Transfers	Commuting	Seasonal Homes
Coastal Counties						
Coos	46	13	16	22	1	2
Curry	26	9	31	27	5	3
Lincoln	31	11	17	30	2	10
Tillamook	38	13	16	16	3	14
Wood Products						
Douglas	49	17	7	22	4	1
Jackson	53	13	16	16	2	0
Josephine	45	13	14	22	5	1
Klamath	39	19	19	28	2	2
Lane	53	16	14	15	3	1
Linn	44	13	10	16	17	0
Central Willamette						
Benton	47	17	18	8	8	0
Marian	53	13	11	13	10	0
Polk	30	7	16	13	33	0
Yamhill	40	12	12	12	23	0
Portland Metro						
Clackamas	41	14	12	8	25	0
Columbia	22	10	19	23	25	0
Washington	48	26	8	6	11	0

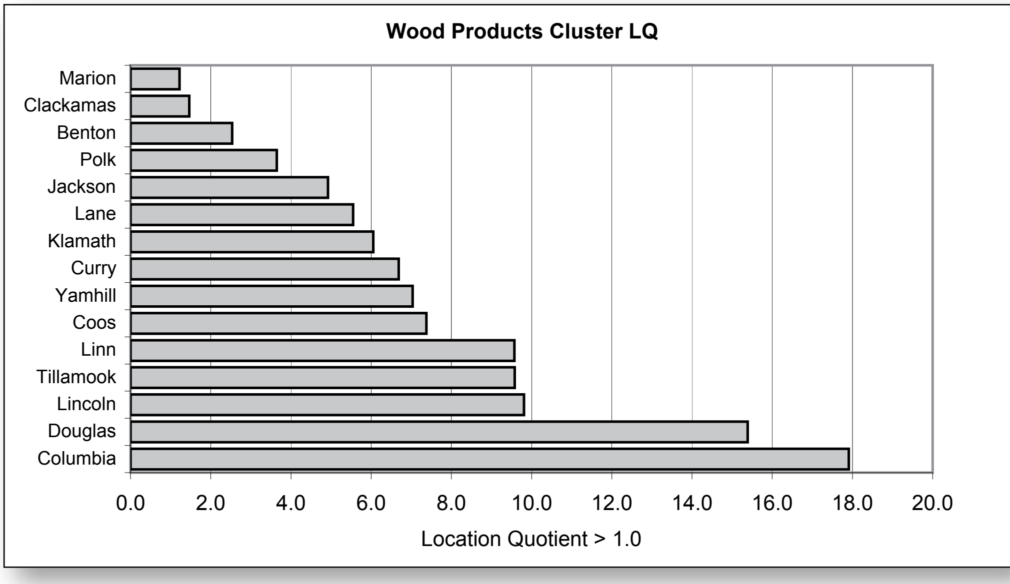
- **Wood Products.** Counties based on wood products combine the highest proportions of wage and salary income with lower property incomes. Linn County is a bit of anomaly because of its high commuting rates--presumably to high wage jobs in Salem, Corvallis, and Eugene.
- **Central.** Counties in the central Willamette Valley have significantly more commuting and earned income proportions (wage and salary income plus commuting). Earned income accounts for more than 60% of total income in these counties. These counties have the lowest overall percent of retirees and the lowest proportion of social security income.
- **Portland Metro.** Counties surrounding the Portland metropolitan area have very high commuting. Washington County has the lowest commuting, because its high tech jobs cluster is itself a job magnet. Retirement income (transfers) tends to be low except for Columbia County, which has a significant retiree population.

Another way of describing county economic structures is through location quotients. This index measures how the economic concentration for one economic sector in a county compares to the national average concentration for that same sector. A location quotient much larger than 1.0 in the wood products sector, for example, indicates that the county has a higher than average concentration in that sector, and may reflect a relatively specialized economic base that is more sensitive to changes.

Location quotients reveal that western Oregon is still a wood products region. County wood products cluster location quotients are very large for 15 of the O&C counties. See *Figure 3-21 (County economies with high wood products sector location quotients [LQ])*. The large number of high location quotients indicates how sensitive those county economies might be to BLM harvest changes.

Although several measures of socioeconomic well-being, community capacity, and community resiliency have been developed, no universally accepted measures exist. Community capacity and community

Figure 3-21. County Economies With High Wood Products Sector Location Quotients (LQ)

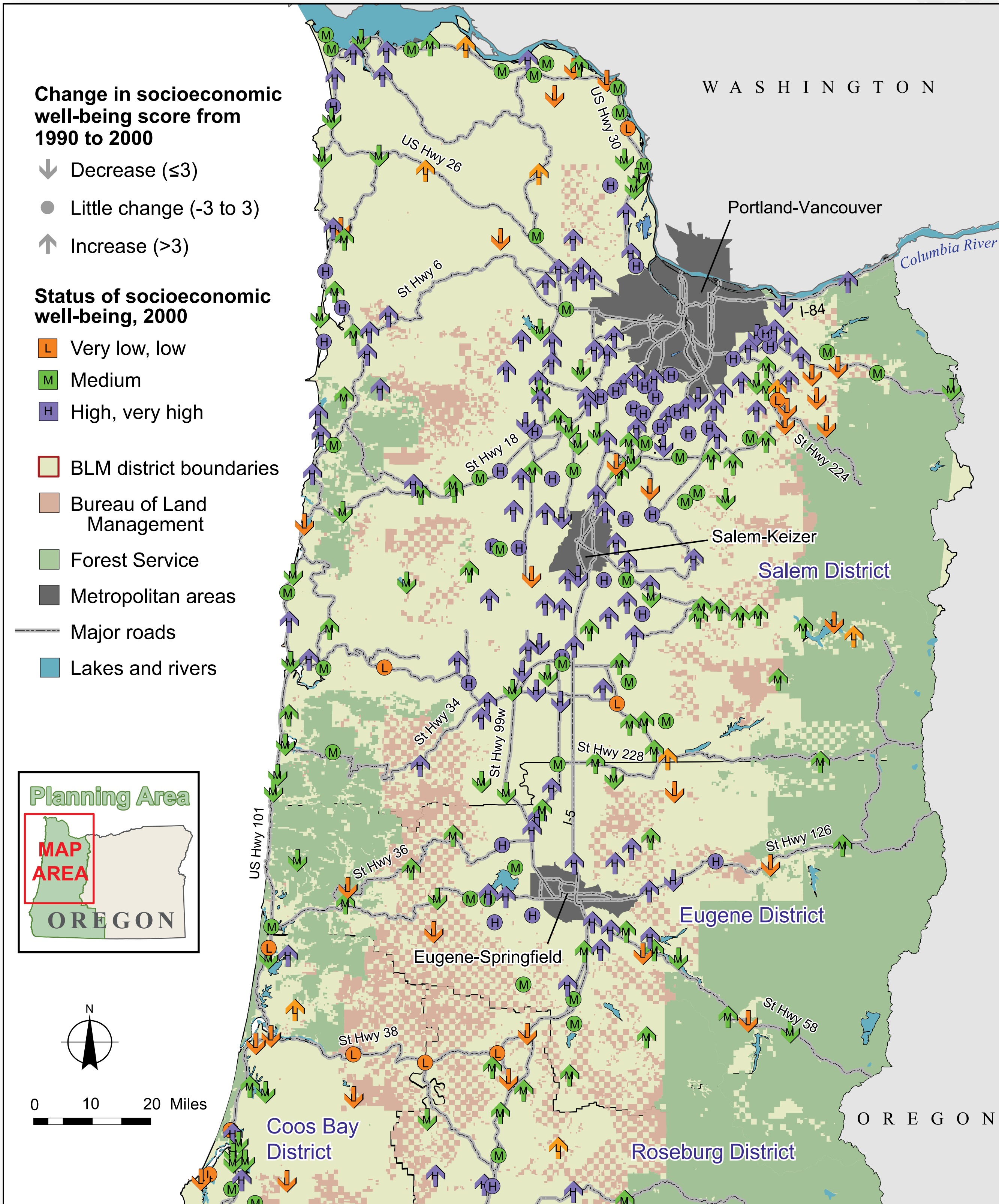


resiliency are fundamentally about dynamic processes that involve the actions of community leaders and residents. Leadership, social cohesion, and decision-making are important factors in how a community adapts to change and betters the lives of its residents, but they are not attributes that can be easily measured. Causality between changes in forest management policy and some community socioeconomic conditions is difficult to demonstrate. The social and economic well-being index and scores for western Oregon communities were developed as part of the Northwest Forest Plan Socioeconomic Economic Monitoring report (USDA USFS 2006a). The index consists of six indicators:

- diversity of employment by industry
- percentage of population that is 25 years and older with a bachelor's degree or higher
- percentage unemployed
- percentage of persons living below the poverty level
- household income inequality
- average travel time to work

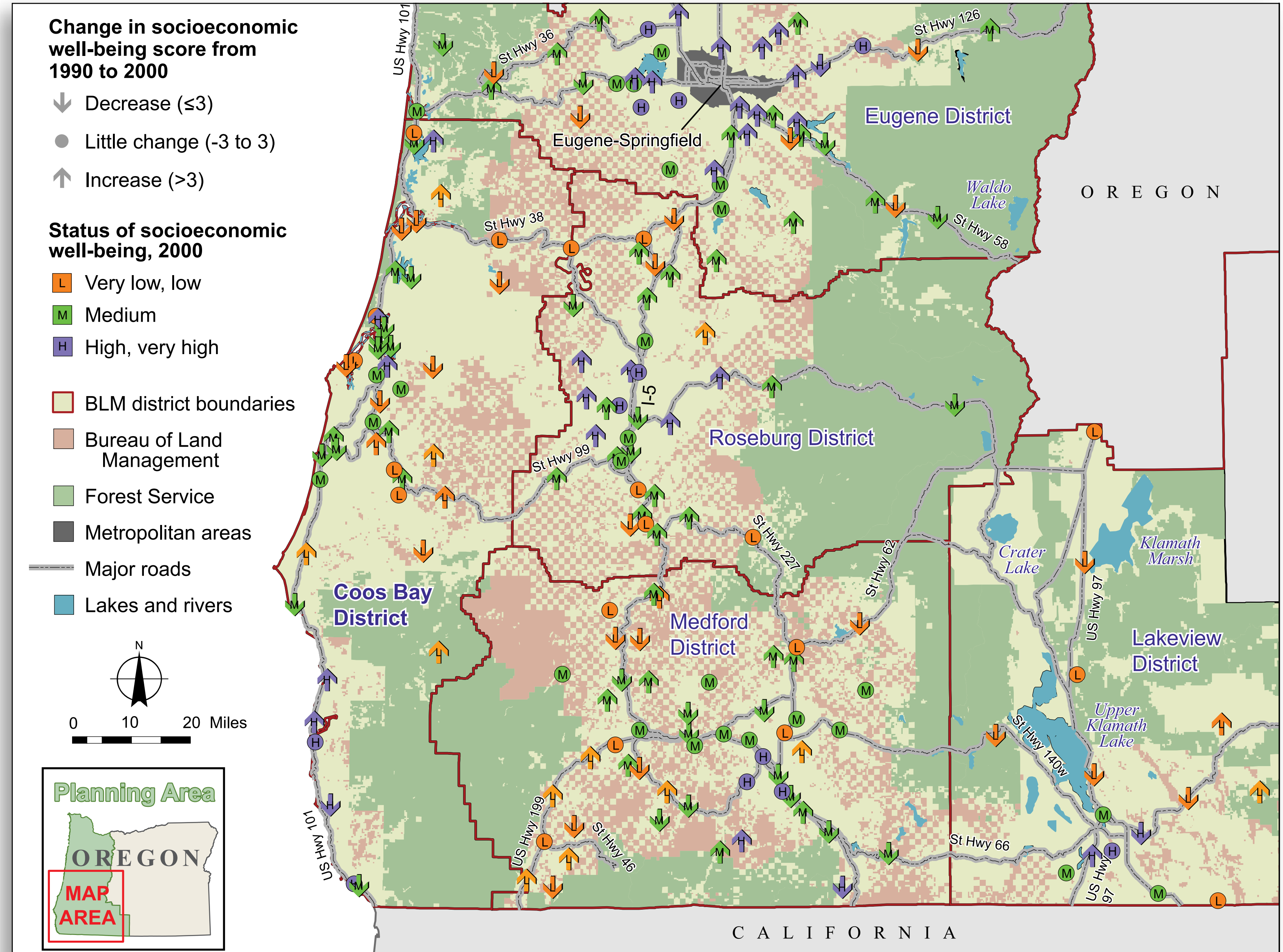
Many communities in western Oregon either increased or decreased in their social and economic well-being score between 1990 and 2000. See *Figure 3-22 (Change in socioeconomic well-being scores from 1990 to 2000 in the northern portion of the planning area)* and *Figure 3-23 (Change in the socioeconomic well-being scores from 1990 to 2000 in the southern portion of the planning area)* for a summary of the direction and magnitude of change in this index. The communities were examined by population size class: small, medium, and large communities. The smaller community size classes of 501 to 2,000 people had proportionately more communities with relatively lower social and economic well-being scores, whereas the larger population size classes of 2,001 to 5,000 people and 5,001 to 50,000 people had proportionately more communities with higher scores. Recent regional social assessments suggested that the higher the population in a rural community, the greater the infrastructure and the higher the socioeconomic resilience (Harris et al. 2000).

Figure 3-22. Change In The Socioeconomic Well-Being Scores From 1990 To 2000 In The Northern Portion Of The Planning Area



Source: USDA 2006a

Figure 3-23. Change In The Socioeconomic Well-Being Scores From 1990 To 2000 In The Southern Portion Of The Planning Area



Source: USDA 2006a

O&C Revenues and County Budgets

The O&C Act specifies that counties with O&C lands will receive 75% of the revenue generated from these lands. In 1953, the O&C counties agreed to receive 50% of the revenue, and that the other 25% would be used by the BLM for roads, reforestation and silvicultural treatments, recreation sites, fire protection, and other forest management. Historically, the bulk of the revenue generated from the BLM has been and continues to be associated with timber harvesting and is the focus of this discussion.

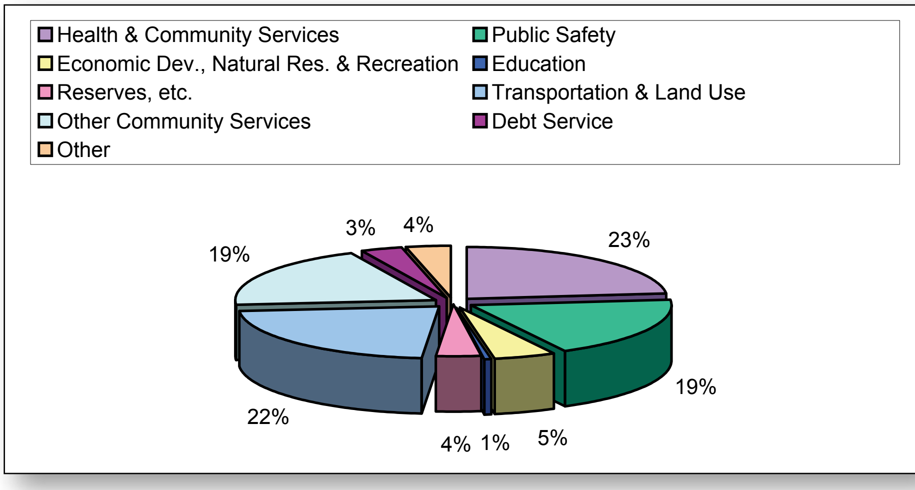
County governments provide a variety of public services. A survey of the O&C counties was conducted to understand the source and use of county revenues. See *Appendix D - Socioeconomics*. See *Table 3-10 (Public services that county revenues support)* for a list of service categories and the services within each category. Also see *Figure 3-24 (Fiscal year 2005 county expenditures)* for a summary of the $3.9 billion spent in fiscal year 2005 by the O&C counties.

County governments are funded from sources such as local taxes, transfers from federal and state governments, and fees and charges for services. In addition, the O&C counties receive 50% of the revenue

Table 3-10. Public Services That County Revenues Support

Service Categories	Types of Services	
Health and Community Services	Aging services Alcohol and drug addiction services Services for children and families Developmentally disabled Mental health services Oregon health plan services	Veterans services Public health services Environmental health services Housing services Medical examiner Solid waste disposal/recycling
Public Safety	Trial courts District attorney County jail 911/emergency communications Emergency management Homeland security	Community corrections Court security Juvenile services County law library Sheriff patrol Animal control
Economic Development, Natural Resources, and Recreation	Oregon plan implementation State forest management Federal land policy Extension services Telecommunications County fair	Watermaster County forests County library County parks County museums
Transportation and Land Use	Highway and road systems Land use planning and coordination Senior and disabled transportation Development services	Engineering Building permitting and inspections Surveying Capital projects
Other Community Services	Management and administration Elections Assessment and taxation Human resources and employee relations	Property and facilities management Procurement Recording public documents

Figure 3-24. Fiscal Year 2005 County Expenditures



generated by the sale of timber and other goods and services produced from the O&C lands. See *Figure 3-25 (Fiscal year 2005 revenues for the O&C counties)* for the source of the $4.2 billion in revenues received by the O&C counties in the 2005 fiscal year.

In fiscal year 2005, the O&C-related revenues accounted for about $115 million (or about 2.7% of the total funds available to the O&C counties). (Note: In the survey, the counties reported receiving $103 million from the BLM, whereas the BLM reports a total of about $115 million. Most of the difference is accounted for as Title II funds, which are expended by the agency under the direction of the county-level resource advisory committee. Title II funds do not go directly through the county budgets.)

The importance of O&C revenues varies by county. See *Table 3-11 (Total revenue, discretionary revenue, and O&C funding)*. For example, the O&C revenues account for more than 20% of Douglas County revenue, but only 0.1% of the metropolitan Multnomah and Washington county revenues.

The counties also reported receiving about $99 million of Secure Rural Schools funding that was associated with land managed by the U.S. Forest Service. The U.S. Forest Service reports a distribution of $123.3

Figure 3-25. Fiscal Year 2005 Revenues For The O&C Counties

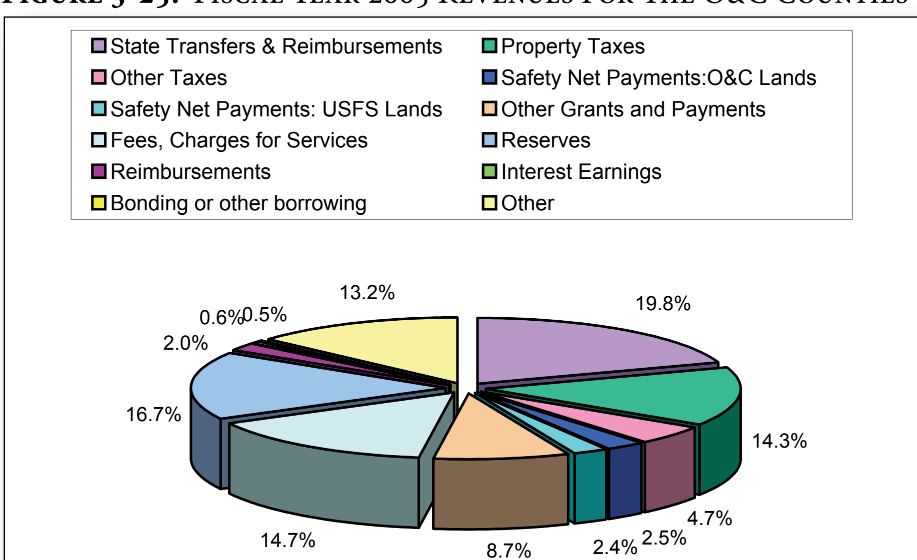


Table 3-11. Total Revenue, Discretionary Revenue, And O&C Funding For Fiscal Year 2005

County	Revenue ($)			O&C Revenue as % of:	
	All Sources		BLM		
	Total	Discretionary	Total O&C	Total %	Discretionary %
Rural Counties					
Benton	72,288,316	24,114,009	2,920,490	4.0	12.1
Columbia	47,303,696	9,881,991	2,250,622	4.8	22.8
Coos	45,315,118	13,113,030	6,537,510	14.4	49.9
Curry	54,959,478	6,920,829	3,424,000	6.2	49.5
Douglas	136,784,970	39,942,546	28,105,526	20.5	70.4
Jackson	290,614,408	77,040,445	15,145,237	5.2	19.7
Josephine	109,802,550	29,278,099	12,092,595	11.0	41.3
Klamath	160,315,525	15,522,030	2,206,000	1.4	14.2
Lane	466,328,935	56,786,868	14,583,629	3.1	25.7
Lincoln	74,031,888	32,218,773	388,968	0.5	1.2
Linn	83,070,524	25,287,488	2,518,846	3.0	10.0
Marion	314,833,911	70,333,962	1,360,000	0.4	1.9
Polk	60,207,240	13,956,261	2,385,000	4.0	17.1
Tillamook	57,560,514	14,622,039	730,820	1.3	5.0
Yamhill	82,504,377	13,211,916	807,500	1.0	6.1
Rural Subtotals	**2,055,921,450**	**442,230,286**	**95,456,743**	**4.6**	**21.6**
Metropolitan Counties					
Clackamas	406,647,713	82,829,267	5,890,071	1.4	7.1
Multnomah	1,092,793,083	409,015,566	1,000,000	0.1	0.2
Washington	607,731,836	121,402,176	707,861	0.1	0.6
Metro Subtotals	**2,107,172,632**	**613,247,009**	**7,597,932**	**0.4**	**1.2**
Totals - All Counties	**4,163,094,082**	**1,055,477,295**	**103,054,675**	**2.5**	**9.8**

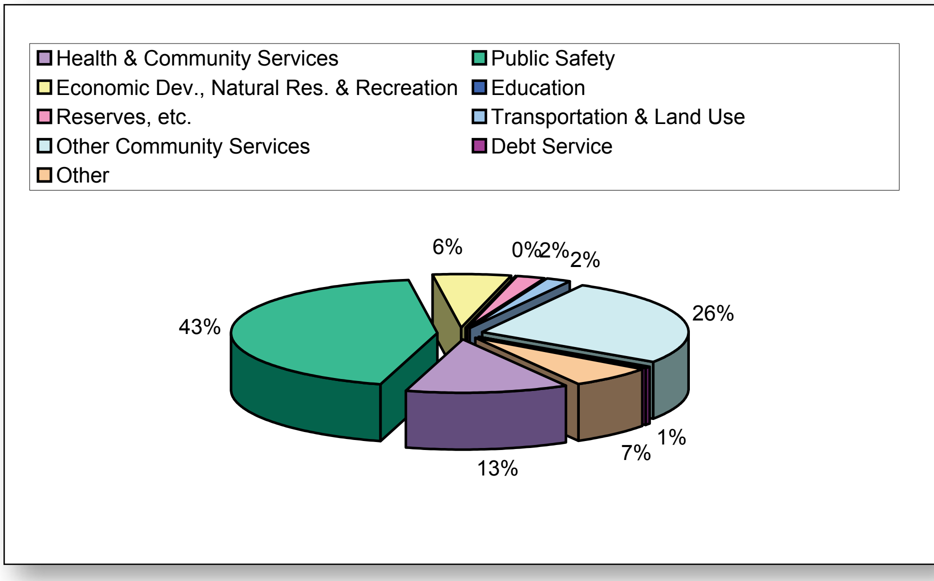
million for western Oregon counties. (Note: The difference could be related to the fact that U.S. Forest Service funding is distributed through the state rather than directly to the counties.) The U.S. Forest Service funds are typically not considered discretionary in that they are earmarked for schools and roads.

Much of the funding received by county governments is directed to specific programs. For fiscal year 2005, the O&C counties reported that only about 25% of total revenue received was discretionary. The rest of the revenue received by the county governments is earmarked for specific programs. Counties consider most of the BLM revenue as discretionary in that it can be used for whatever purpose the county commissioners deem suitable.

See *Figure 3-26 (Fiscal year 2005 discretionary spending for the O&C counties)* lists how the O&C counties spent the funds considered discretionary. About 43% of the discretionary budget is spent on public safety. The next largest category is for other community services, which includes such services as management, administration, and elections.

Table 3-11 (Total revenue, discretionary revenue, and O&C funding for fiscal year 2005) shows that across the O&C counties, O&C revenues accounted for 9.8% of the discretionary funding. Some counties, however, rely on O&C revenues much more to fund discretionary programs than others. For example, more than

Figure 3-26. Fiscal Year 2005 Discretionary Spending For The O&C Counties



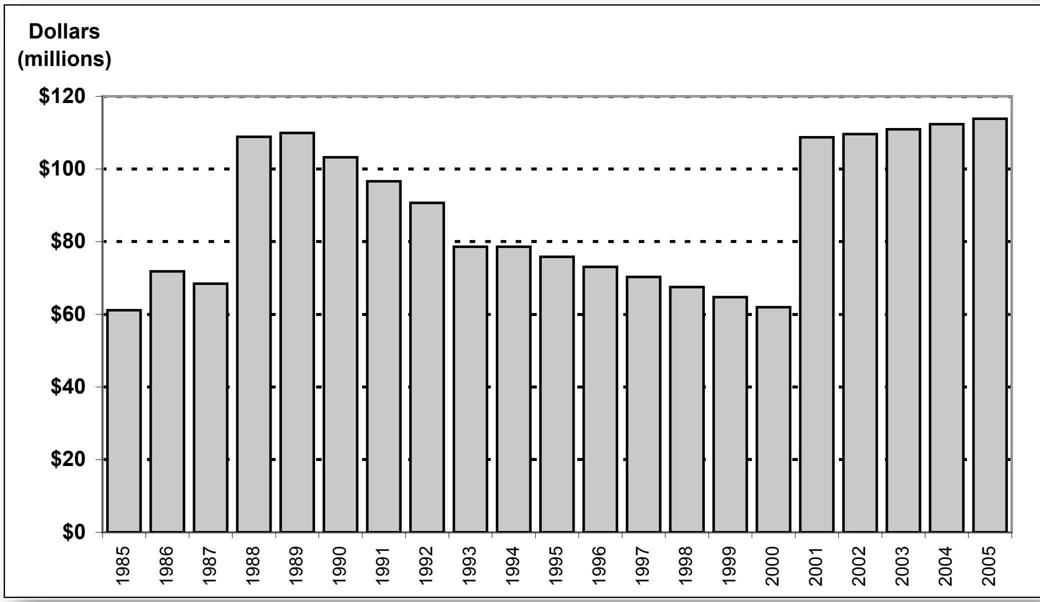
70% of the discretionary funding in Douglas County is based on O&C revenues. A number of counties rely on O&C revenues for more than 20% of discretionary funding. The O&C revenues comprise only a small portion of discretionary funding for the larger metropolitan counties.

Timber harvesting from O&C lands began declining in the 1990s as a result of the listing of the northern spotted owl and the adoption of the Northwest Forest Plan. In response, Congress established safety net payments for 72 counties in Oregon, Washington, and California through the Omnibus Budget Reconciliation Act of 1993. This provided a stabilized income flow to timber-dependent communities through the remainder of the 1990s.

In 2000, Congress repealed the safety net payments and passed the Secure Rural School and Community Self Determination Act (P.L. 106-393). This law established a stable level of payments to counties at an amount equal to the average of their three highest timber receipts from 1986 through 1999. Under the Act, counties elect the percentage of payment (80 to 85%) to be distributed directly to the county (Title I), and the percentage (15 to 20%) to be allocated between Title II projects and Title III projects. Title I, II, and III funds are described below:

- **Title I.** These are funds that are distributed to the county and may be used for any purpose the previous 50% revenue-sharing funds were used for, as a supplement to other county funds. Typically, these revenues go to county general fund budgets.
- **Title II.** These are funds that are used to support cooperative projects under the guidance of a resource advisory committee to restore healthy conditions on public lands, or on private lands for the benefit of public land resources. Such projects include wildfire hazard reduction, stream and watershed restoration, forest road maintenance, road decommissioning or obliteration, control of noxious weeds, and improvement of fish and wildlife habitat.
- **Title III.** Under Title III of the Act, counties may use funds for search, rescue, and emergency services; community service work camps; purchase of easements for recreation or conservation; forest-related educational programs; and fire prevention activities.

Figure 3-27. BLM Payments To Counties For Fiscal Years 1985 To 2005



See *Figure 3-27 (BLM payments to counties for fiscal years 1985 to 2005)* for the trend in BLM payments to counties since 1985. In fiscal year 2005, the BLM payments to counties totaled about $115 million.

Historically, payments authorized under the O&C Act accounted for the bulk of the total BLM payments to counties. Counties do, however, receive revenue associated with other BLM funding sources. Douglas and Coos Counties receive payments from the Coos Bay Wagon Road grant fund. There are 15 counties that receive payments in lieu of taxes (PILT) from public domain lands located within their county. A few counties also receive grazing and mineral lease income. Altogether, these other sources of payments averaged just over $1.0 million annually over the last five years.

Table 3-12 (BLM payments to counties within the planning area for selected years) summarizes the total payments to counties from western Oregon BLM-administered lands. Those payments include timber receipts, safety net payments, and Secure Rural Schools Self Determination Act payments under Title I, II and III; Coos Bay Wagon Road grants; payments in lieu of taxes; and mineral and grazing income. The average annual BLM payment to all counties since implementation of the Secure Rural Schools legislation has been $112 million.

The O&C revenue is allocated between counties based on an acre-weighted pro-ration formula. The largest recipients of payments from western Oregon BLM-administered lands are Douglas, Jackson, Lane, and Josephine counties, which together received 68% of the total payments in 2005.

The Secure Rural Schools legislation was not reauthorized for 2007. Absent a reauthorization or new legislation, the size of the BLM payment to counties will be highly dependent on the amount and price of timber sold from O&C lands. For example, without the Secure Rural Schools legislation, the fiscal year 2005 BLM payment to counties would have totaled about $12.2 million, which is a reduction of about 90% from the total with the legislation.

In addition, many of the O&C counties would also lose Secure Rural School funding attributable to land that is managed by the U.S. Forest Service. For fiscal year 2005, such funding totaled $123.3 million.

Table 3-12. BLM Payments To Counties Within The Planning Area For Selected Years ($ Million)

County	1985	1990	1995	2000	2001	2002	2003	2004	2005
Benton	1.7	2.9	2.1	1.7	3.1	3.1	3.1	3.2	3.2
Clackamas	3.4	5.8	4.2	3.4	6.0	6.1	6.2	6.2	6.3
Columbia	1.3	2.1	1.6	1.3	2.2	2.3	2.3	2.3	2.3
Coos	4.0	6.8	5.0	4.1	7.2	7.3	7.4	7.5	7.6
Curry	2.2	3.8	2.8	2.3	4.0	4.0	4.1	4.1	4.2
Douglas	15.4	26.0	19.1	15.6	27.4	27.6	27.9	28.3	28.7
Jackson	9.6	16.2	11.9	9.7	17.0	17.2	17.4	17.6	17.8
Josephine	7.4	12.5	9.2	7.5	13.1	13.2	13.4	13.6	13.8
Klamath	1.5	2.4	1.8	1.5	2.6	2.6	2.6	2.7	2.7
Lane	9.3	15.8	11.6	9.5	16.6	16.7	16.9	17.2	17.4
Lincoln	0.2	0.4	0.3	0.2	0.4	0.4	0.4	0.4	0.4
Linn	1.6	2.7	2.0	1.6	2.9	2.9	2.9	3.0	3.0
Marion	0.9	1.5	1.1	0.9	1.6	1.6	1.6	1.6	1.7
Multnomah	0.7	1.1	0.8	0.7	1.2	1.2	1.2	1.2	1.2
Polk	1.3	2.2	1.6	1.3	2.3	2.4	2.4	2.4	2.5
Tillamook	0.3	0.6	0.4	0.3	0.6	0.6	0.6	0.6	0.6
Washington	0.4	0.7	0.5	0.4	0.7	0.7	0.7	0.7	0.7
Yamhill	0.4	0.7	0.5	0.4	0.8	0.8	0.8	0.8	0.8
Totals	**61.7**	**104.2**	**76.5**	**62.5**	**109.8**	**110.6**	**112.0**	**113.4**	**114.9**

The O&C counties have a limited ability to replace BLM revenues with other sources of revenue. Oregon income taxes are paid to the state, not the counties. As a result of several ballot measures, Oregon counties are not able to raise tax rates and the growth in taxable property value is capped at 3% a year. The federal government, furthermore, owns a large portion of the land in some of the O&C counties. See *Table 3-13 (Percent of public land in O&C counties)*. These lands are not on the tax rolls. The O&C counties believe that neither economic growth nor tourism can reasonably be expected to offset a shortfall in O&C-related revenues (Davis 2006). See *Appendix D - Socioeconomics*.

The economics of BLM timber harvesting are directly linked to western Oregon's timber economy and market.

The counties in western Oregon comprise the relevant market area for this analysis. Although some of the BLM timber may be shipped outside of this area for primary processing, the most recent information about log flow suggests that the bulk of BLM timber will likely be processed within the market area. As shown below, western Oregon is a net importer of logs—more timber is processed than harvested in the area.

There are 413 bbf of sawtimber on 16.3 million acres of timberland within the planning area of western Oregon (Miles 2006). (Note: Not all of the 2.6 million BLM acres within the planning area are classified as timberland.) See *Table 3-14 (2005 timberland area and inventory within the planning area)*. The BLM administers about 13% of the timberland and 16% of the sawtimber in western Oregon.

See *Figure 3-28 (Harvest by landowner within the planning area)* for the western Oregon harvest by owner. Since 2000, western Oregon harvests have averaged about 3.4 bbf (billion board feet, scribner log scale)—a 47% reduction from the average 6.4 bbf average harvest prior to the 1990 listing of the northern spotted owl. Most of the reduction came from federal timberlands (U.S. Forest Service and BLM).

Table 3-13. Percent Of Public Land In O&C Counties

O&C County	Total (acres)	BLM (acres)	BLM (%)	Government (acres)	Government (%)
Benton	433,500	58,100	13.4	106,300	24.5
Clackamas	1,205,000	75,400	6.3	632,200	52.5
Columbia	440,800	10,800	2.5	32,100	7.3
Coos	1,041,000	162,900	15.6	261,100	25.1
Curry	1,047,100	67,600	6.5	688,700	65.8
Douglas	3,244,500	655,100	20.2	1,670,500	51.5
Jackson	1,792,700	449,700	25.1	914,200	51.0
Josephine	1,050,200	299,800	28.5	714,900	68.1
Klamath	3,137,900	224,900	7.2	1,651,300	52.6
Lane	2,957,900	288,100	9.7	1,740,400	58.8
Lincoln	635,600	20,200	3.2	216,800	34.1
Linn	1,477,000	87,200	5.9	581,400	39.4
Marion	762,600	20,900	2.7	258,800	33.9
Multnomah	297,500	4,200	1.4	88,400	29.7
Polk	476,000	40,200	8.4	53,100	11.2
Tillamook	719,500	48,500	6.7	450,200	62.6
Washington	465,000	11,500	2.5	67,700	14.6
Yamhill	459,700	32,600	7.1	65,100	14.2
Totals	**21,643,500**	**2,557,700**	**11.8**	**10,193,200**	**47.1**

Table 3-14. 2005 Timberland Area And Inventory Within The Planning Area

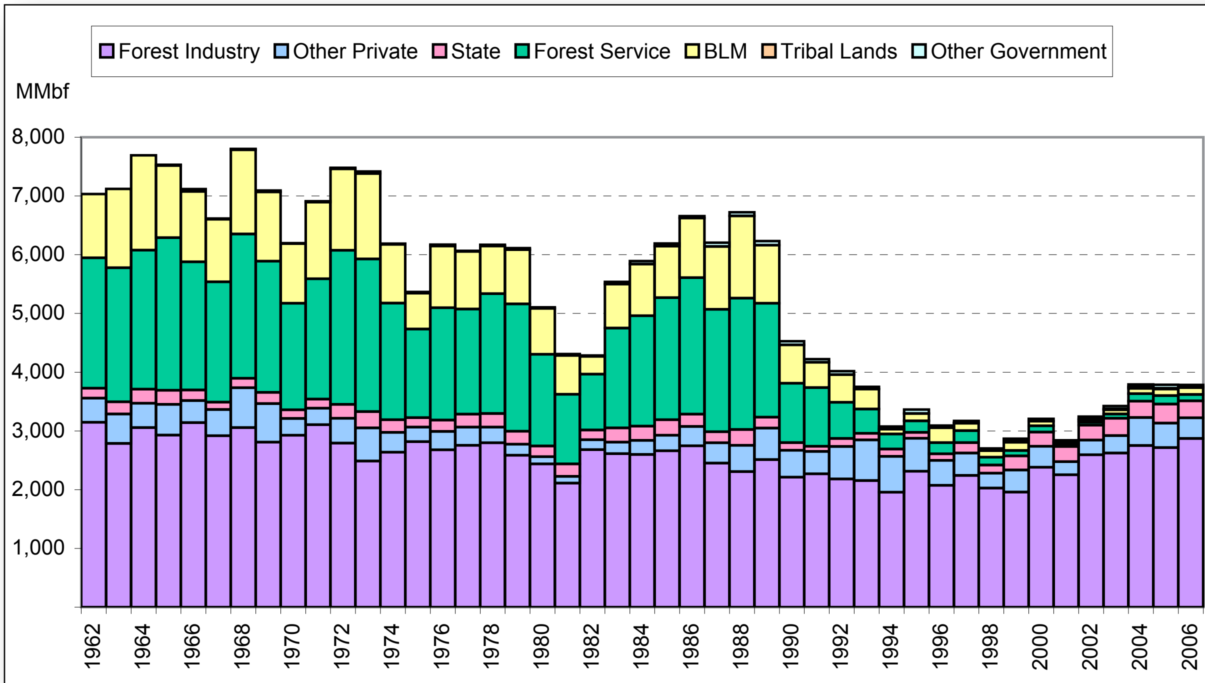
Ownership class	Timberland Area (acres)	Sawtimber Inventory (bbf)
National Forest	5,937,000	210
Bureau of Land Management	2,068,000	66
Other federal	27,000	1
State	839,000	29
County and Municipal	116,000	2
Other local government	10,000	-
Private	7,323,000	105
Totals	**16,320,000**	**413**

During the 1970s, the BLM harvests averaged 1.05 bbf, which is about 16% of the total. The BLM harvests averaged 0.87 bbf in the 1980s, which is about 15% of the total. Under the Northwest Forest Plan (since 1994), the BLM harvests have averaged about 0.11 bbf annually, which is about 3.4% of the total harvest.

(Note: In this discussion, the BLM timber volumes have been converted from the 16-foot log scale used by the BLM, to the 32-foot log scale used by other western landowners. The conversion factor varies with timber species and log size. Generally, a factor of 0.80 can be used to convert BLM 16-foot log volumes to 32-foot log volumes.)

Harvests from private lands trended down slightly through the 1990s (3.08 bbf in the 1970s, 2.79 bbf in the 1980s, and 2.61 bbf in the 1990s). Private harvests have been trending up since 1995 and have averaged 2.89 bbf since 2000. Currently, private lands provide about 85% of the harvest within the planning area.

Figure 3-28. Harvest By Landowner Within The Planning Area



See *Figure 3-29 (Willamette Valley Douglas fir delivered log prices and BLM volume and average stumpage)* for log price trends since 1989 (Log Lines 1989-2006). (Note: Log Lines is a log price reporting service that began reporting log prices in 1988.) Log prices rose dramatically in the early 1990s, due primarily to a reduction in federal harvests during a time of strong demand for lumber and wood products. High log prices and increased penetration of U.S. markets by Canadian lumber manufacturers led to a reduction in mill capacity in western Oregon. Log prices declined through the 1990s. Log prices began trending up again in 2003 as housing markets strengthened. Western Oregon mills added capacity with the sawmills still operating in 2005 and producing about 37% more wood in 2005 than they did in 2001 (Ehinger 2006). In Western Washington, mills added about 1.0 bbf in net capacity between 1999 and 2006, which further strengthened log prices (Ehinger 2005.)

Figure 3-29 (Willamette Valley Douglas fir delivered log prices and BLM volume and average stumpage) also shows that the premium for higher grade logs has been shrinking (2S and 3S logs sell for about the same price, and 3P log margins are narrowing). (Note: 3P, 2S, and 3S are log grades reflecting size and quality.) This data reflects recent investment in smaller log mills and the ongoing shift toward dimension lumber.

Figure 3-29 also shows the total volume and average stumpage price of the BLM timber sold in western Oregon. Since 1995, when the BLM began selling smaller timber under the Northwest Forest Plan, stumpage prices have followed a trend similar to the current market for 2S and 3S logs.

Logs harvested in one area are often manufactured into wood products in another area. Understanding how logs flow helps to establish the geographic extent of the market area. Predicting future log flows, furthermore, is important to establishing impact at the county level.

See *Table 3-15 (2003 mill study log flows)* for a summary of log flows reported in the 2003 mill study (Brandt et al. 2006, USDA USFS 2006a). About 3.757 bbf was consumed by western Oregon mills in 2003. About 8% of the total was imported into western Oregon from outside the state and another 4% was imported from eastern Oregon.

Figure 3-29. Willamette Valley Douglas Fir Delivered Log Prices And BLM Volume And Average Stumpage

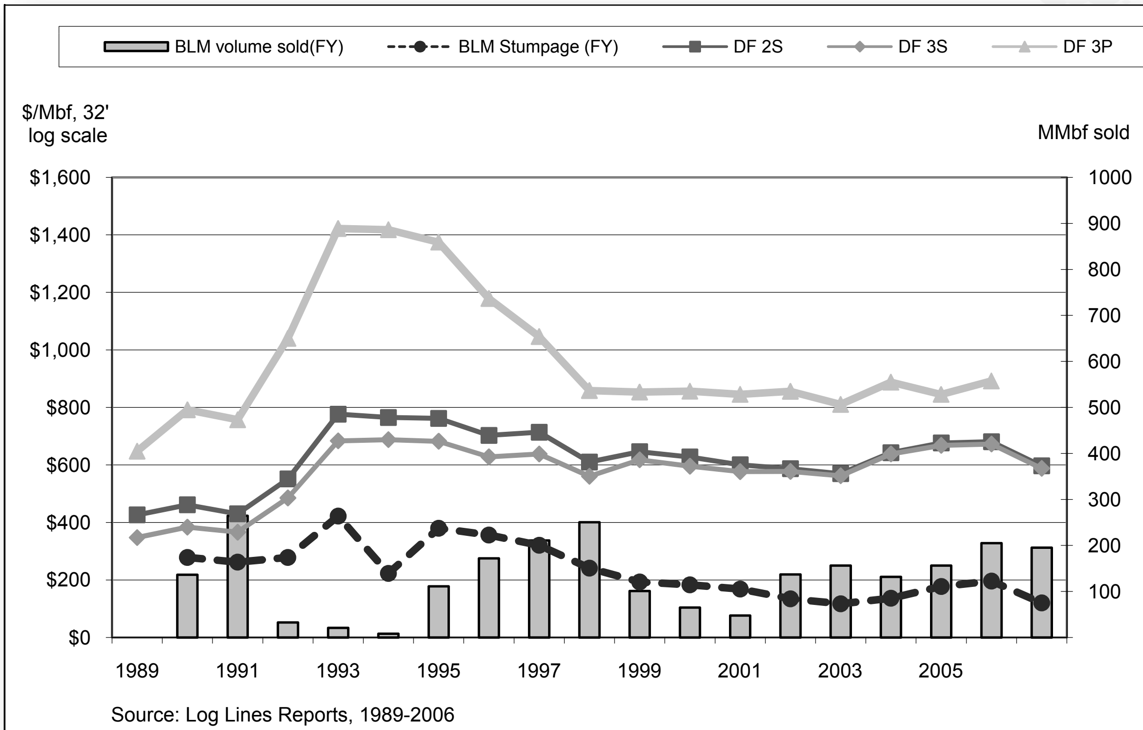


Table 3-15 (2003 mill study log flows) also suggests that the difference between local log supply and local log demand is greatest in southwest Oregon. These mills imported 412 mmbf from northwest Oregon, whereas only 58 mmbf went from southern Oregon to northwest Oregon.

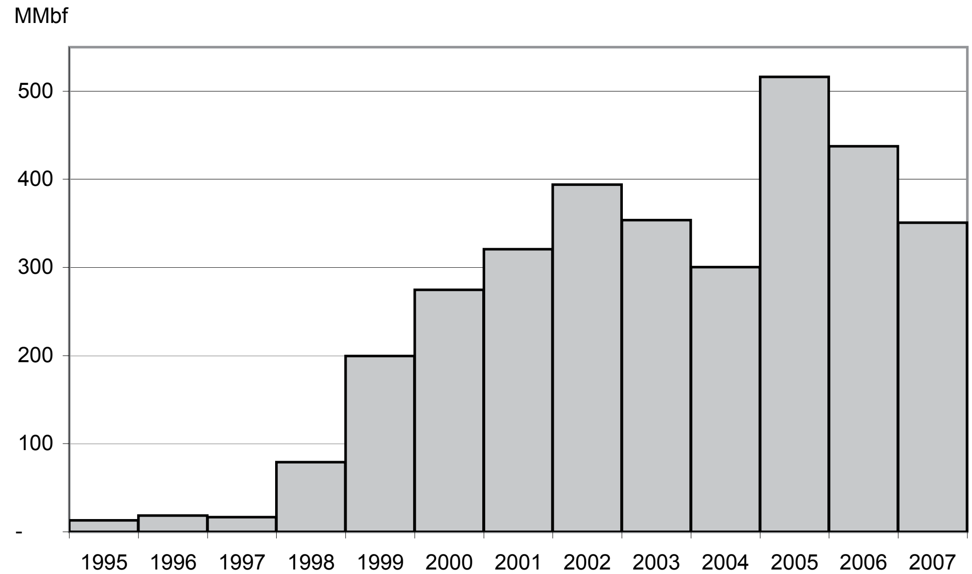
Current estimates are that log imports into western Oregon have increased since the 2003 mill study. *Figure 3-30 (Log imports from Canada to Washington and Oregon ports)* shows that Canadian logs imported into western ports exceeded 500 mmbf in 2005 and are on a similar track in 2006. Oregon log buyers expect that about 500 mmbf is currently flowing into Oregon from Washington and Canada. Many consider the Canadian volume to be subject to intense competition by more favorably located mills in Washington, or by new in ventures in Canada (Rasmussen, pers. comm. 2006).

The log market in western Oregon is competitive. In 2005, for example, only 28% of the timber used by Oregon's sawmills was fee timber (timber owned by the manufacturing company). The rest of the timber harvested was purchased by manufacturers from timberland owners (Western Wood Products Association

Table 3-15. 2003 Mill Study Log Flows

Destination	Log Volume (mmbf)				
	Total Utilization	Source			
		Northwest Oregon	Southwest Oregon	Eastern Oregon	Other States
Northwest Oregon	1,667	1,378	58	0	231
Southwest Oregon	2,090	412	1,460	158	60
Total Western Oregon	**3,757**	**1,790**	**1,518**	**158**	291

Figure 3-30. Log Imports From Canada To Washington And Oregon Ports



Sources: Warren, Debra D. 2006. Production, Prices, Employment, and Trade in Northwest Forest Industries, all quarters of 2004, Portland, OR
U.S. International Trade Commission. [http://www.usitc.gov/]

2006). Much of this timber is sold in an open, competitive market to the highest bidder. BLM timber is appraised and sold at auction to the highest qualified bidder, which ensures that the agency receives fair market value.

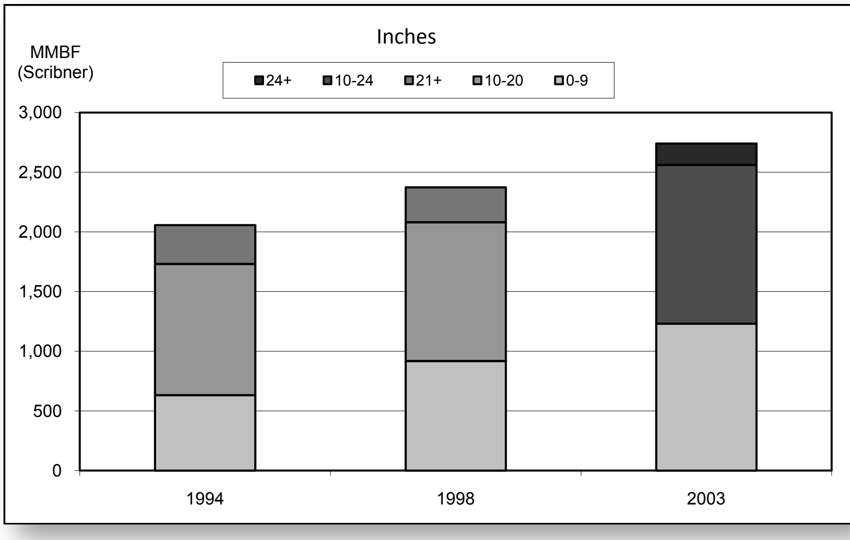
Mills are typically optimized to process certain species and sizes of logs. The log market allocates logs to the mills that can most efficiently and effectively process particular types of logs. Prior to the Northwest Forest Plan, the U.S. Forest Service and the BLM were key suppliers of large, high-quality logs. Decisions made in the Northwest Forest Plan substantially reduced the volume of large logs available to Oregon mills. Much of the recent investment made in Oregon mills focused on more efficient processing of the smaller logs harvested from private lands. *Figure 3-31 (Oregon sawmill consumption by diameter class)* shows that logs that are less than 9 inches DIB (diameter inside the bark at the small end of the log) being processed by Oregon mills have doubled from 632 mmbf in 1994 to 1,230 mmbf in 2003.

Even with the investment in smaller log processing, there remains in Oregon a sizeable capacity for the larger logs that could be harvested from BLM-administered land.

- *Figure 3-31 (Oregon sawmill consumption by diameter class)* shows that about 300 mmbf of logs greater than 21 inches DIB were processed in 1994 and 1998. The 2003 study changed the classification—179 mmbf of logs greater than 24 inches DIB were processed in that year.
- Ehinger (2006) defines large logs as those over 48 inches DIB, lists 11 mills that process large logs, and reports that 10% of western Oregon mill capacity is capable of handling large logs (about 450 mmbf), and that more large log capacity is being added.
- An Oregon State University study defined large logs as those over 30 inches DIB and found 18 mills that handle large logs (Wagner et al. 2003).

The primary wood products manufacturing sector is a large contributor to the Oregon economy. In 2003, there were 249 firms that used 4.3 bbf of wood to produce $6.7 billion of annual sales (Brandt et al. 2006). While this sector accounts for less than 0.1% of Oregon firms, it produces 14.6% of annual manufacturers'

Figure 3-31. Oregon Sawmill Consumption By Diameter Class



shipments (U.S. Census Bureau 2000-2004). This estimate does not include substantial secondary wood products sectors such as furniture and cabinetry.

The Oregon primary wood products sector employs 51,900 workers who earn $1.9 billion annually (OED OLMIS 2006), which is about 3.2% of total Oregon wages. Using a conservative employment multiplier of 2.5, the primary wood products sector accounts for about 130,000 nonfarm Oregon jobs, which is about 7.6% of the total.

Periodic surveys of wood product manufacturers show how the wood products manufacturing sector has changed (Brandt et al. 2006). This information, coupled with annual production data, suggests that the current manufacturing sector could absorb additional timber from BLM-administered lands.

Since the early 1990s, western Oregon's wood products manufacturing capacity has been shifting toward lumber production. See *Figure 3-32 (Log consumption by product in western Oregon)*. Lumber mills now account for about 75% of the wood consumed in western Oregon mills. Oregon's plywood and veneer mills were heavily dependent on larger logs, much of which came from federal forests. With the reduction in federal timber harvests, larger logs became more expensive at the same time that manufacturers in the Midwest and southern United States added lower cost panel capacity to oriented strand board mills. Very few logs are exported from Oregon's ports.

New investments in lumber mills have been concentrated in larger mills. *Figure 3-33 (Western Oregon sawmills by capacity)* shows that most of the remaining mills in western Oregon are larger mills that produce over 120 mbf per shift. The average production per mill for this largest class, in fact, is now over twice what it was in 1976. The apparent increase in the number of small mills in 2003 is due to a difference in survey techniques.

Figure 3-34 (Lumber production in Oregon and Washington) shows lumber production in Oregon and Washington (Western Wood Products Association 2006). Lumber production in western Oregon fell by about 45% between 1989 and 1995, primarily due to reduced federal log supplies. Production began increasing as mills invested in more equipment that could process smaller timber. A softening log export market, furthermore, resulted in a greater portion of the harvest becoming available to domestic mills.

Washington state production trends are important as western Oregon mills currently compete for Washington logs. Lumber production in western Washington did not decline as sharply as it did in Oregon,

Figure 3-32. Log Consumption By Product In Western Oregon

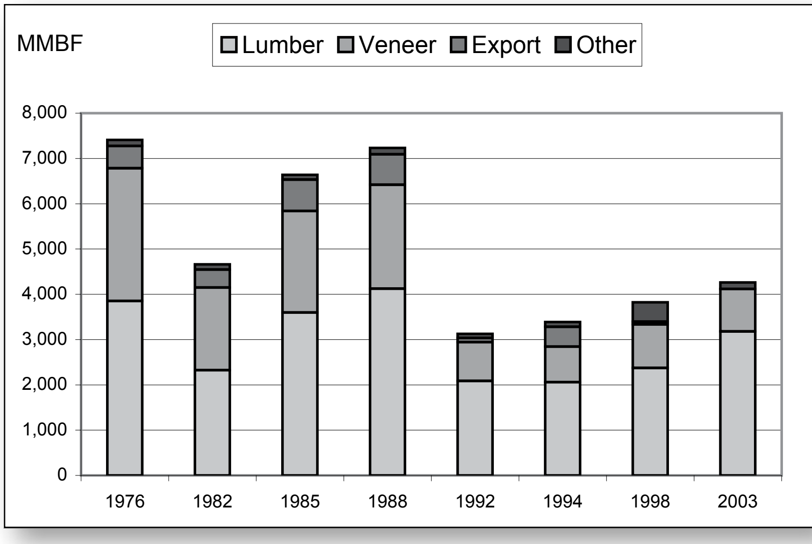
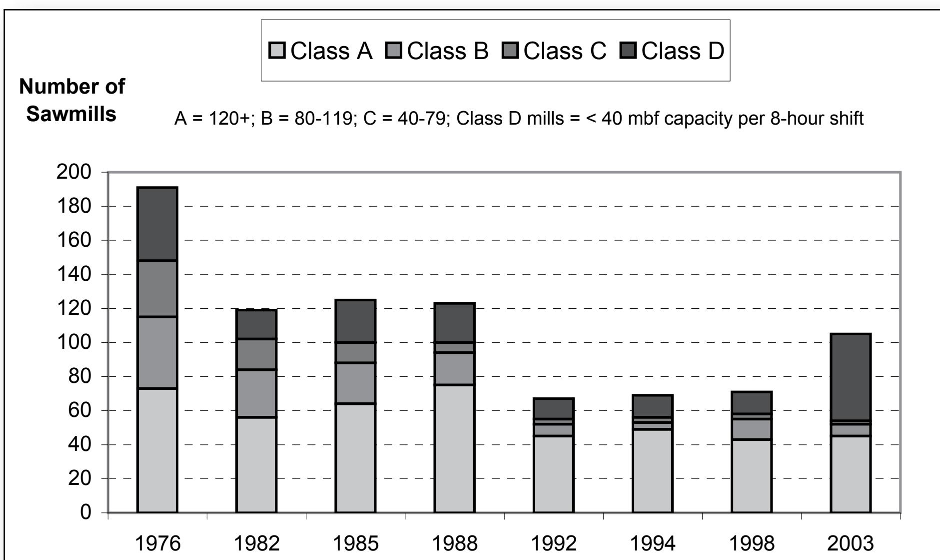


Figure 3-33. Western Oregon Sawmills By Capacity



primarily because much of the western Washington timber was exported as logs rather than sawn into lumber. The reduction in log exports made more timber available to sawmills in both states. Since 1999, western Washington mills have added 1.0 bbf of net new lumber production capacity (Ehinger 2005) and production has been increasing steadily.

Western plywood production began a downward trend in the early 1990s. See *Figure 3-35 (Western plywood production)*. At 3.04 billion square feet for 2005, Oregon plywood production is about 58% below the 1970 to 1990 average.

The reduction in federal timber harvest, which is a source of large clear veneer logs, created upward pressure on plywood prices. At the same time, panel manufacturers in the Midwest, the southern United States, and Canada were adding capacity to produce less expensive oriented strand board (OSB) panels from low cost

Figure 3-34. Lumber Production In Oregon And Washington

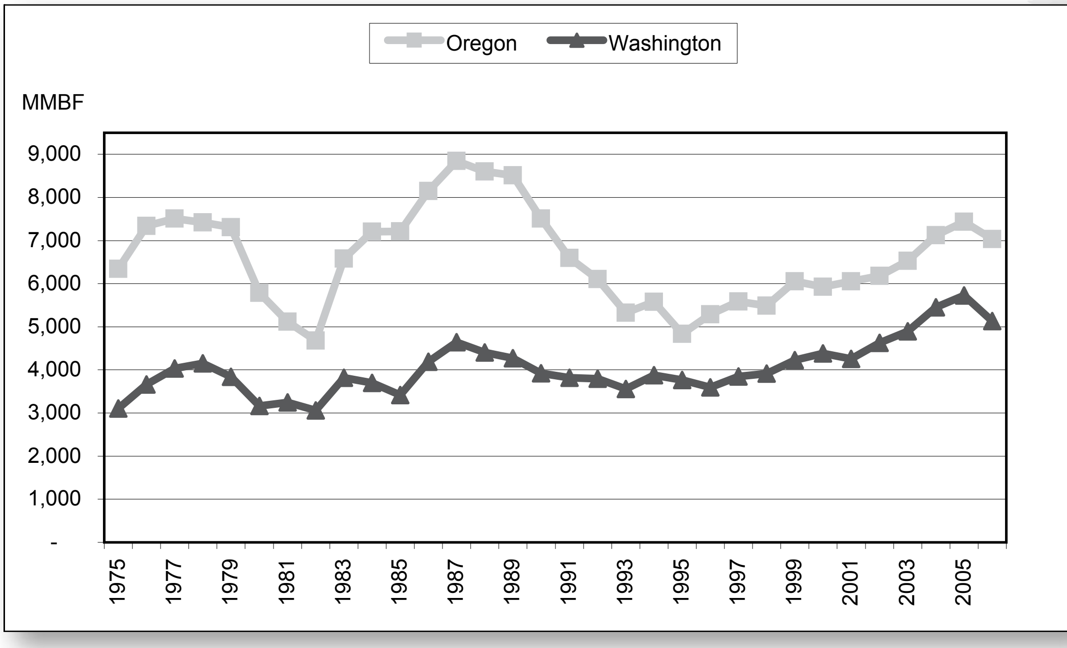
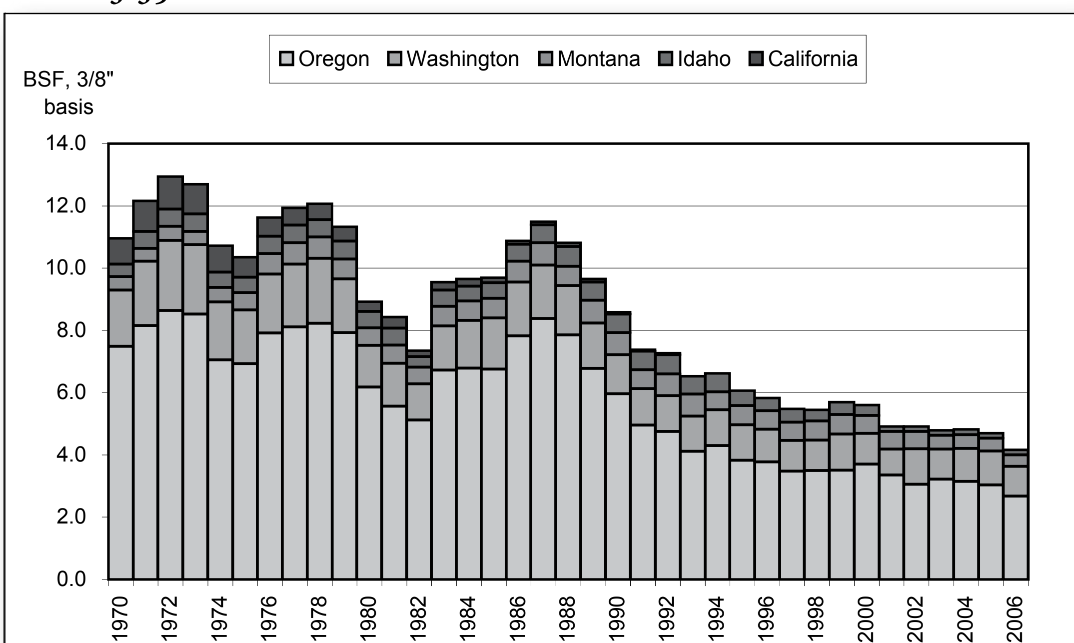


Figure 3-35. Western Plywood Production



timber. U.S. Forest Service projections suggest that plywood will lose additional market share to OSB. *Figure 3-36 (U.S. panel production)* shows U.S. plywood production at just half of current levels by 2020.

Figure 3-37 (Log exports from western United States ports) shows the volume and price of logs exported from western United States ports. Currently, about 800 mmbf of logs are exported, which is down 80% from the 4.4 bbf peak in 1989. The Asian financial crisis, the weakening of the Yen against the United States dollar, a shift toward Asian log suppliers, and stronger U.S. domestic log markets account for most of the change.

Figure 3-36. U.S. Panel Production

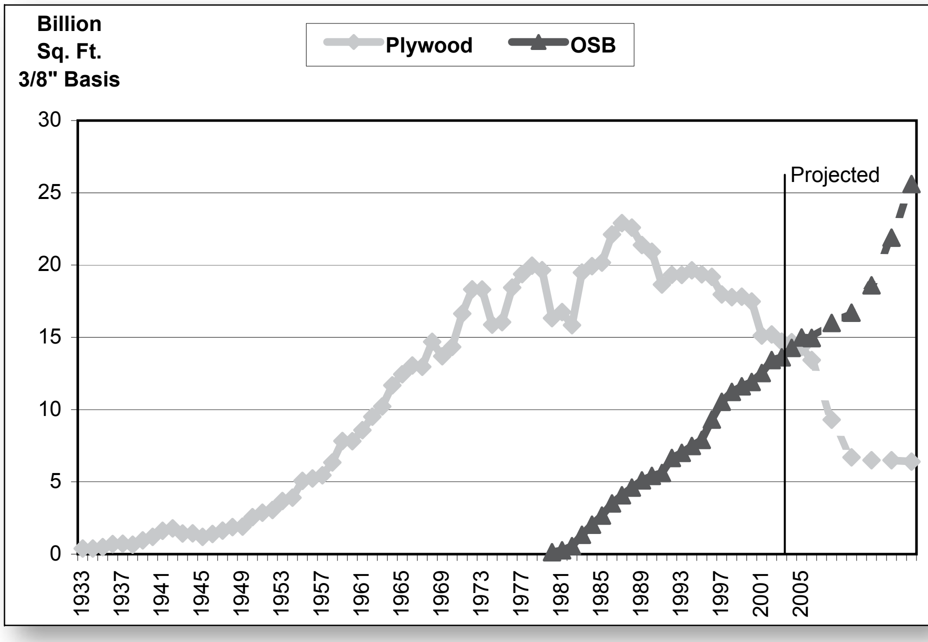
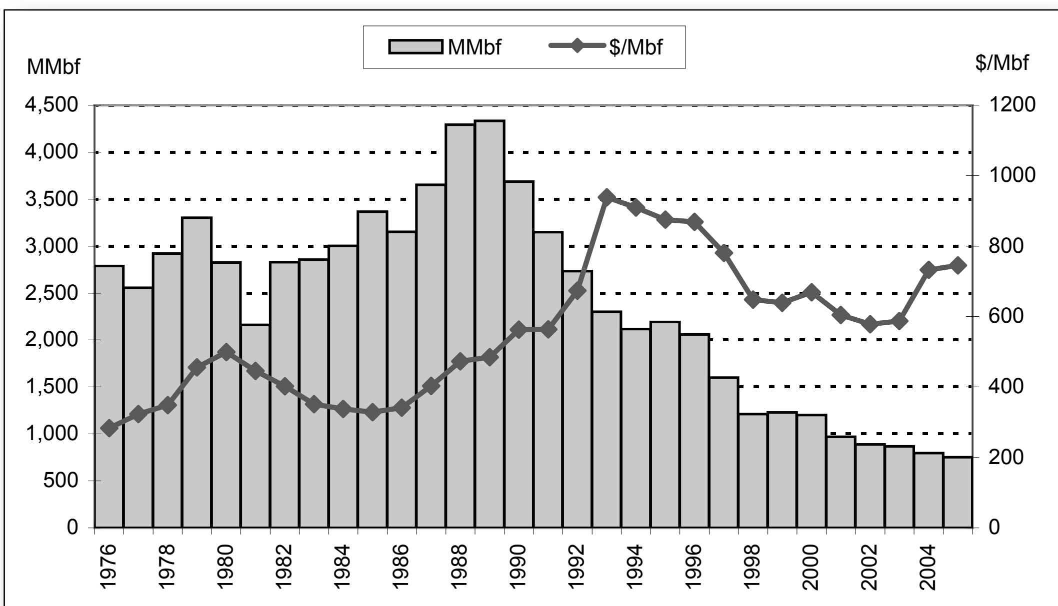


Figure 3-37. Log Exports From Western United States Ports



The BLM conducted a meeting in August 2008 with log buyers and timber industry representatives to gather information. There was a common concern that current western Oregon wood product production levels cannot be maintained without additional timber supplies. Current production relies on log imports from Canada and western Washington. Both of those supply sources are vulnerable to competition from new mills in Washington and to export restrictions in Canada (Rasmussen, pers. comm. 2006).

Changes in the level of employment in Oregon's forest product industry are indicated by U.S. Department of Commerce employment statistics, which tally forest products sector jobs into four sectors:

- forestry and logging (NAICS 113)
- forestry support activities (NAICS 1153)
- wood products manufacturing (NAICS 321)
- paper manufacturing (NAICS 322)

North American Industry Classification System (NAICS)

System used by business and government to classify and measure economic activity.

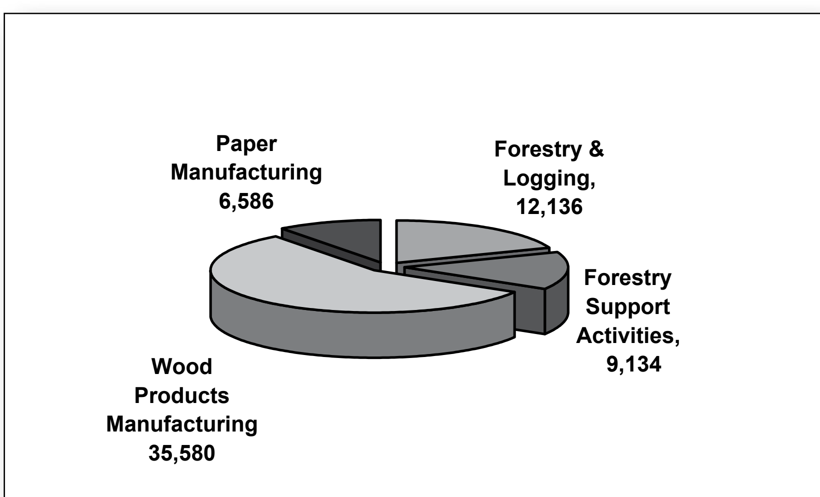
These sectors include both primary and secondary manufacturers along with the infrastructure (forestry workers, loggers, etc.) required to manage the growing and harvesting of timber crops. (Note: The previous discussion of the economy of the wood products sector in western Oregon is based on research conducted for this EIS, and resulted in adjustments to the U.S. Department of Commerce figures. However, such adjustments are not available for previous periods. The U.S. Department of Commerce data, therefore, are used for the purpose of analyzing historic employment trends.)

Primary manufacturing includes logging, processing of logs into lumber and other wood products, processing wood residues from timber-processing plants into such outputs as paper or electricity, and managing of private sector forest services. The secondary industry includes firms processing outputs from the primary industry. These outputs may come from mills in Oregon or elsewhere. Secondary products include prefabricated buildings, molding, millwork and cut stock, doors, windows, laminated veneer lumber, and other products (Brandt et al. 2006).

Employment in Oregon in these four sectors totaled nearly 63,400 workers in 2005 (U.S. Department of Commerce 2006). Wood products manufacturing represents the largest sector, which comprise 56% of the jobs. See *Figure 3-38 (Employment in Oregon's forest products sector [2005])*.

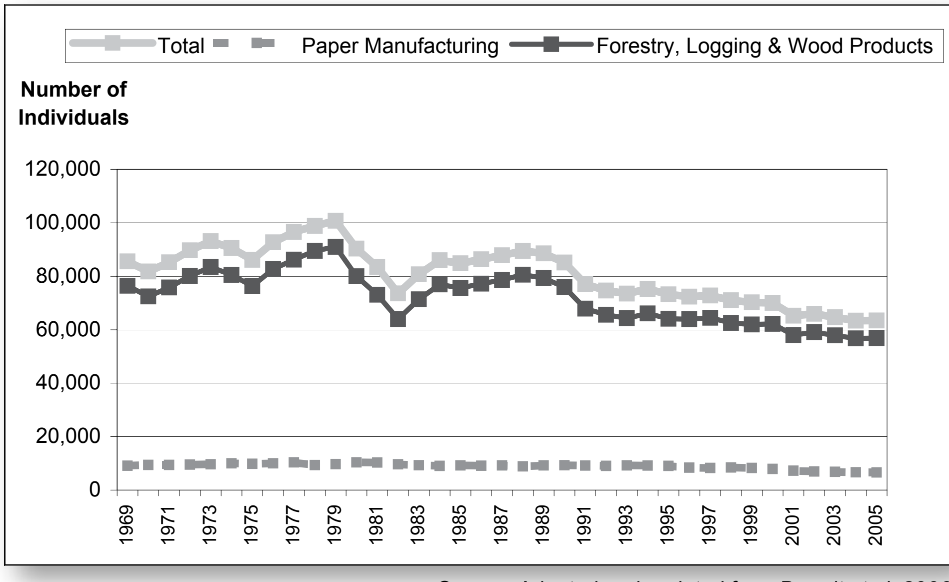
Employment in 2005 was down 37% from peak employment of more than 100,700 workers in 1979. See *Figure 3-39 (Employment in Oregon's forest products industry [1969 to 2005])*. The decline in forest sector employment is due to the reduction in total timber harvest and technological change (Brandt et al. 2006, USDA USFS 2006a). Oregon's forest sector job loss might have been greater, but was offset to some degree by a concurrent decrease in log exports, an increase in log imports from surrounding states, and an expansion of secondary wood products manufacturing (Brandt et al. 2006).

Figure 3-38. Employment In Oregon's Forest Products Sector (2005)



Source: USDC 2006

Figure 3-39. Employment In Oregon's Forest Products Industry (1969 To 2005)



Source: Adapted and updated from Brandt et al. 2006

Forest industry employment trends for the coastal Pacific Northwest were recently studied as part of a 10-year review of the implementation of the Northwest Forest Plan. Across the region included in the Northwest Forest Plan—western Oregon, western Washington, and northern California—it has been estimated that 45,000 direct, indirect, and induced jobs were affected by reduced timber harvesting between 1990 and 2000. Of that, 30,000 were direct jobs including 7,500 in the logging industry and 22,500 in other primary wood industries.

About 19,000 jobs were lost in the region between 1990 and 1994 as the volume of timber harvested but not exported fell from 10.1 bbf to 7.4 bbf. An additional 11,000 direct job losses occurred between 1994 and 2000, even though the volume of wood available for manufacture stabilized and even rose slightly. These latter job loses are attributable largely to additional industry restructuring and changes in technology (USDA USFS 2006a).

Technological change has also impacted employment in the logging industry. In Oregon, for example, increased mechanization of harvest operations has increased annual productivity per worker from 544,000 board feet harvested per worker in 1990 to 592,000 board feet per worker in 2004, which is an 8% increase (Rooney 2006).

Oregon employment in the solid-wood industry was hit disproportionately hard compared to Washington and California. Oregon represented approximately 50% of solid-wood employment in the region. However, about 61% of the decline in jobs occurred in Oregon. The reverse is true of paper manufacturing—Oregon represented 30% of primary pulp and paper industry employment during the 1990s, but only 21% of the job losses in that sector (USDA USFS 2006a).

In addition to timber harvest, the western Oregon BLM budget contributes to local economic activity. The western Oregon BLM budget for 1995 to 2005 is summarized in *Figure 3-40 (Western Oregon BLM budget for selected fiscal years)*. The largest expenditure of funds, representing 64% of the current budget, is for the O&C land grants and management of lands and resources programs. These programs provide for forest management, reforestation and forest development, rangeland, recreation, soil, water and air, and wildlife and fish habitat on the O&C grant lands and public domain lands in western Oregon.

The wildland fire management program, which is 18% of the current budget, provides for fire preparedness, fire suppression, and other operations. Funding for hazardous fuels reduction and burned area rehabilitation is included in the latter category. Other appropriations represent another 18% of the total budget. This includes funding for acquisitions, construction projects, and other needs.

Over the past few years, the BLM budget for western Oregon has been relatively constant (averaging about $141 million annually). See *Figure 3-41 (BLM budget by district and state office for selected fiscal years)*.

In addition to employment in the forest products industry, the management of the BLM-administered lands in western Oregon requires employment of a staff of natural resource specialists, managers, and administrative personnel. *Figure 3-42 (Full-time equivalent positions by BLM district and state office)* shows that BLM staffing has been relatively constant. The BLM's Oregon/Washington state office in Portland provides administrative oversight and support for all BLM-administered lands in Oregon and Washington. The full-time employee data shown on *Figure 3-42* includes all positions at the BLM state office.

Figure 3-43 (Number of BLM full-time equivalent positions by county) shows the number of BLM full-time equivalent positions by the county in which the position is based for the fiscal year 2004. The jobs shown for Multnomah County are in the BLM's Oregon/Washington state office in Portland.

Figure 3-40. Western Oregon BLM Budget For Selected Fiscal Years

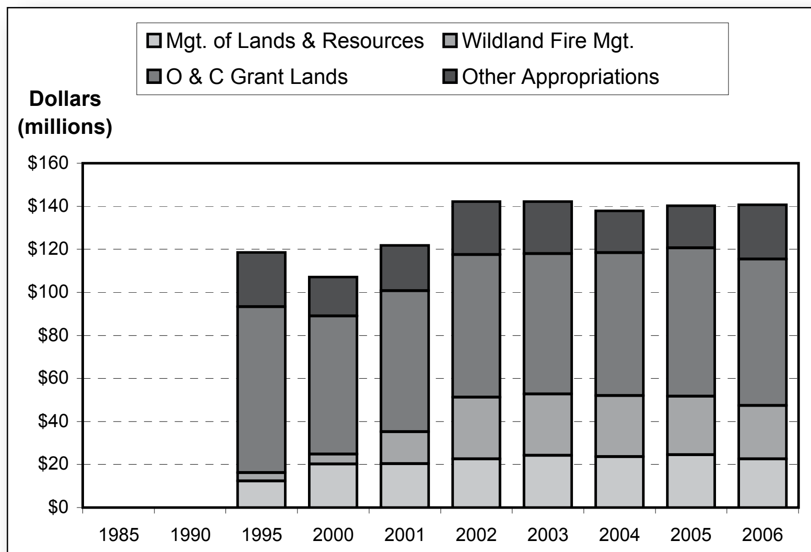


Figure 3-41. The BLM Budget By District And State Office For Selected Fiscal Years

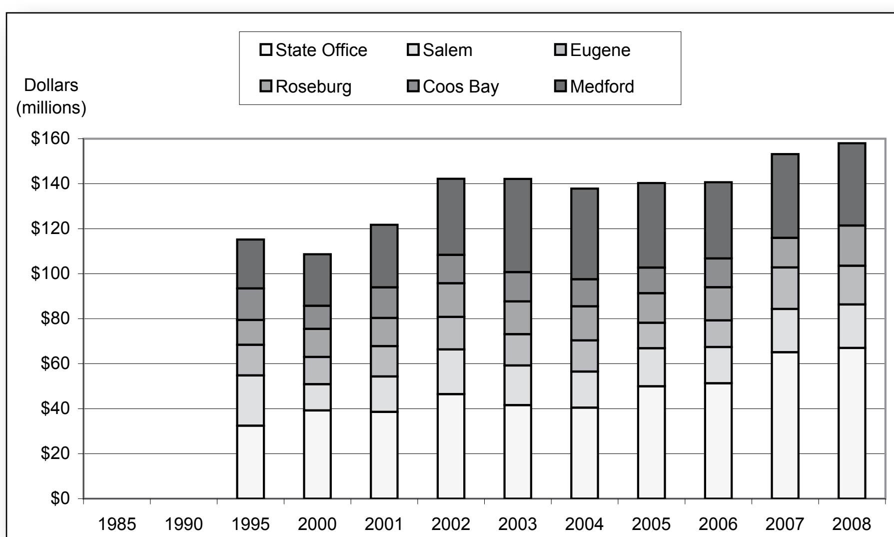


Figure 3-42. Full-Time Equivalent Positions By BLM District And State Office

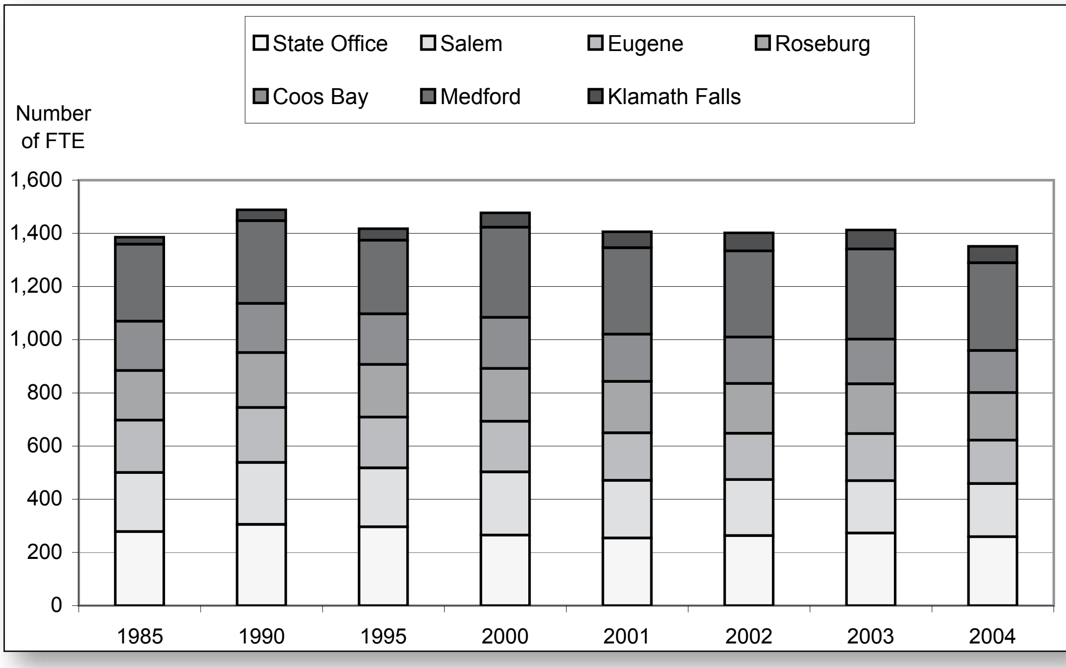
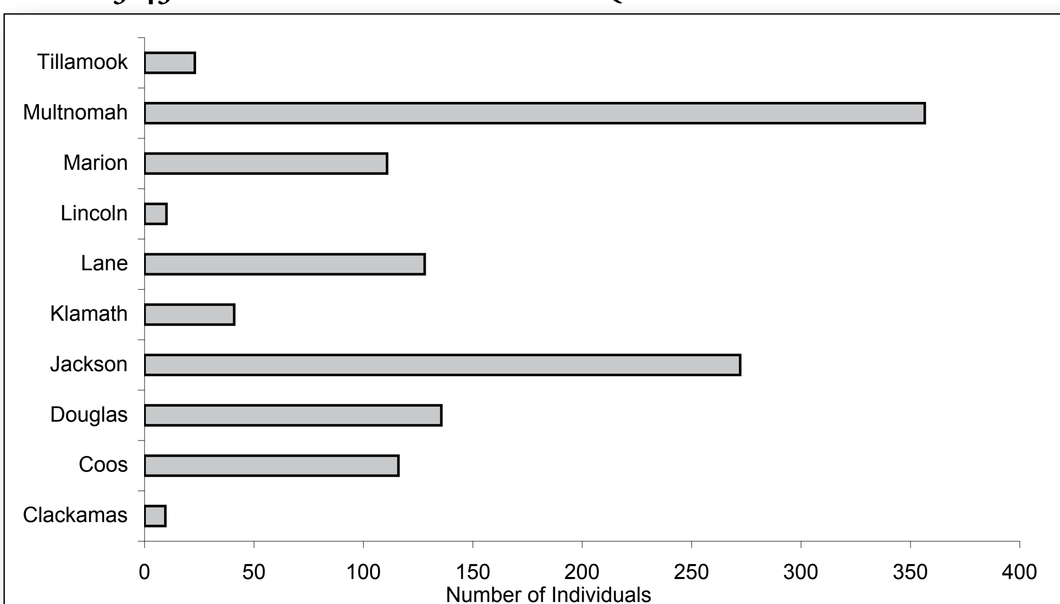


Figure 3-43. Number Of BLM Full-Time Equivalent Positions By County



Timber

Key Points

- Recent inventories indicate an increase in the standing inventory on BLM-administered lands.
- The BLM-administered lands contain a substantial amount of large, high-grade logs in older stands (i.e., mature and structurally complex forests).
- The majority of the younger stands (i.e., stand establishment and young forests) within the planning area have resulted from harvesting and the application of intensive forestry practices on the reforested acres.
- Stands with a management history comprise approximately 46% of the BLM forested lands that are classified as suitable for a sustained harvest of timber.

Forests on BLM-administered lands can be characterized by their standing volume and their acres of existing age classes. The current standing volume is shown in *Table 3-16 (Current standing volume and acres of forested lands)*

The volume figures in *Table 3-16* are based on current vegetative survey plots. See *Appendix R - Vegetation Modeling* for further information on the continuous vegetative survey inventory system. The Eastern Management Lands of the Klamath Falls Resource Area are not included in the above inventory. Acres are rounded to nearest thousands.

See *Table 3-17 (Historic timber volume estimates)* for previous estimates of the volumes on portions of the BLM-administered lands. These figures are the best estimate of merchantable volume for the acreage and include definitions of use at the time period indicated. Note that the definitions of use changed over time.

The large increase between the 1990 and the current timber volumes is mostly explained by the difference in acres included in the determination of volume. In addition to the difference in acres, there is the increase in growth and volume resulting from the increase in faster growing, younger stands, and harvest levels below the annual productive capacity. Although these inventories were conducted using different inventory systems, different assumptions, and different portions of the BLM-administered lands, the inventories provide the basis for broad comparisons and general trends. These inventories show that overall growth on the BLM-administered lands has kept pace with harvesting, and that there is no evidence that cutting has exceeded growth.

Table 3-16. Current Standing Volume And Acres Of Forested Land

BLM Districts	Forested Lands[a] (acres)	Standing Volume (bbf[b])
Salem	365,000	16.8
Eugene	296,000	13.4
Roseburg	399,000	15.5
Coos Bay	302,000	12.8
Medford	788,000	14.8
Klamath Falls Resource Area of the Lakeview District (west)	47,000	--[c]
Totals	**2,197,000**	**73.3**

[a] See Glossary for definition.
[b] Billion board feet.
[c] Included in the Medford District inventory.

Table 3-17. Historic Timber Volume Estimates

Historic Estimates	1940[b]	1960[c]	1970[d]	1980[e]	1990[e]
Timber volume (mbf[a])	46,000,000	49,059,900	50,308,000	46,856,721	49,865,870
Acres	2,165,900	2,145,072	2,391,172	1,771,657	1,794,420
Diameter at breast height (dbh)	≥ 16 inches	≥ 11 inches	≥ 11 inches	≥ 7 inches	≥ 7 inches

[a]Thousand board feet.
[b]Andrews and Colvin 1940
[c]USDI BLM 1960
[d]USDI BLM 1970
[e]USDI BLM 1991

In addition to the total standing volume, the forest can be characterized by the acres of existing age classes. The age class distribution is shown in *Figure 3-44 (Acres of forested lands within the planning area for 2006 by 10-year age class)*.

Figure 3-44 does not include Eastern Management Lands of the Klamath Falls Resource Area (of the Lakeview District) since no starting age class was assigned to these acres. The Salem, Eugene, Roseburg, Coos Bay, and Medford Districts contain predominately Douglas fir by volume. Historical volume harvested by species shows that for most districts, forest stands average about 80% of their volume harvested from Douglas fir. See *Appendix E - Timber*. The Klamath Falls Resource Area of the Lakeview District has white fir as the primary commercial species along with ponderosa pine.

The inventory systems that BLM maintains are not designed to record log quality by level of expected size and grades. Therefore, only general information is available. Log sizes and grades are highly variable depending on the stand type that is harvested. This is particularly true in older stands where substantial peeler grade logs might be expected. Some general information can be derived from examining the historical level of peeler versus sawlogs as a percent of volume in past harvesting actions. This historic information can then be used to predict future levels from different types of stands using the structural stage of stands as a classification with anticipated levels of peeler grade for each structural stage. See *Appendix*

Figure 3-44. Acres Of Forested Lands Within The Planning Area For 2006 By 10-Year Age Class

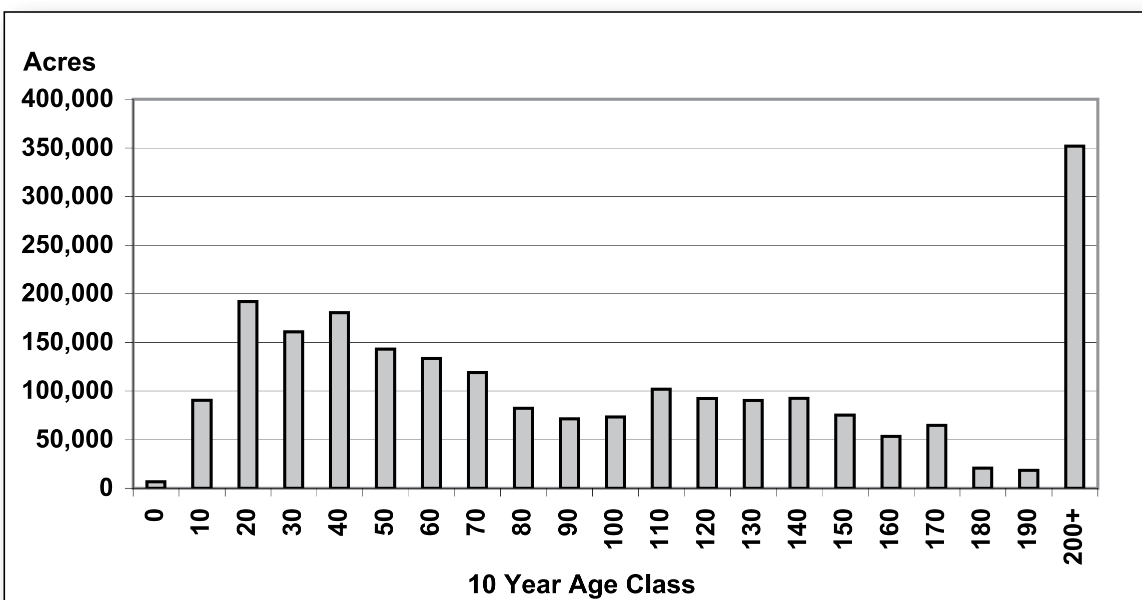
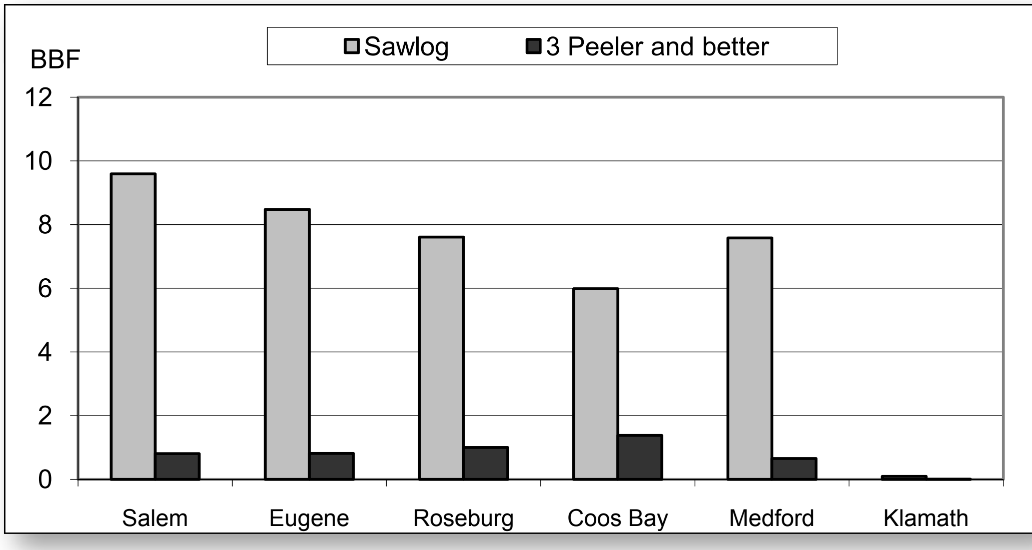


Figure 3-45. Peeler Versus Sawlog Grade Of Douglas Fir Logs By District Within The Planning Area



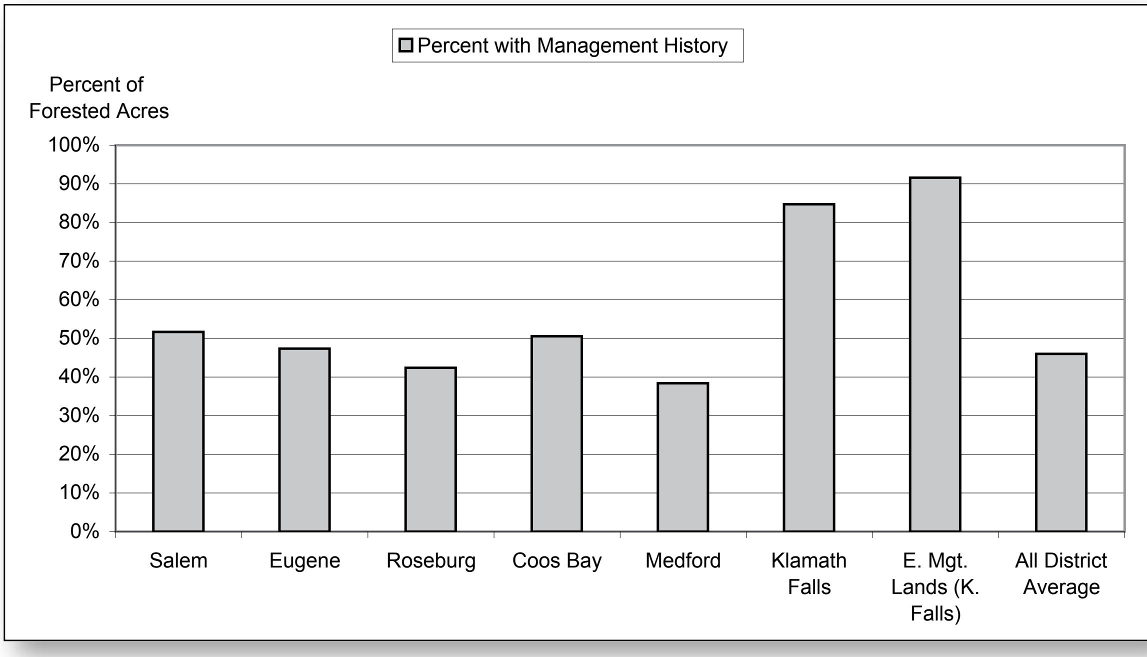
E - Timber. See *Figure 3-45 (Peeler versus sawlog grade of Douglas fir logs by district within the planning area)* for the level of anticipated peeler grades of Douglas fir on BLM-administered lands suitable for timber harvesting and not part of the National Landscape Conservation System.

Existing stand condition is a codified classification system for inventory that separates stands into classes with similar management histories and conditions. This system is used to predict future growth and development trajectories of stands. The future growth that is anticipated from stands can be affected by past management history and current stand density, for the following reasons:

- Managed stands are expected to have considerably higher volumes of timber per acre than natural stands of similar age due to more consistent spacing, changes in species composition, and use of improved genetic stock during reforestation.
- Young stands resulting from regeneration harvesting where a component of the original stand is left as a legacy often have lower growth rates for the understory component of those stands.

See *Figure 3-46 (Percent of BLM lands within the planning area with management history that are suitable for sustained timber production)* for the percentage of BLM-administered lands within the planning area that have a management history suitable for sustained timber production. In general, the BLM-administered lands have had a substantial amount of past management from either regeneration harvesting or thinning.

Figure 3-46. Percent Of BLM Lands Within The Planning Area With Management History That Are Suitable For Sustained Timber Production



Special Forest Products

Key Points

- Over the past seven years, 91 forest products in 10 categories were harvested or collected on BLM lands.
- Wood products (including firewood), mushrooms, and floral and greenery are consistently the three special forest product categories of highest interest, based on the number of permits sold and revenue collected.
- Collectors normally focus harvesting efforts in areas where the commercial forest product is abundant and it is easy and economical to harvest.

Special forest products encompass a wide variety of wood, plant and fungi resources. These products are harvested, gathered, or collected for commercial or personal uses and have various social, economical, or spiritual values. American Indians, wildcrafters, harvesters, and woodcrafters are among those who regularly collect and harvest products throughout the year.

Public lands managed by BLM provide broad opportunities for special forest product collection and harvest. Even though there are no designated BLM management areas or activities designed specifically to manage special forest products, a wide variety of special forest products is available. Common examples include conifer boughs, Christmas trees, mushrooms, edibles and medicinals, floral and greenery, mosses and lichens, ornamentals, seed and cones, tree burls, transplants and wood products including posts, poles, firewood, shakes, and rails.

Special forest products are generally collected or harvested from common plants and fungi associated with conifer forests, hardwood, shrublands, and grassland plant communities throughout the Pacific Northwest, including BLM-administered lands. The distribution and abundance of special forest products vary within the planning area and by BLM district. Many special forest products such as firewood, Christmas trees, evergreen boughs, huckleberries, and some mushroom species have broad ecological amplitude and are spatially widespread, whereas others require a specific plant community, habitat, or even a specific host. In addition to spatial variance, there is temporal variability. For example, the abundance of mushrooms and berries vary considerably from year-to-year and by region, based on site conditions and yearly climate patterns.

Commercial, personal, and incidental uses are distinct categories for public users on BLM-administered lands, although the boundaries between personal and incidental use blend together. Commercial use of special forest products requires a permit and harvesters generally search for and harvest high value products from patches in a systematic and thorough method for high resale value. Many individuals enjoy harvesting or collecting special forest products for their own personal use and tend to harvest smaller quantities, searching less systematically and less thoroughly and at a smaller spatial scale. Some personal use special forest products require permits, such as Christmas trees and firewood. Incidental use includes collection and gathering of berries and mushrooms for immediate use and firewood for campfires (USDI BLM 1996). Although most commercial harvesters in the Pacific Northwest do not rely on special forest products for their sole source of income, these products do provide important supplemental or seasonal sources of income that contribute to household economies (Charnley 2006).

Recently the interest, types, and demand of special forest products have increased as the pharmaceutical industry, restaurants, entrepreneurs and others have developed new products and established new distribution and markets, both nationally and internationally, especially for herbal and floral products, edibles and specialty wood and craft products (Chamberlain et al. 1998, Jones et al. 2002).

The BLM organizes the 91 special forest products of public interest on BLM-administered lands into 10 categories. The product categories are generally similar to those discussed in other studies (McLain and Jones 2005, Vance et al. 2001, Jones et al. 2002). The past 7 years of BLM permit data, although limited in nature, provides a year-by-year summary of products and harvest amounts allowed by BLM districts. The data also provides the basis for a retrospective analysis of trends and demand for special forest products. The actual number of products and quantities harvested is unknown, but is likely larger than reported in permits, according to the limited amount of studies conducted in the Pacific Northwest (Jones and Lynch 2007).

Below are general descriptions of the 10 common special forest product categories and, in parenthesis, the number of different products in each category reported on BLM permits. Also included are examples of forest and plant communities and species from which these products are typically harvested. See *Table 3-18 (Special forest products by category)* for a complete list of the special forest products.

Boughs (12). The typical species from which boughs are collected are western red cedar and incense cedars, true firs, pines, juniper, and Douglas fir. Conifer boughs are used by individuals and the floral industry primarily during the Christmas season for seasonal decorations. Boughs are generally collected from young or mature forest stands. Western red cedars occur in riparian zones.

Burls (2). Burls are used for woodcrafting in manufacturing specialty items, such as clocks, tables, veneers, and other decorative items. Burls are found on either the bole (cluster burls) or on the stumps (stump burls) of trees. Burls are harvested from hardwood trees in mature and structurally complex forest stands of hardwood and mixed conifer and hardwoods forest types. Common species include maples, madrone, and myrtlewood.

Christmas trees (4). Christmas trees are sold as seasonal decorations for personal or commercial use. Christmas trees are harvested from young conifer plantations.

Edibles and Medicinals (11). Huckleberries are collected from mature forest stands, and elderberries are collected from stand establishment and young forest stands. Cascara and yew bark is peeled from the bole of trees and used to make laxatives and tonics. Since the majority of Cascara and yew is confined to streams or seasonally wet areas, their harvest is typically limited.

Floral and greenery (9). Floral and greenery products are used in decorative arrangements. Common plants include salal, evergreen huckleberry, sword fern, and beargrass that generally occur in the understories of conifer forests. Numerous floral and greenery products are harvested from upland areas in conifer forest types in mature and structurally complex forests stands. Manzanita is harvested for decorative greens and bird perches and occurs in woodland and shrubland communities, mostly in southern Oregon.

Mosses (3). Mosses are generally collected in the Coast Range and largely used in the florist/horticulture trade.

Mushrooms (12). Mushrooms that are commonly harvested include golden chanterelle, winter chanterelle (yellow foot), morels, matsutake, shaggy parasols, coral mushrooms, truffles, and hedgehogs. Each mushroom is associated with one or more specific hosts in forested conifer or mixed hardwood stands. Mushrooms are generally harvested from hardwood and conifer forest communities of mature and structurally complex forests stands. Morels appear to increase in abundance after disturbances such as timber harvest, insect infestations, and often immediately after a wildfire (Pilz et al 2007).

Seeds and cones (5). Cones are collected commercially for seed or harvested for ornamental purposes from mature and structurally complex forests.

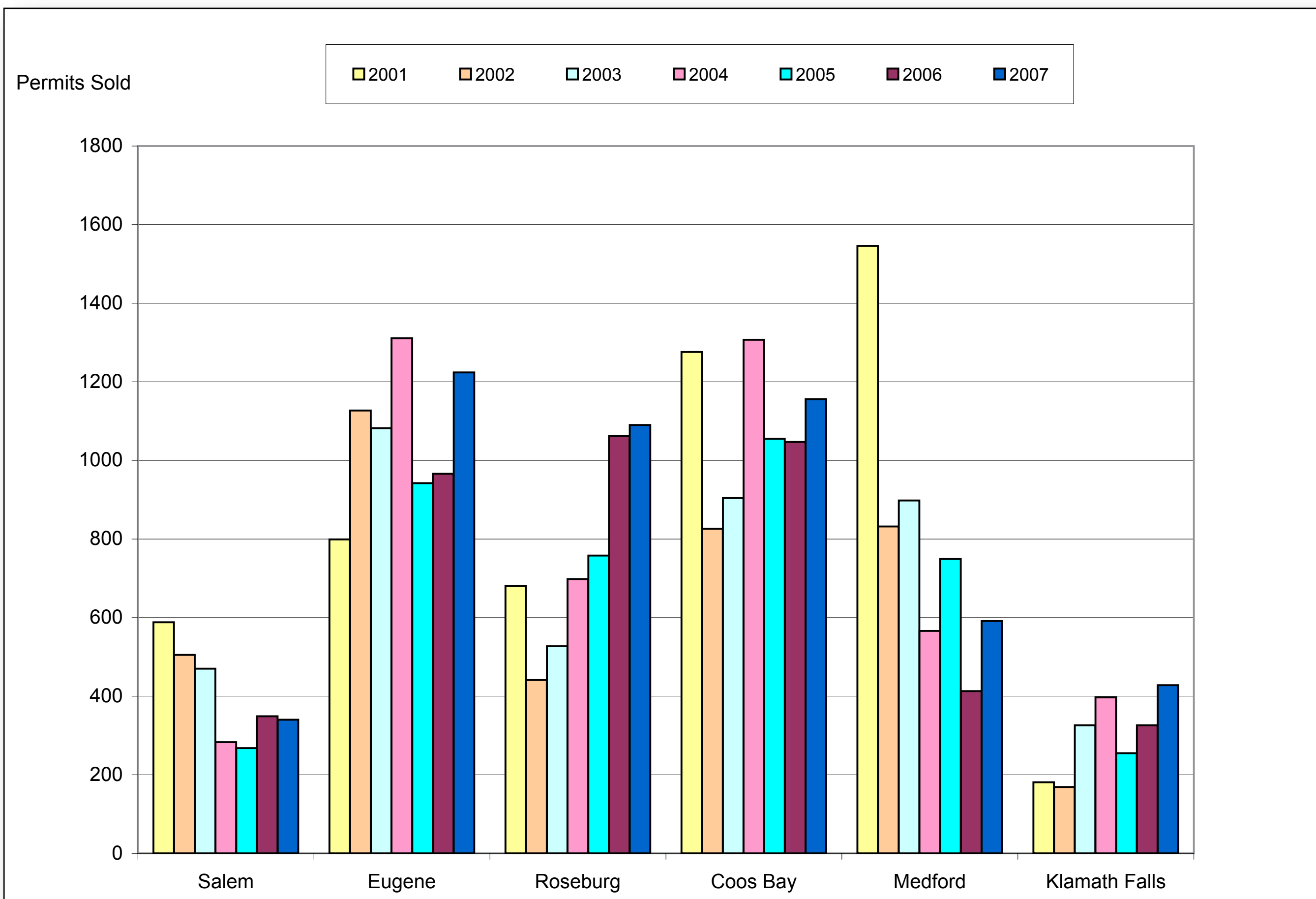
Transplants (14). Transplants include various native ground covers or shrubs, forbs, and tree species including root stock for medicinal purposes. These plant species are found in riparian and upland areas in all plant communities.

Wood products (19). Wood products include firewood, posts and poles, rails, cedar shake bolts, biomass, or pulp wood. Poles can be any length, but no more than 6 inches in diameter on the large end. Wood products are harvested from young, mature, and structurally complex forests. Wood products also include ornamental wood species such as red alder, big leaf maple, madrone, vine maple, and willows. These are used to construct furniture and cabinetry, veneers, and bow staves. Ornamental wood species also include cut sticks, generally red alder, or other hardwood species that measure less than 4 inches in diameter at the large end. Ornamental wood species are harvested from all forest communities, but generally from mature and structurally complex forests.

The types of special forest products vary across the planning area and their abundance can vary from year-to-year. The location of the commercial harvesting sites and the type of product and site conditions may change from year-to-year. These differences are reflected in the forest product permits issued by BLM district, although permit record data is inconsistent and may obscure other variables (USDI BLM 2007a). See *Figure 3-47 (Trend in the total number of permits issued over seven years by BLM district)*.

The total number of special forest product permits varies by approximately 20% between any two-year interval. The Eugene, Coos Bay and Roseburg districts sell the highest number of permits yearly. For 2007,

Figure 3-47. Trend In The Total Number Of Permits Issued Over Seven Years By BLM District



the combined total of permits for these three districts was approximately 3,500. (Note: The number of issued permits reported for the Medford District shows a decline of more than half over seven years, which is likely not an actual drop in the number of permits issued, but rather reflective of a change in accounting procedures.)

Permits for commercial use and some types of personal use for special forest products may include restrictions to help meet ecological and renewable resource standards and to protect other sensitive resource values. Permits may restrict the type of species, quantity harvested, harvest or collection method, location, access, and season.

Over-harvesting of special forest products is not known to occur on BLM administered lands to the extent that the amount of harvesting creates concern for sustainability of the product or species at either small or large spatial scales. Detailed special forest product specific studies and analysis have been conducted where concerns for over-harvesting and long-term sustainability existed in the past, such as moss harvesting in Eugene (Muir 2004) and yew wood harvesting (USDA USDI 1993a). However, only a few studies address the relationship between species ecology, abundance, and harvest patterns (Jones et al. 2007). Field inventories of special forest products that include distribution and abundance, harvest areas, and actual harvest amounts on BLM-administered lands are lacking. Although this information is lacking, the public regularly expresses concern about the apparent over-harvesting of popular products such as medicinals, mushrooms, mosses, and edibles. Whenever these anecdotal situations are validated through field investigations, harvesting permits are modified, discontinued, or issued for other areas.

Natural disturbances (e.g., wildfire, storms, and floods) affect the types and productivity of special forest products over time. Wildfires change vegetative and structural components of the landscape by consuming plant biomass, but can promote reproductive responses of some special forest products. For example, morel mushrooms respond quickly after wildfires. In other instances wildfires create conditions, in subsequent years that can be favorable for other vegetative products such as willow whips, beargrass, other floral and greenery products and medicinal forbs. Alternatively, wildfires diminish or eliminate the value of such special forest wood products as boughs, Christmas trees, firewood, and poles.

Floods alter the vegetation and special forest products in riparian plant communities. Although initially floods may appear to destroy the existing riparian vegetation, the changed conditions induce vigorous resprouting and reseeding of shrubs and forbs, and within a few years provide a new potential crop of alder, willow, and forb products along streams and wetland areas.

Timber harvesting changes the forest condition and, depending on the product, increases or decreases collecting and harvesting opportunities and quality. Forest stand characteristics such as species composition, age, distribution of age classes, growth rate, and density influence the type, productivity, and quality of special forest products. The road network (particularly forest roads that access patches of special forest products) and land use restrictions influence the location, availability, type of product, and amount for harvest.

Timber harvesting and associated fuels reduction treatments routinely alter forest stand structure and forest floor conditions. These two activities affect a larger area than all other planned activities combined. The method of timber harvesting has a particularly large influence on abundance and value of special forest products (Cocksedge 2006). Ground-based harvesting operations disturb more area with greater levels of disturbance to the understory vegetation (and associated special forest products, such as mushrooms and floral and greenery) than cable operations. Helicopter harvesting disturbs the least amount of the understory vegetation. Timber management activities, however, provide road access to harvest areas that would otherwise not be available.

Regeneration timber harvesting reduces suitable conditions for numerous special forest products, while at the same time providing abundant biomass, fiber, and firewood as commercial by-products. Timber harvest reduces suitable conditions for chanterelles, which do not fruit for the first 15 years after a regeneration harvest (Pilz et al. 2003), and matsutakes that rarely fruit in stands under 40 years of age (Vance et al. 2001). Some commercial floral and greenery products (e.g. moss, and boughs) may be lost for one or more decades from regeneration harvest units (Muir 2006). Commercial thinning generally provides conditions where understory greenery products can persist, and their commercial value may even improve within a short period of time. Abundance, availability and quality of many understory greenery products (for example, beargrass and salal) can increase within a short time after thinning harvests due to a rise in the light availability, whereas others (such as morels) increase in abundance from disturbances (Pilz et al. 2007).

Silvicultural treatments conducted after timber harvest generally cut evergreen vegetation and hardwoods. These activities create large amounts of impenetrable debris, retarding development of floral and greenery products and reducing their quality for years. At the same time, the quality of Christmas trees increases.

Fuels treatments target the pole component of forest stands, as well as the hardwood and shrub understory. Fuels treatments include broadcast burning, and manual and mechanical treatments. Broadcast burning disposes logging slash and other forest floor fuels; burns wood products, floral and greenery, and medicinals; and degrades product quality. Manual treatments have less impact on understory vegetation, the forest floor, and associated special forest products than mechanical treatments (such as slash-buster operations) due to the size of the equipment. Opportunities for pole harvest can be created in coordination with fuel reduction projects. Flora and greenery products and mushrooms generally respond quicker to manual operations than mechanical operations because manual operations are more selective and less damaging.

Permit sales provided revenues averaging over $200,000 per year and totaling nearly $1.5 million over the past seven years. Revenue from wood products exceeded that for all other special forest products combined. The other three special forest product categories that have provided high revenues over the years are floral and greenery, mushrooms, and boughs.

See *Table 3-18 (Special forest products by category)* for the 10 categories of 91 specific forest products found on BLM-administered land within the planning area.

Table 3-18. Special Forest Products By Category

Category	Special Forest Products		
Boughs (coniferous)	Douglas fir	Noble fir	Sugar pine
	Grand fir	Pacific silver fir	Western hemlock
	Incense cedar	Port Orford cedar	Western red cedar
	Juniper	Shasta red fir	White fir
Burls and miscellaneous	Big leaf maple		
	Pacific madrone		
Christmas trees	Douglas fir	Noble fir	
	Grand fir	Shasta red fir	
Edibles and medicinals	Bay leaves	Oregon grape root	Prince's pine
	Blue Huckleberries	Pacific yew bark	Quinine Conk
	Cascara bark	Pacific yew boughs	St. John's wart
	Elderberries		
Floral and greenery	Beargrass	Joshua Tree	Sword fern
	Bracken fern	Manzanita	
	Cactus species	Oregon grape	
	Huckleberry	Salal sp.	
Mosses (bryophytes)	Lichen sp.		
	Sheet moss		
	Tree moss		
Mushrooms (fungi)	Black picoa	Horn of plenty	Shaggy parasol
	Cauliflower	King bolete	Spreading hedgehog
	Coral tooth	Matsutake sp.	White chanterelle
	Golden chanterelle	Morel sp.	Yellowfoot mushroom
Seeds and seed cones	Douglas fir	Sugar pine	
	Noble fir	Western hemlock	
	Ponderosa pine		
Transplants	Bleeding heart	Oregon grape	Western hemlock
	Bracken Fern	Rhododendron	Western red cedar
	Douglas fir	Sword fern	Wild iris
	Huckleberry	Vine maple	Willow sp.
	Incense cedar		
	Mountain mahogany		
Wood products	Alder stick (large)	Grape stakes	Pulpwood
	Arrow stock	Hobby wood	Rails (split)
	Bolts and shakes	Large poles	Round wood
	Corral poles	Marginal logs	Small poles
	Fence stays	Pitchwood	Tepee poles (4 inches x 16 feet)
	Fuel wood	Posts (corner)	
		Posts (line)	Whip stock (miscellaneous)

Botany

Key Points

- Rare plants and fungi are not evenly distributed or predictable across the landscape, even where suitable habitat exists.
- There are 155 species of rare plants/fungi on BLM-administered lands within the planning area.
- Of the 155 occurrences, 90 plants/fungi have 20 or fewer occurrences.
- Approximately two-thirds of the 3,700 locations and 97 species occur in the Klamath Province.
- Six of the 13 federally listed species and the one federal candidate species occur on BLM-administered lands in the planning area.

The landscape and vegetation within the BLM planning area are extraordinarily diverse and include a unique combination of geology, climate, topography, and natural disturbances. The Northwest temperate conifer forest is the dominant floristic province within the planning area. Two other floristic provinces contribute substantial biodiversity: the California province in southern Oregon, and the Great Basin province in eastern Oregon. The broad floristic provinces are further subdivided into physiographic provinces based on geographic features and plant communities called plant series. Of high botanical interest are the plant communities of smaller geographic extent that increase biodiversity within the planning area; these include mixed hardwoods, oak woodlands, chaparral, grasslands, and the juniper and sage-brush steppe. Franklin and Dyrness (1988) describe plant communities and habitat in Oregon.

Distribution, Habitat and Biology

Unique landscape features of the physiographic provinces contribute to the presence and diversity of rare and locally endemic plant species and fungi. These plants and fungi are distributed throughout the planning area and found in nearly every habitat type. Southwest Oregon and northern California (the Klamath Province) have some of the highest rates of plant endemism and rarity in the United States (DellaSalla et al. 1999). Conversely, the eastern Cascades and the Great Basin provinces of the planning area have the fewest rare plant species.

More than 4,500 plant species are found in Oregon, and the majority of these occur within the planning area (ORNHIC 2007). Most of these plant species are common and of no conservation concern from the standpoint of rarity. However, 296 species are considered rare and are included on the list of Bureau special status species. These species are of conservation concern due to the small number of known occurrences, narrow distribution, loss of populations and habitat, and threats to their existence posed by human activity or other inherent biological factors.

Of the 296 species of Bureau special status species suspected or known to occur in Oregon, 155 species have documented occurrences on BLM-administered lands within the planning area (not including the West Eugene Wetlands or the Cascades-Siskiyou National Monument).

Rare/BLM special status species

The terms “rare” and “BLM special status species” are used interchangeably in the document.

> **Occurrence**
>
> The term "occurrence" is a single record from GeoBob or ORNHIC (mapping data standards for a location and extent of an individual or group of plants or fungi). All individuals within 300 feet of each other are a single record.

Of those 155 species:

- 90 species have 20 or fewer occurrences.
- 42 species have 5 or fewer occurrences.
- 44 species occur only on BLM-administered lands.

Rare plants and fungi are not evenly distributed or predictable across the landscape, even when good potential habitat exists. Some are associated with specific plant communities, habitat type, host species, substrate, or an ecological feature that defines their habitat. However, other rare species are associated with plant communities with less defined habitat characteristics. Kaye et al. (1997) describes types of rarity, patterns, distribution, and threats to rare plant species in Oregon.

The distribution of rare plants and fungi and their occurrences vary at the provincial scale within the planning area from nearly 100 species in the Klamath Province, to a few species in the Eastern Cascades Province. The Klamath Province, which has the highest total species richness of any province within the planning area, includes more than 250 plant species that are endemic to serpentine soils (Kruckeberg 1984). Ten percent of those species are considered rare. Crinite mariposa-lily (*Calochortus coxii*) and Howell's mariposa-lily (*Calochortus howellii*) are examples of rare, narrow endemics found only on soils influenced by a serpentine substrate. Approximately 97 rare plant species (not all of which are restricted to serpentine soils) and nearly two-thirds of the total known occurrences on BLM-administered lands are found in the Klamath Province.

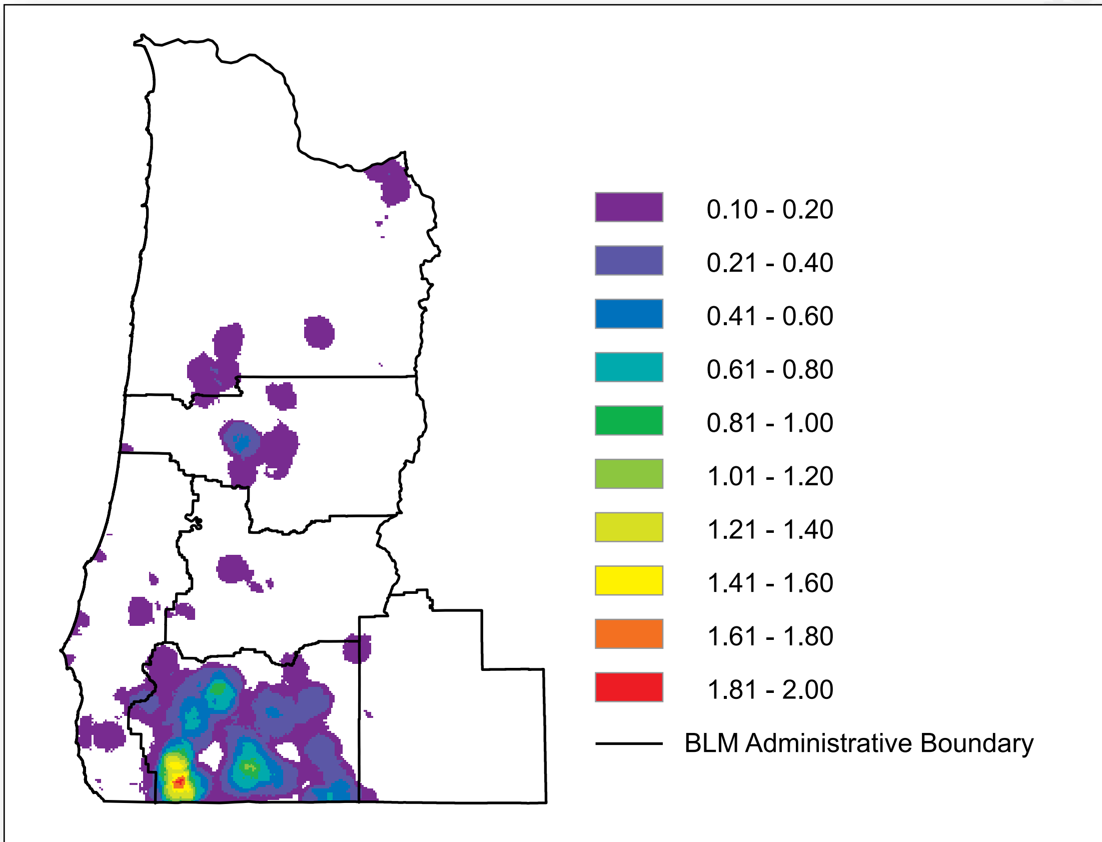
When the 296 rare plants and fungi suspected or documented to occur in Oregon are mapped by physiographic provinces on BLM-administered lands in western Oregon, their diversity and distribution patterns occur in the following manner, with some found in more than one province:

- 6 species within the Eastern Cascades Province
- 11 species within the Willamette Valley Province
- 50 species within the Coast Range Province
- 73 species within the West Cascades Province
- 97 species within the Klamath Province

Mapping of species occurrences provides distribution and density patterns. Areas of high and low densities of special status species occurrences can be displayed as hot spots (greater density) and cold spots (lesser density). Hot spots occur at fine spatial scales where there are such special habitat features as meadows, wetlands, rock outcrops, and at larger geographic scales such as the Klamath Province or the Eugene Wetlands area. Cold spots may result from fewer rare species, low occurrence levels, or lower survey intensity. The density figure below includes special status species occurrences on all lands within the planning area. See *Figure 3-48* (*Special status species occurrence density shown as hot spots and cold spots*).

Field surveys are the best method to confirm presence or absence of rare species and to increase knowledge of range, distribution, and habitat characteristics. Field searches for special status species (vascular plants, bryophytes and lichens) have occurred on approximately 510,000 acres in the past seven years on BLM-administered lands and resulted in the discovery of more than 1,300 new occurrences since 2003. For fungi, a coarse-filter approach was adopted that used a broad random sampling methodology and strategic searches (USDI BLM 2004c). More than 77% of all special status species occurrences in the past four years were reported from the Medford District, which includes the Klamath Province. At the opposite end of the range, approximately 1% of all occurrences were found in the Klamath Falls Resource Area in the Lakeview District.

Figure 3-48. Special Status Species Occurrence Density Shown As Hot Spots And Cold Spots (Density Per Square Kilometer)



Many rare plants are associated with distinct and narrow habitat types within larger vegetative communities shaped by geologic features and substrate, climate, and hydrologic influences. These habitats range from rock substrates and outcrops of different origins with variable soil types and conditions (including sand dunes) to seasonal and permanent wetlands, vernal pools, fens, bogs, and marshes. Because they have persisted over time, these habitats have become refugia for unusual plant communities and rare species adapted to unusual environments. The Oregon Coast includes a group of rare lichens (e.g., *Bryoria pseudocapillaris, Erioderma sorediatum,* and *Hypogymnia duplicata*) adapted to narrow ecological conditions found only along the Pacific coast. However, even in these habitats, rare species occur very infrequently.

Rare vascular plant species occur in a broad range of plant communities, habitat types and substrates including aquatic, riparian, rock, and terrestrial. Generally, the habitat associated with rare vascular plants is well understood. Bryophytes and lichen species are associated with a variety of habitats including conifer trees, rock, soils, and riparian habitat, although primarily in conifer and hardwood communities. Many of these species are closely associated with a particular substrate, habitat condition, and environment. Fungi occur in a number of forms. Most are mycorrhizal and usually associated with host species in conifer and hardwood forest communities. The habitat characteristics for many rare lichen and bryophytes species are less certain and more conceptual than those for vascular plants. Fungi have even less certain habitat characteristics than the lichen and bryophytes (USDA USFS and USDI BLM 2007). The understanding of the distribution and habitat requirements for many lichens, bryophytes and fungi is evolving. The habitat groups (discussed in the last section of this *Botany* section) organize Bureau special status species into broad habitat types based on current understanding. Additional species-specific habitat descriptions can be found in *Appendix F - Botany*.

Biological factors (e.g., reproductive strategies, inbreeding depression, pollinators and pollination, consumption by herbivores, weed invasion, habitat connectivity, disease, predation, habitat change, and global climate change) play important roles in determining the distribution and abundance of a species. Often, the biological factors that affect a species rarity are difficult to isolate, or are interrelated and cause uncertainty as to the real cause of rarity. Some rare Oregon species (e.g., Baker Cypress) appear to be remnant populations from historic plant communities that have shifted as a result of climate change. Other rare species in Oregon (e.g., numerous mariposa lilies and Mendocino gentian) are narrow endemics adapted over long periods of time to specific habitats or substrates, such as the serpentine endemic group. Some rare species may have evolved as isolated populations that are diverging morphologically from meta-populations (*Limnanthes* spp. and *Plagiobothrys* spp.), or may be the result of hybridization (e.g., Gentner's fritillary). Certain rare species of lichen and bryophytes, while geographically widespread, appear to be locally adapted to narrow environmental conditions along the Pacific Northwest coast. A number of species in Oregon (e. g., Golden paintbrush, Bradshaw's desert parsley) are rare due to loss of habitat from an expanding human population and the introduction and spread of invasive plants (USDI USFWS 2000, USDI USFWS 1993).

Natural disturbances (wildfires, windstorms, and floods) change plant community and habitat conditions for rare plants and fungi. Many factors determine whether an occurrence will survive a disturbance. Among those factors are the following:

- type, extent, duration, and intensity of the disturbance
- frequency and season of the disturbance
- habitat and life-cycle requirements of a species
- adaptability of a species to a changed environment

Some rare plant species (e.g., Bradshaw's desert-parsley) are adapted to frequent, low-intensity fires and respond positively in most cases (Kaye et al. 2001). Species such as Gentner's fritillaria, Kincaid's lupine, and coral seeded allocarya (*Plagiobothrys* sps.) can respond positively to the increased light and moisture from loss of overtopping and competing vegetation, and the increase in nutrients available after a wildfire. Although certain species respond positively to disturbance, they remain rare because of infrequent disturbances, loss of habitat, and rapid invasion by weedy annuals. Alternately, many rare lichen, bryophytes, and fungi, along with some vascular plants without fire-adaptive mechanisms, are consumed in a fire. These occurrences, as well as their habitat and hosts, would be lost unless protected in a niche or island where the fire was absent or less severe (Copeland, unpublished 2005).

Floods and debris flows alter riparian and aquatic plant communities and can also alter the rare plant populations that occur in disturbed areas. These types of events are very dynamic with some rare plant occurrences benefiting whereas others are lost. Although floods may appear to destroy the existing riparian and aquatic vegetation initially, they also deposit sediment, distribute seed, and reduce native and invasive vegetation. This facilitates vigorous resprouting and reseeding of riparian associated shrubs, perennial and annual grasses, and forbs. For example, many rare juncus and sedge species, along with coral-seeded allocarya (*Plagiobothrys* sps.*)*, associated with streams and wetlands are adapted to periodic floods by prolific seed production.

Special Status Species

The BLM currently manages 296 rare plant species and fungi in western Oregon called special status species. Special status species include all federally listed, federally proposed, and federal candidate species, Oregon state listed, as well as Bureau sensitive and strategic species (USDI BLM 2007b). Some species are both state and federally listed species. The special status species list changes when species rankings change. The primary ranking considerations include federal and state status, the number of extant populations, distribution, population size and dynamics, and threats. A species ranking inherently includes an ecological and viability assessment and provides the basis for inclusion on the BLM special status species list. The BLM strategic species receive no conservation protection measures and are not included in the analysis.

One of the conservation goals underlying the special status species program is the preservation of species and genetic diversity for human benefit. Rare species have high conservation value for scientific and biological interests, as well as agronomic utility. The hybrid meadowfoam "Floral" was developed by plant breeders at Oregon State University by crossing two meadowfoams: *Limnanthes floccose* ssp. Grandiflora (a federally listed narrow endemic found on mounded prairie in southern Oregon) with *Limnanthes alba*. Grass farmers in the Willamette Valley rotate "Floral" as a cover crop between grass seed crops to eliminate unwanted weeds and grasses and to harvest the seeds for processing into fine oil for the cosmetics and plastics industries, and as a specialty lubricant.

Of the 296 plant species and fungi in the planning area that are on the special status species list, only 155 (52%) have documented occurrences on BLM-administered lands. The remaining 141 (48%) are suspected or likely to occur on BLM-administered lands. Suspect plants or fungi are included on the special status species list because known sites occur nearby, their range coincides with the planning area, and suitable habitat exists on BLM-administered lands. Of the 189 vascular plants suspected to occur on BLM-administered lands within the planning area, there are 102 known occurrences, and only 6 of those are federally listed or candidate species. See *Table 3-19 (Number of documented and suspected plant and fungi special status species*) for known occurrences of bryophytes (i.e., mosses and liverworts), lichens, and fungi on BLM-administered lands in the planning area.

The 155 special status species have been detected at approximately 3,700 locations. They occupy about 4,250 acres of the approximately 2.6 million acres of BLM-administered lands within the planning area.

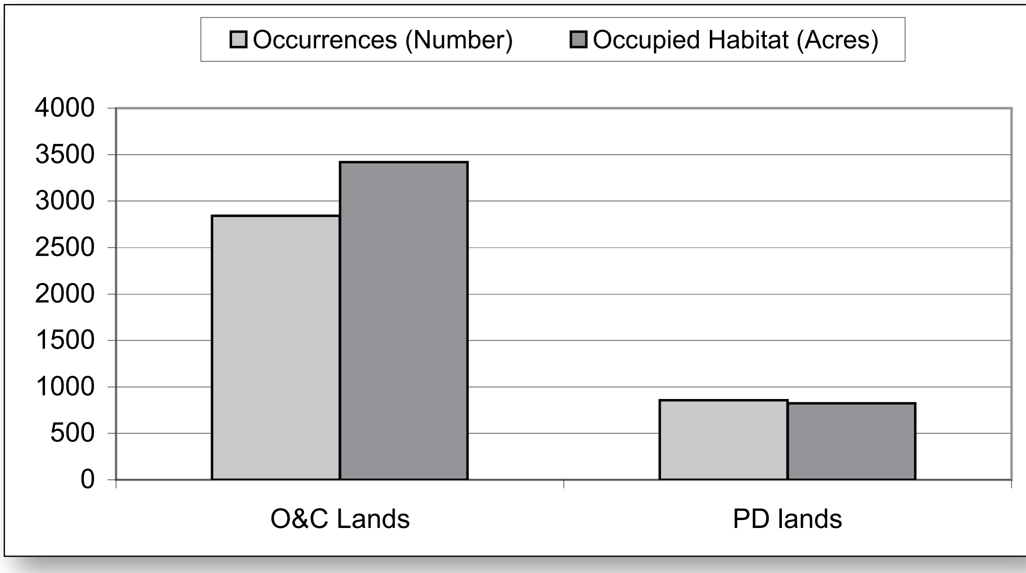
Approximately 74% of the occupied habitat (of 4,250 acres total) and 76% of the occurrences (of 3,700 occurrences total) have been found to occur on O&C lands. The other 26% of the occupied habitat and 24% of the occurrences occur on public domain lands. If the Eastern Cascades Province public domain lands (where 45% of all public domain lands are located and where very few occurrences and occupied habitat are found) were excluded, a higher proportion of occurrences and occupied habitat would occur on public domain lands compared to O&C lands. See *Figure 3-49 (Occurrences and occupied habitat of Bureau special status species on O&C and public domain lands within the planning area)*.

Table 3-19. Number Of Documented And Suspected Plant And Fungi Special Status Species Within The Planning Area

Occurrence of Special Status Plant and Fungi Species	Total Species	Vascular Plants[a]	Bryophytes[b]	Lichens	Fungi
Suspected	141	87	25	11	18
Documented	155	102	12	15	26
Total	**296**	**189**	**37**	**26**	**44**

[a] Includes the 14 species that are federally listed and candidate species
[b] Mosses and liverworts

Figure 3-49. Occurrences And Occupied Habitat Of Bureau Special Status Species On O&C And Public Domain Lands Within The Planning Area



Federally Threatened, Endangered, and Candidate Species

There are 13 species that are listed under the federal Endangered Species Act that occur within the planning area, along with one federal candidate species—for a total of 14 federally listed and candidate species. Only 6 of the 13 federally listed species, and the one federal candidate species, occur on BLM-administered lands. The other seven species are suspected, but are not documented on BLM-administered lands or do not occur on lands where management activities are proposed (West Eugene Wetlands). These federally listed species are included in the analysis because their range and suitable habitat overlap BLM-administered lands. See *Table 3-20 (Federally listed plant species and occurrences within the planning area)*. Also see *Appendix F - Botany* for a general description of the biology, ecology, range, and threats of each species.

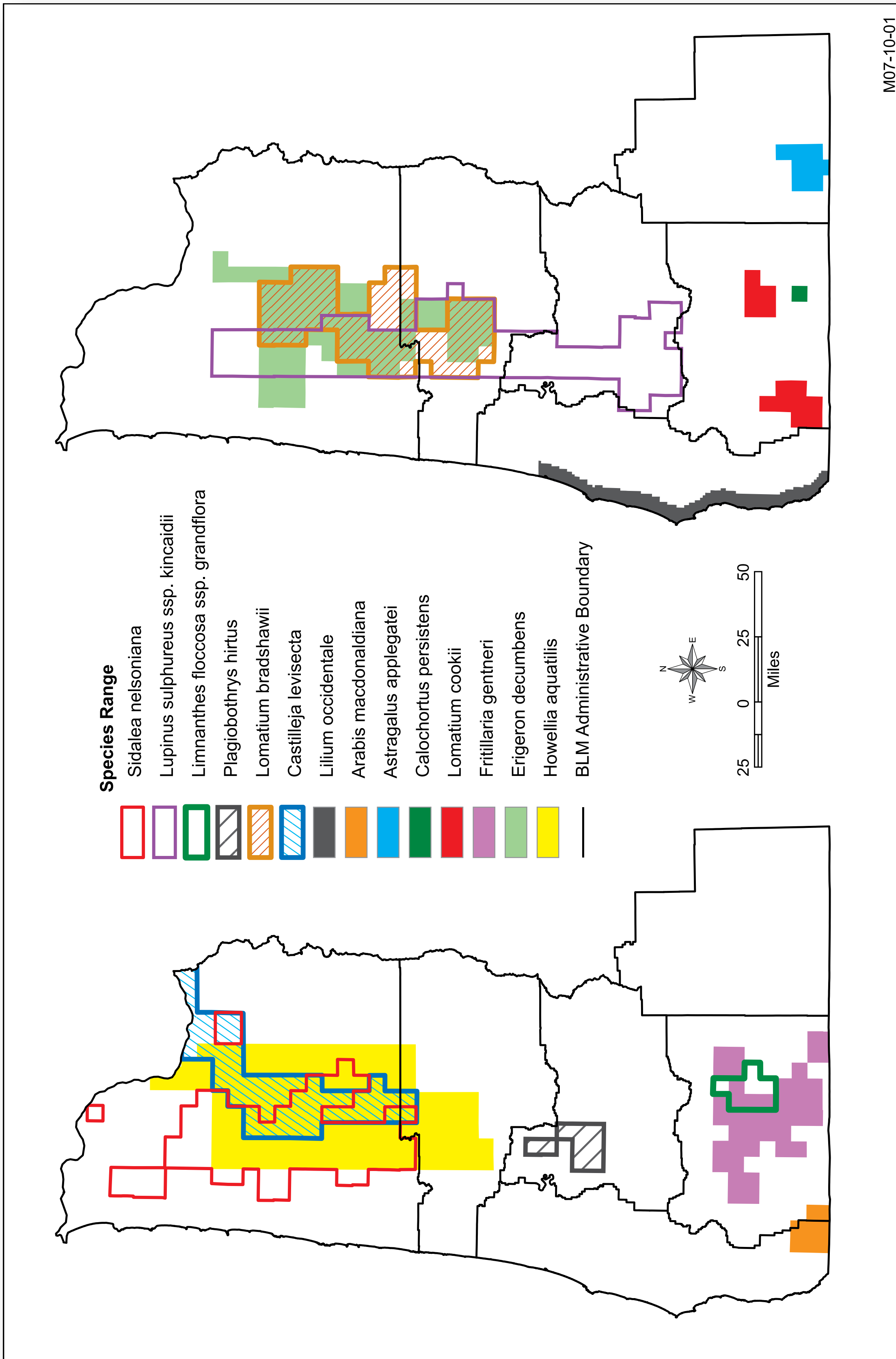
One or more federally listed and candidate species occur on each BLM district within the planning area and all are vascular plants. See *Figure 3-50 (Federally listed plants in the planning area)*. The range, biology, and habitat of each species are unique. Most federally listed plant species are adapted to special habitats within narrow geographic ranges (e.g., Rough popcorn flower, Applegate's milk-vetch, Western lily, and Cook's lomatium), although some are wider ranging (e.g., Golden paintbrush, Water howellia). Most federally listed species are found in lower elevation valley areas that have been heavily modified by agriculture and urbanization. The total number of known federally listed plant occurrences is few on BLM-administered lands, but these occurrences are considered secure because of conservation protection measures provided under the Endangered Species Act. Individual occurrence sizes are generally small, and the area of occupied habitat is also small. See *Appendix F - Botany* for a list of federally listed species, the number of known sites, the area occupied in acres, and the general habitat descriptions.

Table 3-20. Federally Listed And Candidate Plant Species And Their Occurrences Within The Planning Area

Scientific Name	Common Name	Occurrences[a] on BLM	Total Occurrences[b]	BLM Districts
Federally Threatened Oregon (FTO)				
Castilleja levisecta	Golden paintbrush	0	7	Salem, Eugene
Howellia aquatilis	Water howellia	0	0	Salem, Eugene, Roseburg, Medford
Lupinus sulphureus ssp. *Kincaidii*	Kincaid's lupine[c]	11	70	Eugene, Roseburg
Sidalcea nelsoniana	Nelson's checker-mallow	1	99	Salem
Federally Endangered Oregon (FEO)				
Arabis mcdonaldiana	McDonald's rockcress	0	8	Medford, Coos Bay
Astragalus applegatei	Applegate's milk-vetch	0	14	Klamath Falls Resource Area
Erigeron decumbens var. *decumbens*	Willamette Valley daisy[d]	9	44	Eugene, Salem
Fritillaria gentneri	Gentner's fritillary	112	130	Medford
Lilium occidentale	Western lily	1	26	Coos Bay
Limnanthes floccosa ssp. *Grandiflora*	Large-flowered wooly meadow-foam	0	19	Medford
Lomatium bradshawii	Bradshaw's desert parsley[c]	7	49	Salem, Eugene
Lomatium cookie	Cook's lomatium	32	55	Medford
Plagiobothrys hirtus	Rough popcorn flower	2	17	Roseburg
Federal Candidate Oregon (FCO)				
Calochortus persistens	Siskiyou mariposa lily	2	3	Medford

[a] Source: Geographic Biotic Observation Database (GeoBob) (10/2007)
[b] Sources: Oregon Natural Heritage Information Center database (1/2008) and GeoBob (10/2007)
[c] Includes 6 occurrences in West Eugene Wetlands
[d] Includes 9 occurrences in West Eugene Wetlands

Figure 3-50. Federally Listed Plant Species



Oregon State Endangered, Threatened, and Candidate Species

Rare vascular plant species listed by the state of Oregon occur in every BLM district within the planning area. There are 32 plant species listed under the Oregon Endangered Species Act, along with 33 candidate species. The Oregon-listed species include 12 species that are also federally listed. In general, most of these species are narrow endemics that occur within restricted geographic areas or unique habitats, but have distinct range, biology, and habitat conditions. The occurrences of state-listed species are few and normally small in size. See *Appendix F - Botany*.

Bureau Sensitive Species

Bureau sensitive species comprise 282 of the 296 special status species and include vascular plants, bryophytes, lichens, and fungi. The group of 20 Oregon state-listed and 33 candidate species (not including federally listed species) is included under Bureau sensitive species. Bureau sensitive species are managed consistent with species conservation needs (biological and ecological requirements). Conservation measures to protect species occurrences and habitat from management activities include altering the type, timing, extent, and intensity of actions and other strategies designed to maintain populations of species. Conservation measures would include establishing new populations or augmenting existing populations and retaining biological forest legacies as host and substrate for lichens, bryophytes, and fungi in potential habitat. Bureau sensitive species would be managed so that management activities would not contribute to the need to list the species under the Endangered Species Act.

Conservation Plans

The following sections address the recovery plans, conservation agreements, and conservation strategies for rare plant species. A list of the conservation components that apply to land management activities, from each conservation plan, is provided in *Appendix F - Botany.*

Recovery Plans for Federally Listed Plant Species

Recovery plans identify the objectives, actions, and standards necessary to protect and recover federally listed species using the best available science. Recovery plans have been completed for 9 of the 13 species listed under the federal Endangered Species Act that occur in the planning area. See *Table 3-21 (Federally listed plant species with recovery plans)*. A draft recovery plan for Cook's lomatium (*Lomatium cookii*) and large-flowered wooly meadowfoam (*Limnanthes floccosa* ssp. *grandiflora)* was published in June 2006 and a final recovery plan is expected in 2008. A list of the primary conservation components that apply to land management activities, from each recovery plan, is provided in *Appendix F - Botany*.

Conservation Agreements

Conservation agreements outline mutual conservation goals for species between the BLM and other federal agencies, state agencies, and private landowners. They provide general guidance for management of species that is necessary to reduce, eliminate, or mitigate threats or risks. There are four single species conservation agreements and one multiple species interagency conservation agreement between the BLM and other agencies (usually involving the U.S. Fish and Wildlife Service) within the planning area. The multiple species conservation agreement provides management direction for five rare species occurring on habitat surrounding *Darlingtonia* wetlands and fens on serpentine areas See *Table 3-22 (Plant species with conservation agreements)*.

Two of the conservation agreements are for the federally listed species *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine) and *Lomatium cookii* (Cook's lomatium). The agreement for Kincaid's lupine is between the Roseburg BLM District and the U.S. Fish and Wildlife Service and includes populations in Douglas County, Oregon. The agreement's objectives are to: (1) maintain stable populations of the species in Douglas County by protecting and restoring habitats, (2) reduce threats to the species on lands managed by the BLM and USFS, (3) promote larger functioning metapopulations, with increased population size and genetic diversity, and (4) meet recovery criteria in the Recovery Outline for the species (USDI USFWS 2006a). The agreement for Cook's lomatium is between the Medford BLM District and the U.S. Fish and Wildlife Service and includes those populations in the Illinois Valley, Oregon. The agreement's objectives are to: (1) protect

Table 3-21. Federally Listed Plant Species With Recovery Plans

Status[a]	Scientific Name	Common Name	Listing Date	Recovery Plan Date
FEO	*Arabis macdonaldiana*	MacDonald's rockcress	1978	1990
FEO	*Astragalus applegatei*	Applegate's milk-vetch	1993	1998
FTO	*Castilleja levisecta*	Golden paintbrush	1997	2000
FEO	*Erigeron decumbens* var. *decumbens*	Willamette Valley daisy	2000	
FEO	*Fritillaria gentneri*	Gentner's fritillary	1999	2003
FTO	*Howellia aquatilis*	Water howellia	1994	Draft 1996
FEO	*Lilium occidentale*	Western lily	1994	1998
FEO	*Limnanthes floccosa* ssp. *Grandiflora*	Large-flowered wooly meadowfoam	2002	Draft 2006
FEO	*Lomatium bradshawii*	Bradshaw's desert parsley	1988	1993
FEO	*Lomatium cookii*	Cook's lomatium	2002	Draft 2006
FTO	*Lupinus sulphureus* ssp. *Kincaidii*	Kincaid's lupine	2000	
FEO	*Plagiobothrys hirtus*	Rough popcorn flower	2000	2003
FTO	*Sidalcea nelsoniana*	Nelson's checker-mallow	1993	1998

[a] FEO - federally endangered Oregon FTO - federally threatened Oregon

Table 3-22. Plant Species With Conservation Agreements

Single-species agreements			
Status[a]	**Scientific Name**	**Common Name**	**BLM District**
SE	*Calochortus coxii*	Crinite mariposa lily	Roseburg
SE	*Calochortus umpquensis*	Umpqua mariposa lily	Roseburg, Medford
ST	*Eucephalus vialis*	Wayside aster	Eugene, Roseburg, Medford
FEO	*Lomatium cookii*	Cook's lomatium	Medford
FTO	*Lupinus sulphureus* sp. *Kincaidii*	Kincaid's lupine	Roseburg
Multi-species agreement for the serpentine Darlingtonia wetlands and fens of southwestern Oregon and northwestern California, for the following five species:			
Status	**Scientific Name**	**Common Name**	**BLM District**
OR-Sen	*Epilobium oreganum*	Oregon willow-herb	Medford
OR-Sen	*Gentiana setigera*	Mendocino gentian	Medford
ST	*Hastingsia bracteosa* var. *bracteosa*	Large-flowered rush lily	Medford
ST	*Hastingsia atropurpurea* var.*atropurpurea*	Purple-flowered rush lily	Medford
OR-Sen	*Viola primulifolia* ssp. *occidentalis*	Western bog violet	Medford

[a]FTO (federally threatened - Oregon) FEO (federally endangered - Oregon) ST (state threatened) SE (state endangered) OR-Sen (BLM sensitive)

significant biological and ecological values of populations and habitats, (2) protect populations from human activity, recreation and mining, (3) manage populations and habitat to enhance populations, and (4) survey additional suitable habitat (see *Appendix F – Botany)*.

Conservation Strategies

Conservation strategies are more detailed than conservation agreements. Besides containing the information that is included in a conservation assessment (a species biology, ecology, range, occurrence size and population demographics, threats, and habitat management), conservation strategies address how to manage and conserve the species, identify essential populations and habitat, and ensure population viability and persistence. Conservation strategies have been written for five species within the planning area. See *Table 3-23 (Plant species with conservation strategies)*.

See *Appendix F - Botany* for a complete list of conservation strategies and conservation agreements, which includes species, key conservation components that apply to land management actions, participating agencies, and field units.

Habitat Groups for Rare Plants and Fungi

Given the large number of special status plants and fungi and also their unique range, biology, and ecology, a macro-habitat organizational approach was developed to place species with similar ecological characteristics into habitat groups. This approach is a modified multiple species classification system described by Raphael and Molina (2007), but varies in that some species within a habitat group respond differently than others to habitat change. See *Figure 3-51 (Number of special status plant and fungi species by habitat group)*.

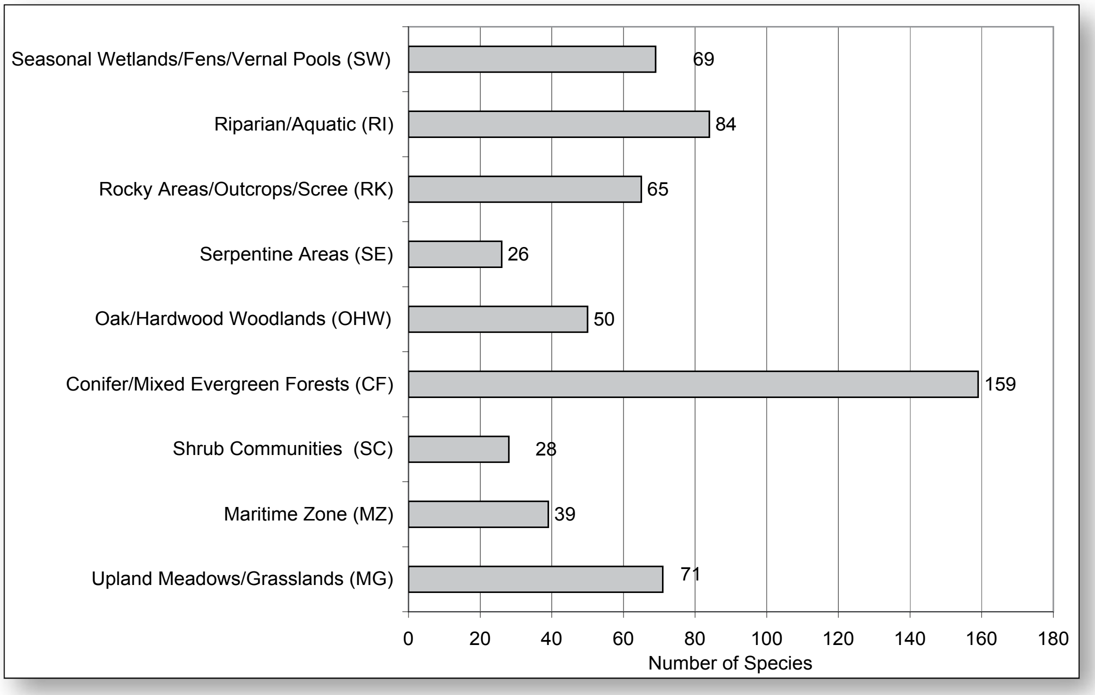
The 296 special status species plants and fungi within the planning area are from approximately 14 life forms (e.g., tree, forb, grass, lichen, and fungi) that are found in numerous habitat-specific substrates, plant communities, and environments. Nine habitat groups were formed based on aggregating similar habitat types that exist throughout the planning area (see list below). For the analysis of the effects of the alternatives, each of the 296 species was placed into one or more groups based on the broadest known range of habitats and conditions associated with the species. Habitat information and habitat groups for each species is in *Appendix F - Botany*.

Table 3-23. Plant Species With Conservation Strategies

Status[a]	Scientific Name	Common Name	BLM District
OR-Sen	*Eucephalus gormanii (Aster gormanii)*	Gorman's aster	Salem
OR-Sen	*Cimicifuga elata*	Tall bugbane	Medford, Roseburg, Salem, and Eugene
ST	*Frasera umpquaensis*	Umpqua gentian	Medford and Roseburg
ST	*Phacelia argentea*	Silvery phacelia	Coos Bay
OR-Sen	*Rorippa columbiae*	Columbia cress	Klamath Falls Resource Area in the Lakeview District

[a] OR-Sen (BLM sensitive) ST (state threatened)

Figure 3-51. Number Of Special Status Plant And Fungi Species By Habitat Group



Habitat groups used in this analysis include:

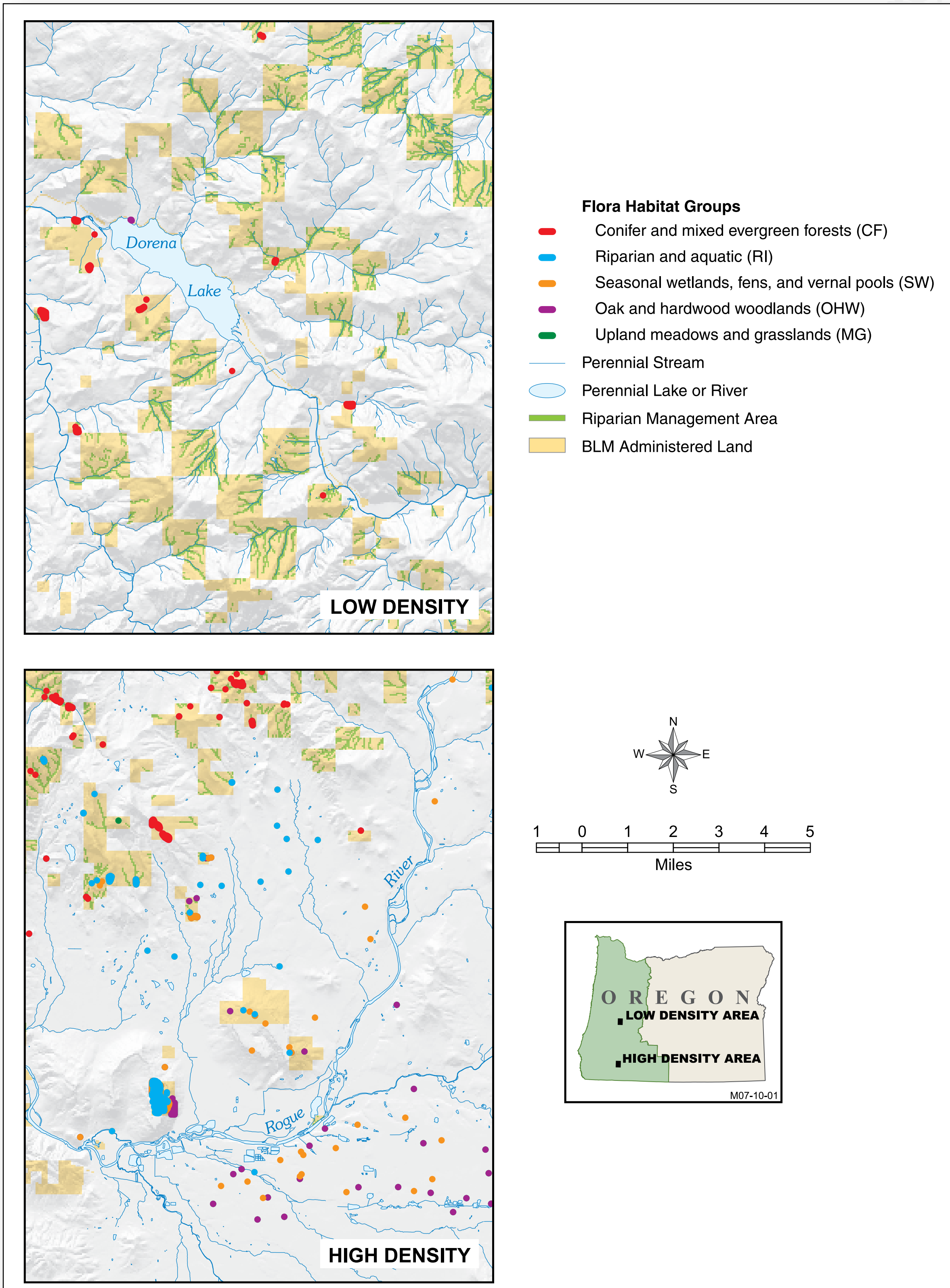
- conifer and mixed evergreen forests (CF)
- maritime zone (MZ)
- oak and hardwood woodlands (OHW)
- riparian and aquatic (RI)
- rocky areas, outcrops, and scree (RK)
- seasonal wetlands, fens, and vernal pools (SW)
- serpentine areas (SE)
- shrub communities (SC)
- upland meadows and grasslands (MG)

The above habitat groups relate to biotic and abiotic conditions as follows:

- Four habitat groups (CF, MG, OHW, and SC) are associated with broad vegetative community types.
- Two habitat groups (RI and SW) are associated with hydrologic and aquatic dependencies.
- Two habitat groups (RK and SE) are associated with parent material substrates (one specifically to serpentine areas).
- One habitat group (MZ) is associated with Oregon coastal conditions (wind, temperature, humidity, and precipitation) within approximately 10 miles of the coast.

In addition to the biotic and abiotic conditions that shape the composition of species by habitat groups, occurrence densities and habitat group diversity (i.e., species diversity) varies by ecoregion and BLM District, from relatively low to high occurrence density and habitat group diversity. See *Figure 3-52 (Southwest Oregon - Example areas of high and low occurrence density, and of high and low habitat group diversity)*

Figure 3-52. Southwest Oregon - Example Areas Of High And Low Occurrence Density, And Of High And Low Habitat Group Diversity



Invasive Plants

Key Points
• Invasive plant infestations are numerous and many are well distributed on BLM-administered lands within the planning area.
• Invasive plant species are introduced and spread through various mechanisms, including land management activities.

Invasive plants are non-native plant species whose introduction causes economic or environmental harm, or harm to human health. Noxious weeds are a subset of invasive plant species. Noxious weeds are plant species that are designated by federal or state law and generally possess one or more of the following characteristics:

- aggressive and difficult to manage
- parasitic
- carrier (or host) of serious insects or disease
- non-native, new, or not common to the United States

More than 130 invasive plant species have been documented within the planning area. Of these, 61 are also listed as noxious weeds in Oregon. See *Table 3-24 (Number of invasive plant and noxious weed species on BLM-administered lands within the planning area)*. Several of the other identified invasive plants are also listed as noxious weeds in other states.

An accurate accounting of the total acreage and distribution of invasive plant infestations and treatments is unavailable for the following reasons:

- No central source exists for compiling invasive plant infestation and treatment information within Oregon.
- There is no requirement for county, private, or corporate landowners to report invasive plant information.

Weedmapper
An interagency cooperative effort with Oregon State University to collect spatial information on the distribution of noxious weeds in the state of Oregon. See www.weedmapper.org.

Despite the limited reporting on weed locations, a good picture of the distribution of noxious weed species is available on a species-by-species basis by WeedMapper (online at www.weedmapper.org).

Representative Invasive Plant Species

The condition of invasive plant infestations on BLM-administered lands within the planning area can be characterized by analyzing a few invasive plant species. The following representative list of invasive plant species is used to describe the condition of invasive plants on BLM-administered lands within the planning area:

- Canada thistle
- Dyer's woad
- False brome
- knotweeds
- Leafy spurge
- meadow knapweed
- Scotch and French brooms
- Spotted and diffuse knapweeds
- yellow starthistle

Table 3-24. Number Of Invasive Plant And Noxious Weed Species On BLM-Administered Lands Within The Planning Area

Plant Category	Planning Area	BLM Districts					
		Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls Resource Area (Lakeview District)
Invasive Plants	136	74	64	81	51	50	50
Noxious Weeds	61	26	28	28	29	36	28

Each of these species or species groups has a unique distribution pattern and strategy for spreading and resisting different treatment methods. Many of the identified invasive plant species are well distributed across the planning area. Some are limited in distribution and others have very few sites on BLM-administered lands. Although each species is unique, these sample invasive plant species represent a range of life histories and methods of introduction and spread sufficient to describe the condition of invasive plant species on BLM-administered lands within the planning area.

Canada Thistle

Canada thistle, a perennial with an extensive root system, occurs in a wide variety of open, moist, disturbed habitats including roadsides, streambanks, pastures, meadows, waste areas, campgrounds, clearcuts, roads, fires, and landslides (Hansen and Clevenger 2005, Turner 1999, Titus et al. 1998, Jensen 1991, Schoenberger et al. 1982, Neiland 1958). A study at Yellowstone National Park revealed that Canada thistle was found in habitats with varying levels of disturbance and that there is a direct relationship with species abundance and the level of disturbance (Allen and Hansen 1999, Turner et al. 1997). Canada thistle is rarely found in undisturbed forests (Heckman 1999, Bailey and Tappeiner 1998, Hutchison 1992, Chen et al. 1996, Dewey 1991, Parendes and Jones 2000, Young et al. 1967).

Canada thistle spreads sexually by seed and vegetatively by root and stem fragments. Most seeds are spread by animals, hay, contaminated crop seed, machinery, and irrigation water. Fewer are dispersed by wind (Nuzzo 2000). The majority of seeds germinate the year they are produced. Seeds are generally viable for less than 5 years, but could remain viable for up to 20 years in soil (Nuzzo 2000, Donald 1994).

After their germination, Canada thistle seedlings require space to grow and relatively high levels of light (Nuzzo 2000, Donald 1994). After they establish, Canada thistle spreads rapidly by vegetative growth in the root and underground stem systems. Within one season a plant can grow up to 20 feet horizontally in good growing conditions (Magnusson et al. 1987).

Canada thistle may establish in natural areas as part of the initial plant community after logging (Jensen 1991, Kellman 1969, Chen et al. 1996, Young et al. 1967), fire (Schoenberger et al. 1982), grazing, and road building (Meier and Weaver 1997).

A study in northern Idaho documented establishment of Canada thistle following clearcutting activities with varying levels of soil displacement. Timber harvesting activities with high levels of soil disturbance favor establishment of forbs, including Canada thistle, to the detriment of tree seedling establishment (Jensen 1991). Canada thistle establishment may take two or more seasons after disturbance events (Doyle et al. 1998, Willard et al. 1995, Jensen 1991).

Canada thistle is well-distributed across the state and is present on BLM-administered lands in every district within the planning area. See *Figure 3-53 (Distribution of Canada thistle)* (WeedMapper 2004a).

Dyer's Woad

Dyer's wood is an invader of rangelands and pastures. Dyer's wood behaves as a winter annual, biennial, or short-lived perennial. It is a prolific seed producer. The seeds are toxic to other plants and may remain viable in the soil for several years. This species only reproduces by seed (Kadrmas and Johnson 2002, Forest Health Technology Enterprise Team Update Team 1997).

Dyer's wood is spread by the transport of contaminated livestock, machinery, and soil; the sowing of contaminated seed; and the feeding of contaminated hay. Natural movements of wind and water also contribute to the spread of Dyer's woad (Kadrmas and Johnson 2002).

The apparent distribution of Dyer's wood in western Oregon is limited to the southeastern portion of the planning area. Dyer's wood infestations are reported from the Klamath Falls Resource Area of the Lakeview District and the Medford District. See *Figure 3-54 (Distribution of Dyer's woad)* (WeedMapper 2004a).

Figure 3-53. Distribution Of Canada Thistle

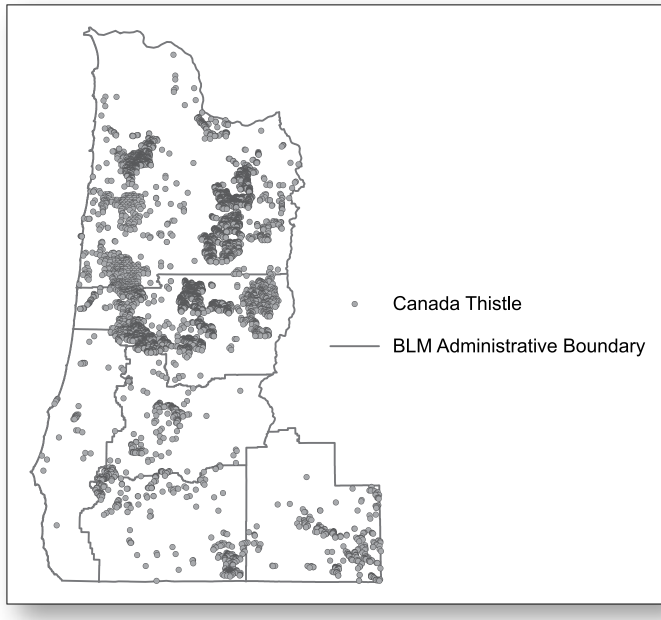
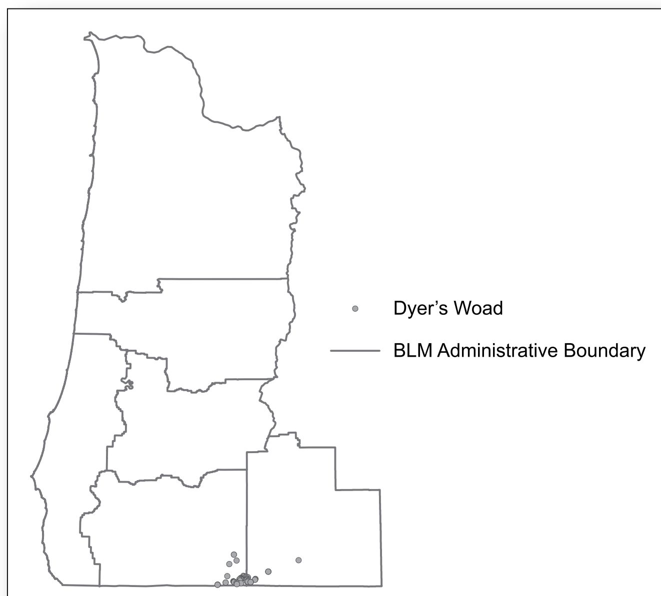


Figure 3-54. Distribution Of Dyer's Woad



False Brome

False brome, a perennial grass, reproduces by producing large quantities of seed. The seeds are dispersed by water, gravity, animals, and are often spread long distances by vehicles, off-highway vehicles, people, and road construction and maintenance equipment (Kaye 2003, False-brome Working Group Newsletter 2004).

False brome is shade tolerant, but can be easily crowded out by other shrubs and forbs. It grows in a wide variety of habitats including dry meadows; along streams, roads, and trails; and under forest canopies. Infestations spread along roads, trails, and down streams (Kaye 2003, False-brome Working Group Newsletter 2004).

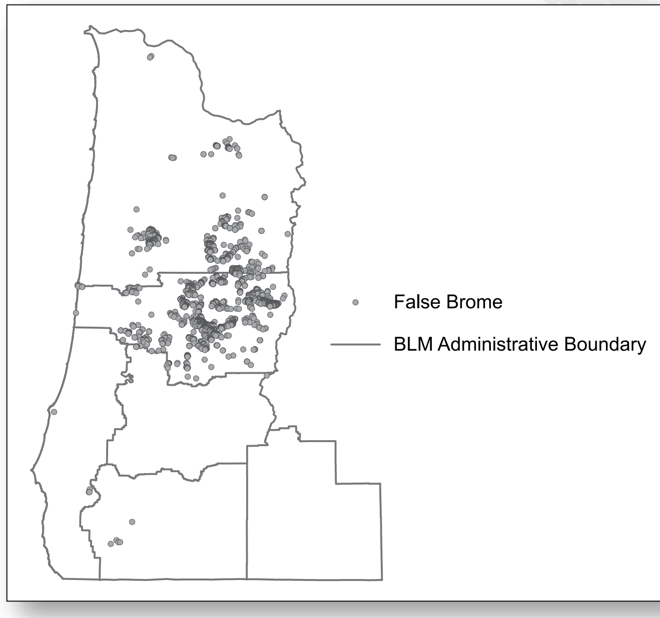
False brome has been reported on BLM-administered lands in the Eugene, Salem, and Medford Districts, and is also known to occur on nonfederal lands in southwestern Oregon and just over the crest of the Cascade Mountains in Jefferson County. See *Figure 3-55 (Distribution of false brome)* (WeedMapper 2004a).

Knotweeds

The knotweeds are long-lived perennials that create dense infestations in disturbed areas (e.g., streambanks and roads) and in waste areas. Roots and rhizomes can reach depths of 7 feet and distances of more than 20 feet from the parent plant. These infestations become dense and outcompete most native plant communities (Soll et al. 2007, Seiger 1991).

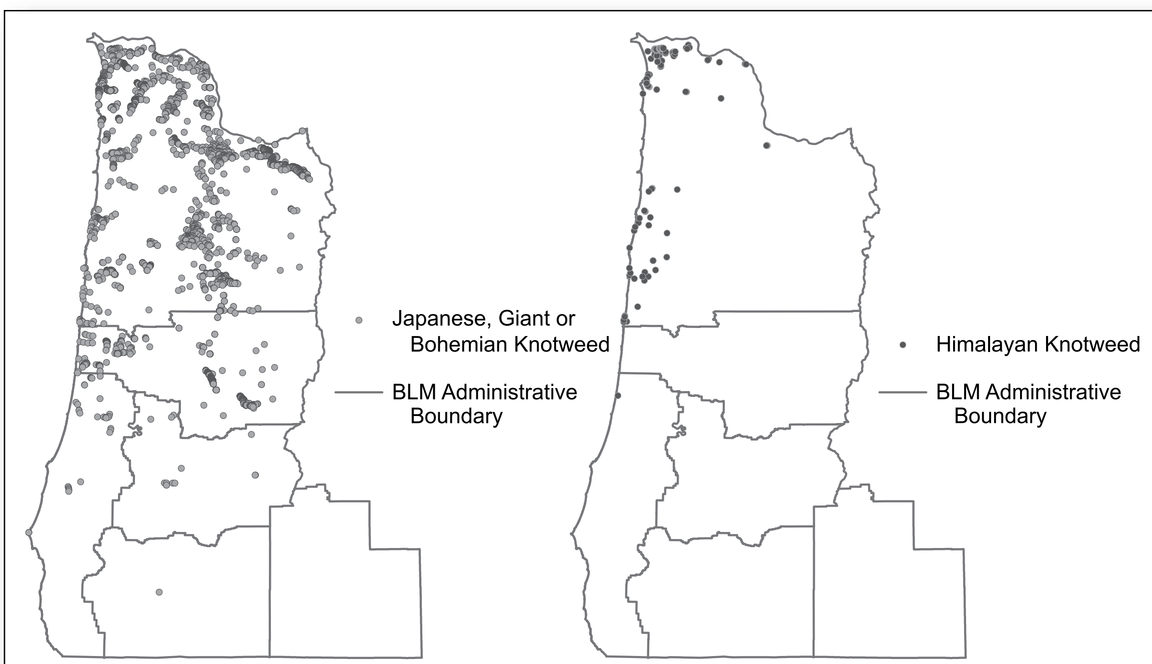
Knotweeds favor unshaded habitats, but can persist in areas of partial shade, particularly where the overstory is dominated by deciduous tree species. Knotweed infestations spread downstream during flood events, and are introduced along roads and waste areas as a result of human activity (Soll et al. 2007, Seiger 1991).

Figure 3-55. Distribution Of False Brome



Knotweeds are present on BLM-administered lands in all of the districts in the planning area, except the Klamath Falls Resource Area of the Lakeview District. See *Figure 3-56 (Distribution of Japanese, giant and Bohemian knotweeds, and the Himalayan knotweed)* (WeedMapper 2004a). Considerable effort has gone into inventorying the invasive knotweed species in some watersheds. However, these figures only reflect sites that have been reported. It is likely that these figures under-represent the actual distribution of knotweeds within the planning area.

Figure 3-56. Distribution Of Japanese, Giant And Bohemian Knotweeds, And The Himalayan Knotweed



Leafy Spurge

Leafy spurge is known to occur in a wide variety of habitats including agricultural, urban areas, grasslands, shrublands, and forests. This species is most vigorous in full sunlight and dry habitats but can also inhabit woodlands, prairies, and other habitats. The root system of leafy spurge is extensive and can reach depths beyond 12 feet into the soil profile and reach more than 30 feet from side to side. Infestations tend to grow into dense stands, easily outcompeting native plant communities (WeedMapper 2004b, Global Invasive Species Database 2005).

Leafy spurge can be introduced to new locations by accidentally including seeds in agricultural seed mixes and may be used as an ornamental in landscapes. Infestations can grow from a single established plant at a rate of 4 feet per year (Global Invasive Species Database 2005).

The distribution of leafy spurge in Oregon is primarily east of the crest of the Cascade Mountains and has been reported on BLM-administered lands in both the Medford District and Klamath Falls Resource Area of the Lakeview District. See *Figure 3-57 (Distribution of leafy spurge)* (WeedMapper 2004a).

Meadow Knapweed

Meadow knapweed was introduced into Oregon as a forage plant and today invades a variety of habitats within the planning area including roadsides, pastures, meadows, native prairies, oak savannahs, and forest openings. In western Oregon, meadow knapweed is becoming more common in clearcuts (Coombs et al. 2004). This species outcompetes native plant communities. It reproduces by seed and spreads by both natural processes and human activity (WeedMapper 2004c).

The reported distribution of meadow knapweed in Oregon is primarily west of the crest of the Cascade Mountains and has been documented on BLM-administered lands in every district within the planning area. See *Figure 3-58 (Distribution of meadow knapweed)* (WeedMapper 2004a).

Figure 3-57. Distribution Of Leafy Spurge

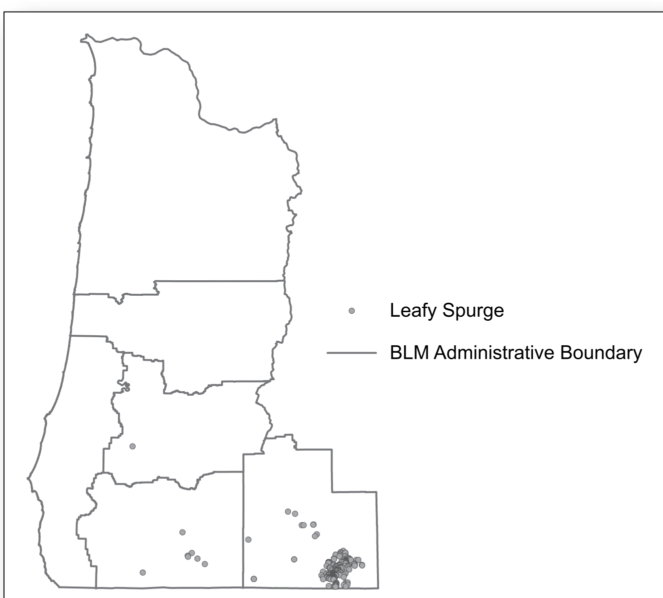
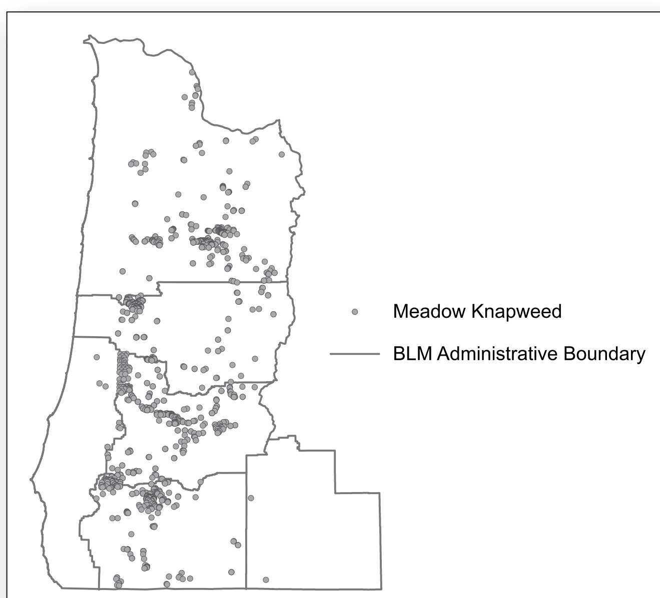


Figure 3-58. Distribution Of Meadow Knapweed



Scotch and French Brooms

Scotch and French brooms are pioneer species known to displace native plant species and increase the costs of timber production. They readily invade disturbed sites in natural areas, dunes, recreational areas, dry riverbeds, utility right-of-ways, open habitats, and forest lands. Scotch broom is shade intolerant but, given a chance, it invades areas soon after logging, clearing, and burning (Coombs et al. 2004). French broom has similar characteristics (Oregon Department of Agriculture 2007, Hoshovsky 1986).

Scotch and French brooms reproduce primarily by long-lived and hard-coated seeds. Mature plants produce a multitude of seeds that can remain viable in the soil for more than 50 years (Soll et al. 2007; Coombs et al. 2004, 160-161). The seeds are transported in soils, down streams, on machinery, and sometimes by birds and other animals that carry the seeds to new isolated areas (Watterson and Jones 2006, Hoshovsky 1986).

Scotch broom infestations are present across Oregon, except in the southeastern portion of the state. In western Oregon, the species is well-distributed north to south and is reported on BLM-administered lands in every district within the planning area. French broom infestations are currently limited to western Oregon and are reported to occur on BLM-administered lands in the Coos Bay, Eugene, Medford, and Roseburg districts. See *Figure 3-59 (Distribution of Scotch and French brooms)* (WeedMapper 2004a).

Spotted and Diffuse Knapweeds

Spotted and diffuse knapweeds are tap-rooted biennials or short-lived perennials that are successful in outcompeting desirable species and native plant communities by growing into dense infestations in open habitats (WeedMapper Team 2004c, 2004d).

Spotted and diffuse knapweed seeds are often spread by being carried along on vehicle frames and shoes to new roadside or trail environments (Sheley et al. 1998). In British Columbia, logging trucks, off-highway vehicles, and trail bikes are documented sources of knapweed spreaders. These knapweeds are also spread along waterways in crop seed and in hay (Strang et al. 1979). Undisturbed infestations spread their seed by wind and water. The seeds can persist in the soil for more than five years (Coombs et al. 2004, 198-199).

Transportation corridors, waterways, gravel pits, and industrial areas are common sites for diffuse knapweed infestations (Coombs et al. 2004, 198-199; Roche and Roche 1988). Diffuse knapweed is also known to invade well-managed rangelands (Sheley et al. 1998).

The two knapweeds have similar distribution patterns within the planning area, but diffuse knapweed is reported less frequently. See *Figure 3-60 (Distribution of spotted and diffuse knapweeds)* (WeedMapper 2004a). Both species are spread throughout the state. Spotted knapweed occurs on BLM-administered lands in all of the districts within the planning area, except for Eugene and Roseburg. Diffuse knapweed has been documented on BLM-administered lands in all of the districts within the planning area, except for Coos Bay and Medford.

Yellow Starthistle

Yellow starthistle is an invasive winter annual or, rarely, a biennial or short-lived perennial forb, which grows best in full light and dry conditions and is almost always found in disturbed areas or open grasslands dominated by annuals.

Yellow starthistle infestations can reach more than 6 million plants per acre (Callihan et al. 1993). At this density, yellow starthistle effectively displaces native plants; reduces wildlife habitats, species diversity, and land values; and limits access to recreational areas.

Figure 3-59. Distribution Of Scotch And French Brooms

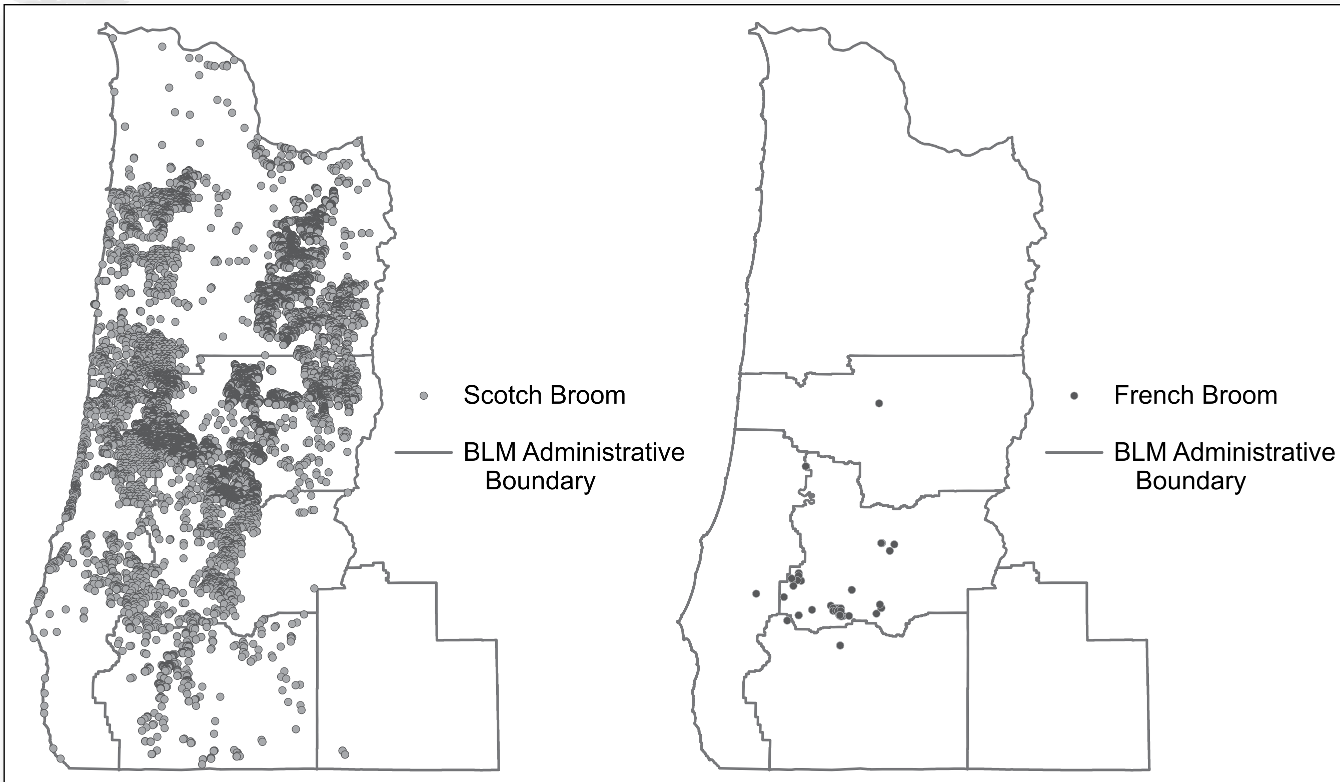


Figure 3-60. Distribution Of Spotted And Diffuse Knapweeds

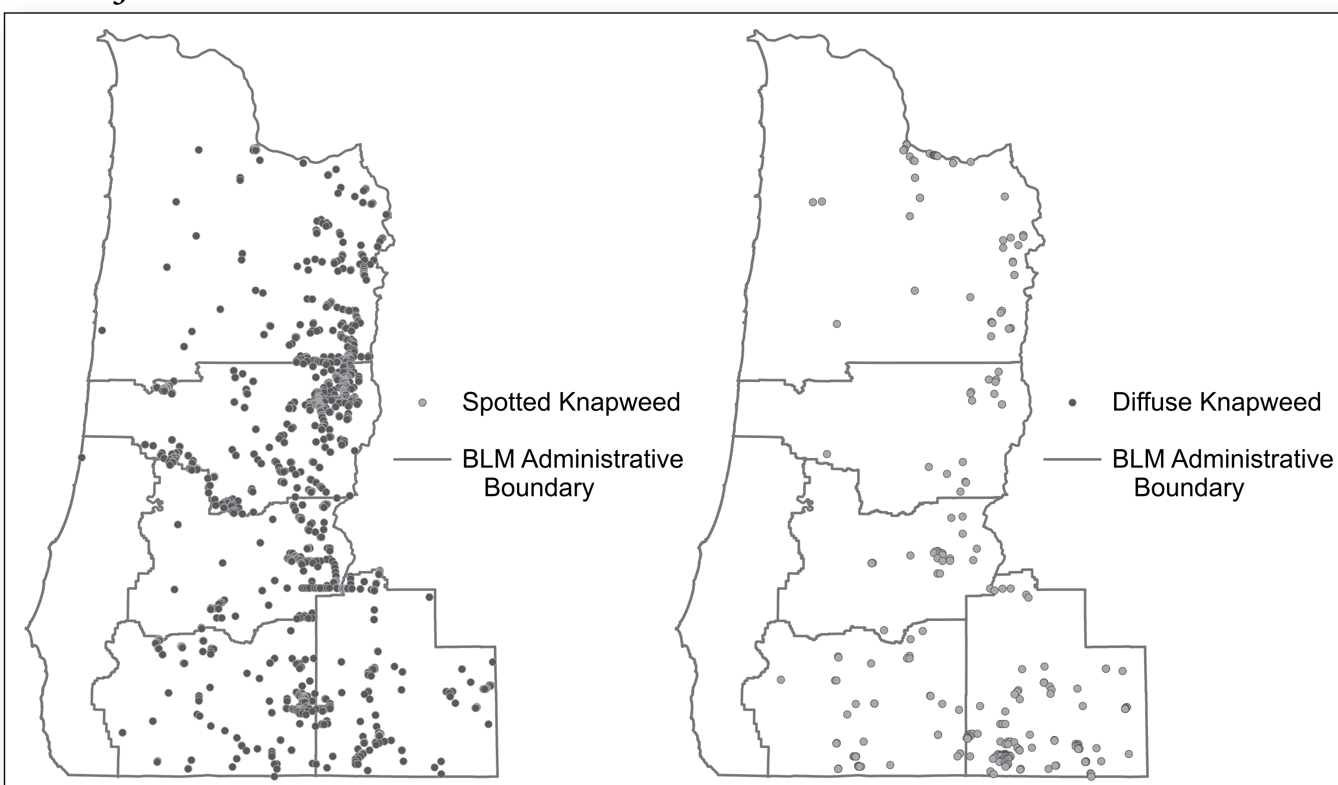
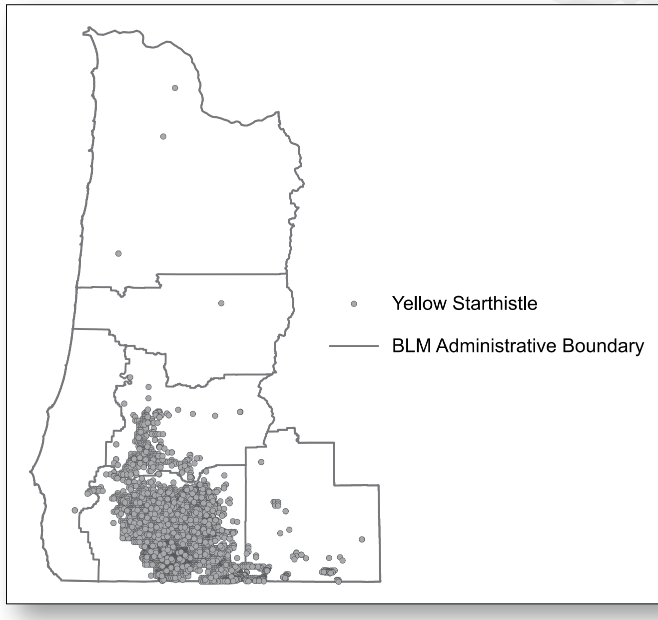


Figure 3-61. Distribution Of Yellow Starthistle



Seeds of yellow starthistle are dispersed short distances by wind and longer distances by animals and people. Yellow starthistle seeds may remain viable for up to 10 years (Callihan et al. 1993). Seeds are most often distributed long distances by such human activities as the movement of livestock, the movement of seeds on the undercarriage of vehicles and on road maintenance equipment, and the use of contaminated hay and crop seed (Healy and DiTomaso 2002, DiTomaso and Gerlach 2000). Yellow starthistle infestations have also been spread from gravel out of infested gravel pits to roadsides and other management activity sites (Roche and Roche 1988).

The yellow starthistle distribution pattern in Oregon is clustered in the northeast and southwest but is present in every physiographic province in the state. See *Figure 3-61 (Distribution of yellow starthistle)* (WeedMapper 2004a). Infestations of yellow starthistle are reported on BLM-administered lands in all of the districts within the planning area, except Salem.

Infestations of Invasive Plant Species

Some invasive plants (e.g., Scotch broom and purple loosestrife) have been intentionally introduced into the planning area for ornamental use or erosion control. Other species were introduced unintentionally by air, water, or transportation routes. Frequently, invasive plants are introduced by the movement of contaminated seed, agricultural materials, or animals; the use of contaminated equipment; and the spreading of infested gravel, road fill, and topsoil (USDI BLM 1996a).

Once introduced, these invasive plant species are spread primarily by vehicles, human activities, water, and wildlife. Initial infestations are often along roads and trails, landings, campgrounds, and other areas of high disturbance (Watterson and Jones 2006; Hansen and Clevenger 2005; and USDA USFS 2005a, 3-18, 3-23, 3-25, and 3-39). These source locations are present on both BLM-administered lands and other ownerships throughout the planning area. Occasionally, infestations are also introduced into relatively undisturbed areas (USDI BLM 2007d, 3-27).

Invasive plants are generally introduced and spread by human and management activities that result in ground disturbance and increased light. For example:

- Knotweed infestations are introduced along roads and waste areas as a result of human activity and then spread downstream during flood events (Hutchison 1992, Seiger 1991).
- False brome, knapweeds, Scotch broom, and other species also spread downstream after being introduced into stream systems (Watterson and Jones 2006).
- Logging trucks, off-highway vehicles, and trail bikes spread knapweed (Strang et al. 1979).
- Transportation corridors, waterways, gravel pits, and industrial areas are common sites for diffuse knapweed infestations (Roche and Roche 1988).

The likelihood of successful invasions and the vigor of infestations increase with the extent of ground disturbance and increased light levels (USDA USFS 2005a, 3-14 and 3-15; Allen and Hansen 1999; and Turner et al. 1997). Factors associated with timber harvesting activities that increase the chances of invasion include:

- increased light levels reaching the forest floor
- increased soil temperatures
- soil disturbance that can increase germination rates of seeds in a seed bank, or create seed beds (Nuzzo 2000, Parendes and Jones 2000, Heckman 1999, Bailey and Tappeiner 1998, Doyle et al. 1998, Titus et al. 1998, Outcalt and White 1981, Chen et al. 1996, Donald 1994, Kellman 1969, Neiland 1958)

Invasive plants are more likely to spread throughout a landscape where disturbance activities are evenly distributed than in landscapes where disturbance activities are spatially confined (USDA USFS 2005a, 3-14 & 3-15, and Appendix D, 7-17).

Reported weed sites for the invasive plant species described above show high densities of reported invasive plant sites in portions of all of the planning area. See *Figure 3-62 (Reported infestations of representative invasive plant species within the planning area)* and *Figure 3-63 (Distribution categories of invasive plant species for the fifth-field watersheds within the planning area)*.

The highest density fifth-field watersheds (shown in black on *Figure 3-63*) are those that have reported infestations on more than 25% of the square miles within them. The lightest gray areas represent fifth-field watersheds with reported infestations on 1% or fewer of the square miles within them, and the white areas show fifth-field watersheds with no reported infestations. The most expansive high-density invasive plant area is in the Medford District and extends north into the Roseburg and Coos Bay Districts. Expansive high-density invasive plant areas are also in the Eugene and Salem Districts.

Figure 3-62. Reported Infestations Of Representative Invasive Plant Species Within The Planning Area

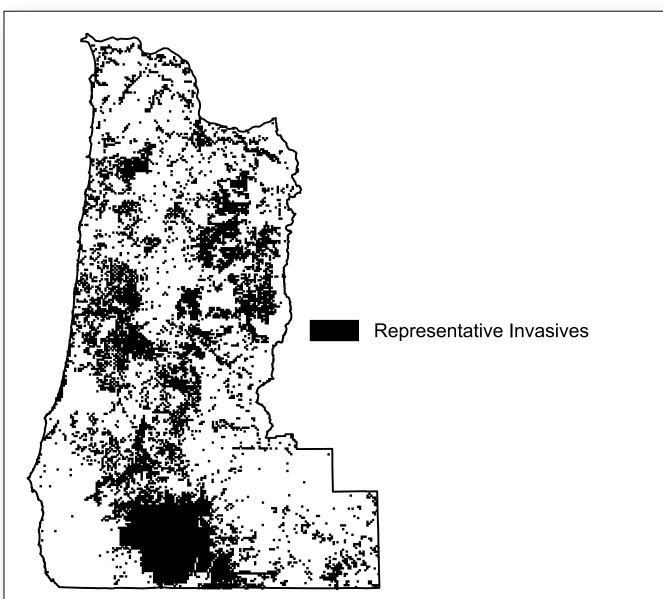
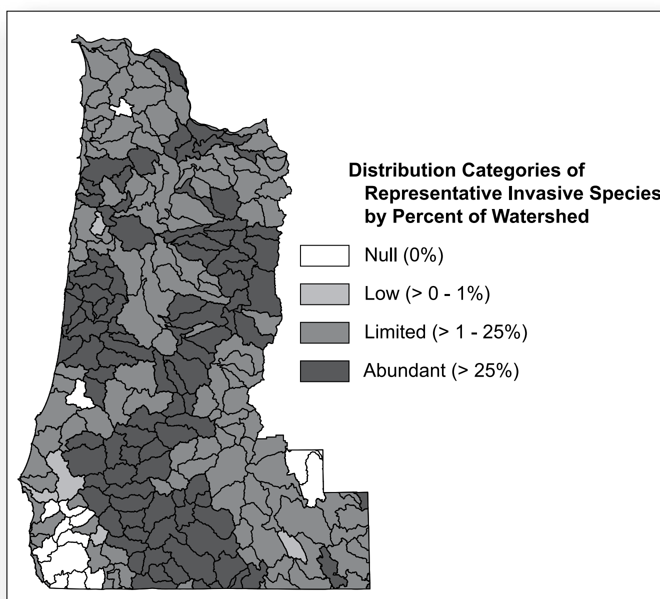


Figure 3-63. Distribution Categories Of Invasive Plant Species For The Fifth-Field Watersheds Within The Planning Area



Wildlife

Key Points

- Between 1985 and 2003, northern spotted owl populations in western Oregon declined by 2.8% per year, with the highest declines occurring in the northern half of this area.
- Since 1995, the rate of loss of northern spotted owl habitat on federally administered lands in western Oregon due to timber harvest has been reduced.
- Since the northern spotted owl was listed in 1990, new threats to species conservation have triggered the development of additional, habitat-specific conservation needs for the spotted owl in the planning area.
- Since 1995, the threat of wildfire to northern spotted owl habitat in the planning area has increased due to past management practices that fundamentally changed fuel conditions. The threat is greater in southwestern Oregon which, between 1994 and 2003, experienced fires that were higher in severity than was typical of its fire regimes.

Within the planning area, the BLM manages habitats that range from coastal beaches to montane forests and Great Basin sagebrush. Several thousand vertebrate and invertebrate species occur in the western and montane forests of Oregon. Eleven species are protected under the federal Endangered Species Act. A subset of individual species is specifically addressed in this final environmental impact statement because of their importance in the analysis of the alternatives, the consultation with the U.S. Fish and Wildlife Service, or high public interest.

Northern Spotted Owl

In 1990, the U.S. Fish and Wildlife Service listed the northern spotted owl (*Strix occidentalis caurina*) as threatened under the Endangered Species Act of 1973, as amended (USDI USFWS 1990). The northern spotted owl was listed as threatened throughout its range in the United States "due to loss and adverse modification of suitable habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms" (Anderson et al. 1990). Significant threats to the northern spotted owl included low or declining populations, limited or declining habitat, poor distribution of habitat or populations, predation and competition, lack of coordinated conservation measures, and vulnerability to natural disturbance (USDI USFWS 1992b). The U.S. Fish and Wildlife Service issued the final approved recovery plan for the northern spotted owl (USDI USFWS 2008a) on May 16, 2008.

Since 1984, there have been 1,333 known northern spotted owl sites (resident pairs or singles) recorded on BLM-administered lands in the planning area. Of these active known sites, in 2007 and 2008, BLM resource area biologists estimated that 1,110 still should be considered as active based on the process described by USDI USFWS/BLM and USDA USFS (2007). The BLM discontinued mandatory pre-project northern spotted owl surveys in 1995; since then, surveys on BLM-administered lands within the planning area have been conducted most consistently within the four Oregon demographic study areas that include BLM-administered lands (Coast Range, Tyee, Klamath and South Oregon Cascades). The BLM data indicate that 645 of these known sites (58%) were occupied by territorial spotted owls at some time during 2000-2004. Not all 1,110 known sites were surveyed during this period.

In addition to these known spotted owl sites, 196 predicted spotted owl nest locations that were defined in 2007 and 2008, in accordance with USDI USFWS/BLM and USDA USFS (2007), were mapped on BLM-administered lands within the planning area. These are locations where, based on habitat conditions and distances from known spotted owl activity sites, there is a reasonable likelihood of spotted owl occupancy.

Biological Overview

The following documents are the most recent summaries of the biological condition of the northern spotted owl across its range:

- Status and Trends in Demography of Northern Spotted Owls, 1985-2003 (Anthony et al. 2004)
- Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al. 2004)
- Northern Spotted Owl Five-year Review: Summary and Evaluation (USDI USFWS 2004a)
- Status and Trends of Northern Spotted Owl Population and Habitat (Lint 2005)

Anthony et al. 2004 is the most recent meta-analysis of owl demographic data collected in 14 demographic study areas across the range of the northern spotted owl. Four of the study areas are in western Washington, six are in western Oregon, and four are in northwestern California. Summarizing this report, between 1985 and 2003:

- The northern spotted owl population declined over its entire range from Washington to California. Populations declined in nine demographic study areas and were stationary in four; population trend was undetermined in the Marin study area in California. The average population decline in the 14 areas was 3.7% per year. The decline was most pronounced in the four study areas in Washington (averaging 7.3% per year) and least pronounced in the four areas in California (averaging 2.2% per year).
- Within the six demographic study areas in western Oregon, populations declined in three and were stationary in three, with an average population decline in all six of 2.8% per year. However, within Oregon, population declines in the northern demographic study areas (Warm Springs, H.J. Andrews, and Coast Range), which averaged 4.9% per year, were more pronounced than in the southern demographic study areas (Tyee, South Oregon Cascades, and Klamath), where declines averaged less than 1% per year and populations statistically were stable.
- Comparing population trends on federal and non-federal lands, range-wide, the mean lambda (λ_{RJS}) for the eight demographic study areas on federal land was 0.976 (2.4% decline per year), compared to 0.942 (5.8% decline per year) in study areas on non-federal lands or with a mix of federal and non-federal lands. This suggested that northern spotted owl populations on federal lands had better demographic rates than elsewhere, but interspersion of land ownership in the study areas confounded the analysis. A similar, but less pronounced, trend was seen in western Oregon where the mean lambda for the three demographic study areas on federal land was 0.973 (2.7% decline per year), compared to 0.970 for those study areas with mixed ownerships (3.0% decline per year).
- Range-wide, adult survival rates declined in 5 of 14 study areas — all four study areas in western Washington and in the northwest California study area. This suggested that declines in adult survival rates might have been an important factor contributing to declining populations. However, in western Oregon, adult survival statistically was stable in all six study areas.

Courtney et al. 2004 was prepared for the U.S. Fish and Wildlife Service to "…report on the status of the northern spotted owl, summarizing and evaluating new information available since its listing, and any new understanding for information that existed at the time of listing" (USDI USFWS 2004a). The USFWS used Courtney et al. 2004 to assist its five-year status review of the northern spotted owl. The USFWS determined that the listing of the northern spotted owl as a threatened species still was warranted (USDI USFWS 2004a). Even though some risk factors had declined (e.g., habitat loss due to timber harvesting), other factors had continued (e.g., habitat loss due to wildfire and spotted owl population decline) and new risk factors with uncertain effects had developed since 1990 (e.g., potential competition from the barred owl [*Strix varia*], West Nile virus, and sudden oak death) (USDI USFWS 2004a).

Lint (2005) reported on the effects that the first 10 years of implementation of the Northwest Forest Plan had on the population and habitats of the northern spotted owl. His findings included:

- The estimated decline of the northern spotted owl population varied from 0 to 10% across the study areas in the Northwest Forest Plan area. The presence of barred owls, weather, past and present harvesting of habitat, wildfire, and insect infestations that alter habitat were possible contributors to those declines.
- Approximately 74% of the federal lands within the range of the northern spotted owl were capable of providing suitable habitat. Approximately 50% of the habitat capable area was providing suitable owl habitat.
- Precipitation, owl age, and habitat condition influence the survival and productivity of the northern spotted owl.
- The barred owl is present throughout the range of the northern spotted owl, so the likelihood of competitive interactions between the species raises concerns as to the future of the northern spotted owl.
- Barred owls, West Nile virus, and the management of suitable habitat for the northern spotted owl in fire-prone areas are likely to be future management concerns.

Northern Spotted Owl Habitat

This analysis addresses those portions of the planning area that are "habitat-capable" with respect to providing habitat conditions potentially used by northern spotted owls, excluding areas that cannot support habitat (e.g., because of soil limitations) or will not support owl nesting (e.g., because of high elevation) (see Lint 2005, Figure 3-7).

Suitable habitat for the northern spotted owl (which supports nesting, roosting and foraging) was described by Thomas et al. (1990, p. 164) as "multi-layered, multispecies canopy dominated by large (greater than 30 inches diameter at breast height) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods; a moderate to high (60 to 80%) canopy closure; substantial decadence in the form of large, live conifer trees with deformities—such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags; ground cover characterized by large accumulations of logs and other woody debris; and a canopy that is open enough to allow owls to fly within and beneath it." Although subsequent research has refined this definition, it remains valid[2] (Courtney et al. 2004, Chapter 5).

Dispersal habitat for the northern spotted owl, which supports owl movement and survival (but not typically nesting), is comprised of forest stands with an average trunk diameter of at least 11 inches (when measured at a person's breast height); an average canopy closure of at least 40 percent; and structural components, such as snags and coarse woody debris, that support prey species (Thomas et al. 1990, pp. 27-29 and Appendix J and Courtney et al. 2004, Chapter 5).

The BLM, in cooperation with the U.S. Fish and Wildlife Service, developed the quantitative definitions of northern spotted owl habitats (i.e., the stand attributes that the BLM used to classify each stand as non-habitat, dispersal habitat or suitable habitat) shown in Table 88 of the Draft EIS (USDI BLM 2007, pp. 287-288). Habitat data for BLM-administered lands came from BLM operations inventory data and the BLM OPTIONS model[3]. Data for private, state and other federal lands came from 1996-vintage Interagency Vegetation Mapping Project (IVMP) data, which were updated using 2002 and 2004 data on clearcuts and stand-replacement fires.

[2]Studies in the California Klamath and Coast Range provinces (e.g., Dugger et al. 2005) found that habitat comprised of a mixture of older and younger forests supported owl reproduction better than habitat comprised almost exclusively of older forest. However, other studies have not supported that conclusion. Given the checkerboard land ownership pattern associated with BLM-administered lands in much of the planning area, homogeneity of older forest was not considered to be a management issue.

[3]Forest stands that initially were classified as "dispersal" were reclassified as "suitable" if they also met the structural stage classification definition of "mature multiple canopy" or "structurally complex" (USDI BLM 2007, 941-945); and, in the Salem District only, "suitable" stands with trees of a quadratic mean diameter of 11-20 inches were reclassified as "dispersal" due to regional considerations of treatment history, which placed the majority of stands toward the lower end of the 11-inch to 20-inch scale, and regional differences in the development of northern spotted owl nesting structure within stands within these classifications.

The BLM-administered lands in the planning area support 1,029,000 acres of suitable habitat and an additional 327,000 acres of dispersal habitat. These comprise 47% and 15%, respectively, of habitat-capable acres on BLM-administered lands. In 1994, about 7.4 million acres of suitable habitat were estimated to exist on all federal lands managed under the Northwest Forest Plan. As of April 12, 2004, the U.S. Fish and Wildlife Service had consulted on the removal or downgrading of about 190,500 of those acres (2.6% of 7.4 million acres) as a result of all management actions. An additional 187,000 acres of suitable habitat (2.5%) were estimated to have been lost during this period to stochastic events (USDI BLM 2007, Appendix H). About two-thirds of the stochastic loss was attributed to the 2002 Biscuit Fire, which burned more than 500,000 acres in southwest Oregon (Rogue River basin) and northern California. This fire resulted in a loss of approximately 113,451 acres of northern spotted owl suitable and dispersal habitats, including habitat within five late-successional reserves. Approximately 18,630 acres of northern spotted owl habitat were lost to the B&B Complex and Davis fires in the Eastern Cascades Province.

Geographic Areas of Concern

Areas of concern for the northern spotted owl were identified and discussed (but not specifically delineated by USDA USFS 1988 and 1991, Anderson et al. 1990, Tweten 1992 and USDI USFWS 1992a, among others) for their "poor distribution and quality of existing habitat in some areas; high level of natural and man-made fragmentation; and localized deficiencies in habitat connectivity" (USDA USFS 1991, 3&4–27). These areas are "of concern" because of the risk that management activities could create regional barriers, or strong filters, to owl movement and demographic interchange across the landscape.

Historically, demographic and genetic interchanges between northern spotted owl populations in the Cascades Mountains and the coastal mountains were facilitated by a variety of forest segments in Washington, Oregon and northern California. However, during the past century, most of these habitat segments have been supplanted by urban or agricultural development or habitat fragmentation from timber harvest.

Forsman et al. (2002, 11-12) identified three remaining forested segments in the planning area between the Cascade and Coast Range mountains. These were located between the Willamette and Umpqua valleys, the Umpqua and Rogue valleys, and south of the Rogue Valley. Tweten (1992) called these, respectively, the South Willamette-North Umpqua Area of Concern, and the Rogue-Umpqua and Ashland portions of the I-5 Area of Concern (herein referred to the Rogue-Umpqua Area of Concern and the Ashland Area of Concern). All three included BLM-administered lands in the planning area. With respect to their importance for northern spotted owl conservation, Forsman et al. (2002, 30) concluded:

> *"In recent efforts to develop management plans for the northern spotted owl it has been assumed that [these three] forested regions between the large lowland valleys of western Oregon function as dispersal pathways for northern spotted owls between the Coastal Mountains and Cascades Mountains (Thomas et al. 1990, FEMAT 1993). The data clearly demonstrate that this is the case, and that concerns regarding the importance of these areas as dispersal 'corridors' for northern spotted owls are warranted."*

The northern-most of these three "dispersal corridors" is the only forested segment between central Oregon and the Canadian border that links the Cascade Mountains and coastal mountains.

Conservation Needs of the Northern Spotted Owl

Thomas et al. (1990, 23-27) proposed that northern spotted owl conservation required:

- Large blocks of nesting, roosting, and foraging habitat (i.e., suitable habitat) that support clusters of reproducing owls, distributed across a variety of ecological conditions and spaced so as to facilitate owl movement between the blocks, and;

- Habitat conditions within and surrounding large blocks of suitable habitat that facilitate owl movement between the blocks and ensure the survival of dispersing owls.

Fourteen years after Thomas et al. (1990), Courtney et al. (2004, Chapter 9) concluded that, although subsequent northern spotted owl research had refined these conservation needs, they remained valid.

Subsequent to 2004, the U.S. Fish and Wildlife Service began identifying two additional "habitat-specific" conservation needs in its biological opinions[4]:

- A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the northern spotted owl's range, and a monitoring program to clarify whether these risk reduction methods are effective and to determine how owls use habitat treated to reduce fuels, and;
- In areas of significant population decline, the application of the full range of survival and recovery options for this species in light of significant uncertainty.

The U.S. Fish and Wildlife Service added these conservation needs because of findings that the range-wide loss of suitable habitat to wildfire, especially in southern Oregon, posed a greater threat to northern spotted owl conservation than previously had been thought (Courtney et al. 2004, Chapter 6) and because of observed declines in the spotted owl population documented by Anthony et al. (2004).

Conservation Need 1

The formation of large blocks of suitable habitat that support clusters of reproducing owls distributed across a variety of ecological conditions and are spaced so as to facilitate owl movement between the blocks.

Clusters of Reproducing Owls

Thomas et al. (1990, 24) and Lamberson et al. (1994) provided modeled and empirical evidence that "clusters" of at least 20 pairs of reproducing northern spotted owls, which supported one another demographically, were needed for subpopulation stability and persistence within a habitat block. In this context, demographic support means that reproducing owls are capable of interacting in such a manner that the subpopulation would remain stable. For example, the owls would not be so physically isolated from one another so as to repress their normal interactions. Therefore, a "large block of suitable habitat" consists of an arrangement and quality of habitat that is capable of supporting a cluster, or at least 20 pairs, of reproducing northern spotted owls that provide demographic support to one another.

Formation of Large Blocks of Suitable Habitat

A block of suitable habitat is comprised of suitable habitat that has a spatial arrangement (quantity and juxtaposition) needed to support at least one nesting northern spotted owl pair. As explained below, spatial arrangement is a function of the mean annual home range, which varies by physiographic province, and the minimum quantities of suitable habitat that must occur within both the home range and the 500-acre core area. These values are shown in *Table 3-25 (Metrics used to identify blocks of suitable habitat for the northern spotted owl).*

[4]The U.S. Fish and Wildlife Service, in its recent biological opinions, also identified two "habitat-independent" conservation needs: A coordinated research and adaptive management effort to better understand and manage competitive interactions between spotted and barred owls, and monitoring to better understand the risk of West Nile virus and sudden oak death to spotted owls and, for West Nile virus, research into methods that may reduce the likelihood or severity of outbreaks in spotted owl populations. This analysis does not address these conservation needs because, as habitat-independent, they would not be influenced by BLM management in the planning area.

Table 3-25. Metrics Used To Identify Blocks Of Suitable Habitat For The Northern Spotted Owl

Oregon Physiographic Province	Mean annual home range (acres)	Radius of a circle equal in size to the mean annual home range (miles)	Calculated minimum quantity of suitable habitat within a mean annual home range (acres)	Calculated minimum quantity of suitable habitat within a 500-acre core area (acres)
West Cascades	2,900	1.2	1,450	250
Coast Range	4,520	1.5	2,260	250
Klamath	3,400	1.3	1,700	250

The size of the mean annual home range in each physiographic province[5] is based on Thomas et al. (1990, Appendix I) and Courtney et al. (2004, Chapter 5). Thomas et al. (1990:194) first tabulated the median annual home ranges of northern spotted owl pairs in different study areas and physiographic provinces. According to Courtney et al. (2004, 5-5), although the size of a northern spotted owl home range differed by physiographic province and forest type, and among individual owls within a study area, research between 1990 and 2004 showed that provincial variations were similar to those originally tabulated by Thomas et al. (1990, 194).

The "calculated minimum quantity of suitable habitat within a mean annual home range" for each province, shown in *Table 3-25* (*(Metrics used to identify blocks of suitable habitat for the northern spotted owl)* was based on Courtney et al. (2004, Chapter 5), Olson et al. (2004) and Dugger et al. (2005). It was a multiple of the mean annual home range and the minimum quantity of suitable habitat (50%) that should occur within that area to support owl survival and reproduction. Even though the quantity of suitable habitat is not the best predictor of owl reproduction and survival, and the observed quantities of suitable habitat within occupied owl home ranges vary by region and by study, in general, a northern spotted owl territory is considered to be unstable when less than 50% of the land within the home range supports suitable habitat. See Courtney et al. (2004, Chapter 5), Olson et al. (2004), Dugger et al. (2005) and USDI USFWS (2005b).

The BLM used several studies to estimate the size of, and the minimum quantity of suitable habitat within, a functional core area. Bingham and Noon (1997) defined the core area as that portion of a northern spotted owl home range that received disproportionately high use for nesting, roosting and access to prey; they suggested that 60-70% of owl reproducing season activity occurred in about 20% of the home range. Even though observed core area sizes varied greatly among owls (Courtney et al. 2004, 5-5), Thrailkill (pers. comm.) determined that Bingham and Noon 1997, Wagner and Anthony 1999, Franklin et al. 2000, and Irwin et al. 2004 collectively suggested a core area of about 500 acres. Meyer et al. 1998 and Zabel et al. 2003 found that their best fitting models for predicting owl occupancy also were at the 500-acre scale. Based on several studies (Bart 1995, Franklin et al. 2000, Zabel et al. 2003, and Dugger et al. 2005), 250 acres (50% of a 500-acre core area) was the minimum quantity of suitable habitat that must occur within the core area to form a stable nesting territory.

Because Conservation Need 1 is not specific to BLM-administered lands, this analysis mapped blocks of suitable habitat across all land ownerships. This analysis "moved" a 500-acre (core area) circle over the planning area, centering it on each 25 meter × 25 meter pixel in turn, and calculated the acres of suitable habitat on all lands within that circle. For those core areas that met or exceeded 250 acres (50%) in suitable habitat, the analysis calculated the acres of suitable habitat within the associated provincial mean annual home range. (The province-specific radius of such a circle is shown in *Table 3-25 [Metrics used to identify blocks of suitable habitat for the northern spotted owl])*. For home ranges that fell in more than one province,

[5]Metrics are not included for either the Eastern Cascades or Willamette Valley physiographic provinces because neither Thomas et al. (1990) nor Courtney et al.(2004) estimated mean annual home ranges of those provinces. For purposes of the analysis, the metrics for the West Cascades Province were applied to the Eastern Cascades Province. The Willamette Valley Physiographic Province is not capable of supporting habitat blocks (Lint 2005, Figure 3-7).

the analysis used the province-specific metrics appropriate for the center of the home range circle.) Where the amount of suitable habitat within the larger circle also met or exceeded the "calculated minimum quantity of suitable habitat within a mean annual home range" shown in *Table 3-25 (Metrics used to identify blocks of suitable habitat for the northern spotted owl),* the analysis identified all lands within the mean annual home range circle, collectively, as a block of suitable habitat. Such a block has both the minimum quantity and spatial arrangement of suitable habitat needed to support a pair of reproducing northern spotted owls.

Where blocks of suitable habitat touched or overlapped, the analysis aggregated those blocks into a single block of suitable habitat. This threshold was based on the expectation that northern spotted owl pairs would be less able to support each other demographically, which is a requirement of an owl cluster, when their potential nest locations were separated by more than the diameter of the mean annual home range.

As described above, a "large block" of suitable habitat is capable of supporting at least 20 pairs of reproducing northern spotted owls. The minimum size of a large block was determined using the formula proposed by Thomas et al. (1990, 198):

- 20 owl pairs × the median annual pair home range size × 0.75.

The function 0.75 accounted for the estimated 25% overlap of home ranges (Thomas et al. 1990). This formula generated the minimum area of a large block of suitable habitat in each province. See *Table 3-26 Metrics used to identify and map large blocks of suitable habitat for the northern spotted owl).*

In accordance with the formula provided by Thomas et al. (1990, 198), if all lands within a habitat block equaled or exceeded the "minimum area of a large habitat block" shown in *Table 3-26* (*Metrics used to identify and map large blocks of suitable habitat for the northern spotted owl)*, the analysis defined that block as a large block of suitable habitat. (Where a block occurred in more than one province, the analysis used the minimum area metric for the province in which the majority of the block occurred.) The remaining blocks remained classified as "small" blocks of suitable habitat.

Distribution of Large Blocks of Suitable Habitat

Thomas et al. (1990:318) considered large blocks of suitable habitat to be distributed across a variety of ecological conditions when they occurred within the full range of ecological gradients (i.e., in all environmental regions of a landscape). In the Northwest Forest Plan (USDA USFS and USDI BLM 1994b, A-3), ecological gradients were defined by the boundaries of the physiographic provinces, which differentiated "areas of common biological and physical processes." This analysis also used the physiographic provinces to express ecological condition.

Spacing of Large Blocks of Suitable Habitat

Thomas et al. (1990, 25-26) considered large blocks of suitable habitat to be spaced properly (so as to facilitate northern spotted owl movement between the blocks) where those blocks were spaced no more

Table 3-26. Metrics Used To Identify And Map Large Blocks Of Suitable Habitat For The Northern Spotted Owl

Physiographic Province	Mean annual home range (acres)	Minimum area of a large habitat block (acres)
West Cascades	2,900	43,500
Coast Range	4,520	67,800
Klamath	3,400	51,000

than 12 miles apart. For small blocks of habitat that were capable of supporting 1 to 19 owl pairs, the distance dropped to no more than 7 miles apart.

Current Habitat Conditions

Current habitat conditions are displayed on *Map 3-4 (The current [2006] distribution of large and small habitat blocks for the northern spotted owl on all land ownerships in the planning area)*. The purple lines are plotted 6 miles from large habitat blocks indicating where large habitat blocks are spaced no more than 12 miles apart. Pink lines are plotted 3.5 miles from all habitat blocks, indicating where small habitat blocks are spaced no more than 7 miles from other small or large habitat blocks.

Currently, the planning area supports large blocks of suitable habitat in all physiographic provinces[6]. However, as indicated by the purple lines on *Map 3-4*, there currently are spacing gaps of greater than 12 miles between some large habitat blocks. In the West Cascades and Klamath Provinces, as indicated by the pink lines that surround all habitat blocks, small habitat blocks currently are helping to provide the correct spacing between several large habitat blocks. In some locations (e.g., the gap between large habitat blocks northeast of Eugene), this support is limited.

In the Coast Range Province, current habitat conditions support only two large habitat blocks, both of which are poorly distributed within the province and isolated from large habitat blocks in the other provinces. In addition, small habitat blocks in the Coast Range Province are not positioned to support owl movement throughout most of the province, or between the large habitat blocks in the Coast Range Province and the Klamath and West Cascades Provinces.

Therefore, current habitat conditions in the planning area do not meet Conservation Need 1 because the distribution and spacing of large and small habitat blocks in the Coast Range Province do not meet the spacing criteria.

Conservation Need 2

Habitat conditions within and surrounding large blocks of suitable habitat that facilitate owl movement between the blocks and ensure the survival of dispersing owls

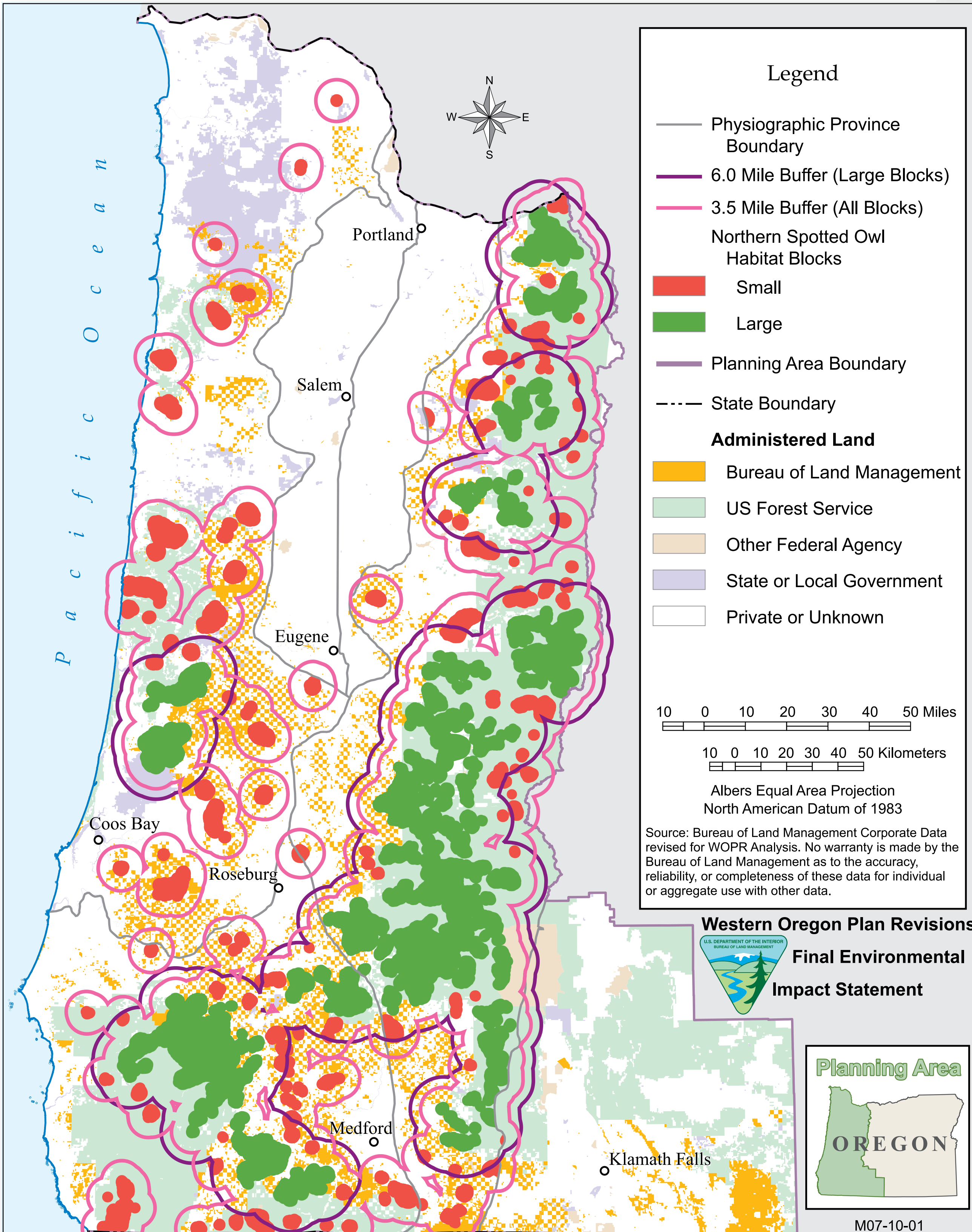
Habitat Conditions Within and Surrounding Large Blocks

Even though Thomas et al. (1990, 27-29 and Appendix J) and Courtney et al. (2004, Chapter 5) defined the minimum structural characteristics of dispersal habitat, the science on the northern spotted owl does not define the minimum quantity or spatial arrangement of such habitat needed to support owl movement between the blocks or the survival of dispersing owls. Instead, Thomas et al. (1990, 27 and 309-310) proposed that, if 50% of the land in a regulated forest supported stands that were older than 40 years (i.e., had an average trunk diameter of at least 11 inches and a canopy closure of at least 40%), and were managed in association with stands of older forest (e.g., visual and riparian corridors, and stands harvested on relatively long rotations), "We would expect much of that managed landbase to be suitable for passage by dispersing northern spotted owls." Although Forsman et al. (2002) subsequently examined northern spotted owl dispersal, the relationship between the degree of forest fragmentation and the movement and survival of dispersing owls was beyond the scope of their study (Forsman et al. 2002, 22). Therefore, the criteria proposed by Thomas et al. (1990) remain the best for evaluating minimum habitat conditions within and surrounding large blocks of suitable habitat that facilitate owl movement between the blocks and ensure the survival of dispersing owls.

[6]The BLM did not anticipate that the Willamette Valley Physiographic Province would support habitat blocks as per Lint 2005, Figure 3-7.

Map 3-4. The Current (2006) Distribution Of Large And Small Habitat Blocks On All Land Ownerships Within The Planning Area

(Note: Purple and pink lines reflect habitat block spacing requirements as described in the text.)



In addition to their criteria, Thomas et al. (1990, 23) stated that "Habitats between blocks [of suitable habitat] function better to allow owls to move (disperse) through them the more nearly they resemble suitable habitat…." Their determination was supported by subsequent research (Courtney et al. 2004, Chapter 5).

This analysis examined development of both dispersal habitat and suitable habitat at the fifth-field watershed scale. Watersheds at this scale typically are sufficiently large to contain multiple northern spotted owl pairs, and the principle management concern for this analysis is to evaluate owl movement between (as opposed to within) potential territories. Deficiencies in dispersal capability at the scale of the fifth-field watershed would better indicate potential problems with owl movement and survival than deficiencies in dispersal capability at finer scales (Thrailkill pers. comm.).

Although both dispersal habitat and suitable habitat types support owl movement and survival, suitable habitat supports those functions better. The analysis tallied development of dispersal habitat at thresholds of 10, 25, and 50% of the land base. As described above, even though the attainment of 50% in association with older stands was considered to be necessary to support owl movement and survival, lesser threshold amounts were included to evaluate departure from minimum necessary conditions. The analysis also tallied development of suitable habitat at thresholds of 10, 25, and 50% of the land base. Even though the attainment of 50% suitable habitat within the core area and the annual home range were considered to be the minimum quantity necessary to support stable northern spotted owl nest territories, lesser threshold amounts were included to evaluate departure from minimum necessary conditions.

Geographic Areas of Concern

The analysis evaluated habitat conditions within the three areas of concern identified by Forsman et al. (2002, 11-12). Although the areas of concern have been identified and described in many studies, they never have been specifically delineated. This analysis used data generated by the previous analyses to evaluate dispersal and suitable habitat conditions within those fifth-field watersheds that the BLM and U.S. Fish and Wildlife Service biologists felt were representative of each area of concern. This identification of the areas of concern by representative fifth-field watersheds is done solely for the purposes of this analysis and does not imply any delineation of the areas of concern.

Current Habitat Conditions

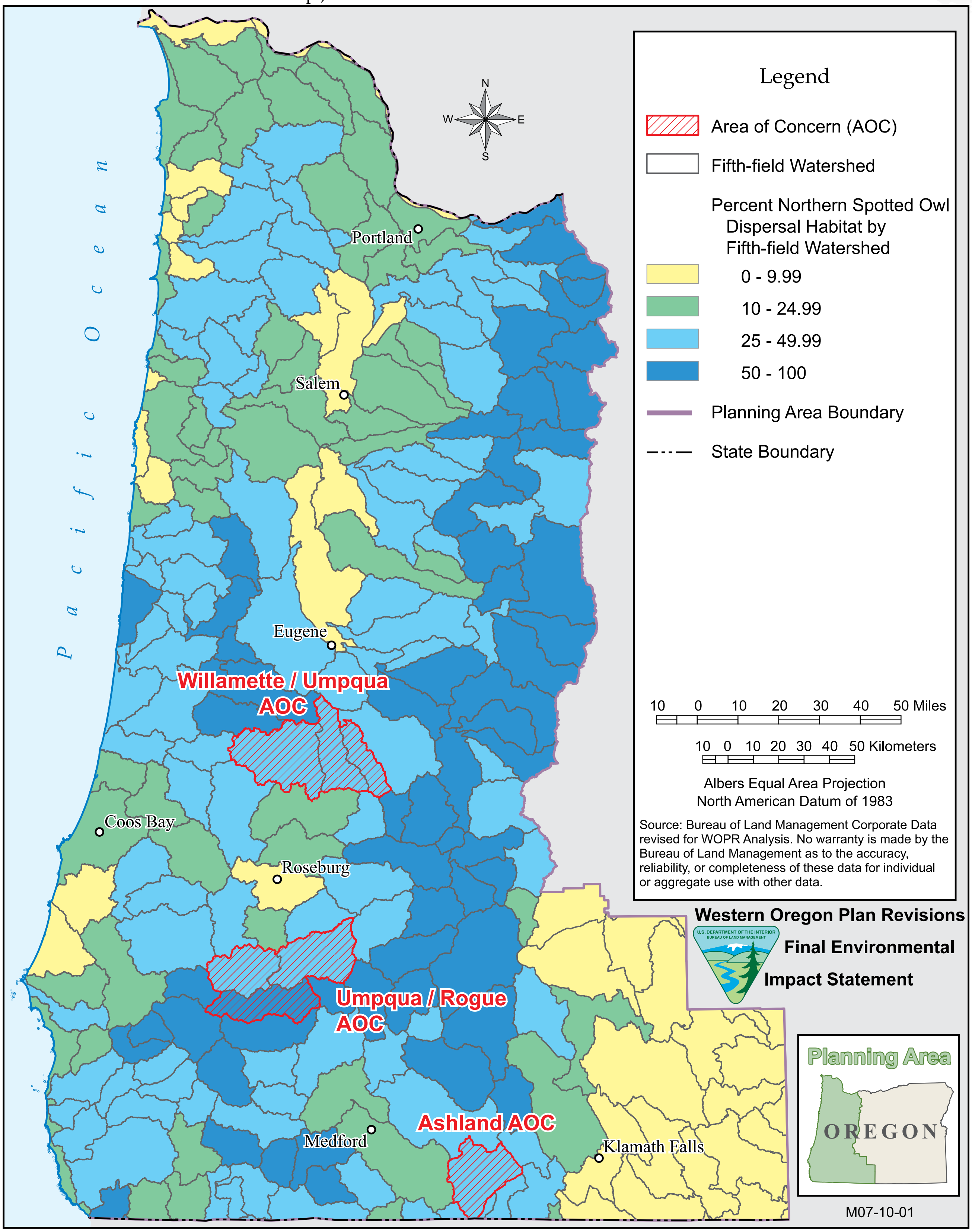
See *Map 3-5 (The current [2006] proportion of northern spotted owl dispersal habitat, on all land ownerships, within each fifth-field watershed of the planning area)*. In the West Cascades Province, functional watersheds (i.e., watersheds that support at least 50% dispersal habitat) are well distributed throughout all but the extreme southern portion of the province. However, functional watersheds are distributed poorly in the Klamath Province and are isolated in the Coast Range Province. In the Klamath Province, habitat conditions appear to be insufficient to support owl movement and survival throughout most of the province and appear to support only limited owl connectivity with the West Cascades Province. In the Coast Range Province, habitat conditions appear to be insufficient to support owl movement and survival throughout most of the province or to provide owl connectivity with the other provinces.

Map 3-6 (*The current [2006] proportion of northern spotted owl suitable habitat, on all land ownerships, within each fifth-field watershed of the planning area)*, shows the current portion of better-quality dispersal habitat (i.e., suitable habitat). Although 50 percent suitable habitat in an area the size of a provincial home range is considered to be the minimum quantity needed to support nesting, lesser (but undetermined) quantities of suitable habitat are expected to facilitate owl movement and survival. *Map 3*-6, therefore, augments Map *3-5*.

As shown in *Map 3-6,* only two fifth-field watersheds currently support 50 percent or more suitable habitat. However, the distribution of watersheds that support at least 25 percent suitable habitat indicates that habitat

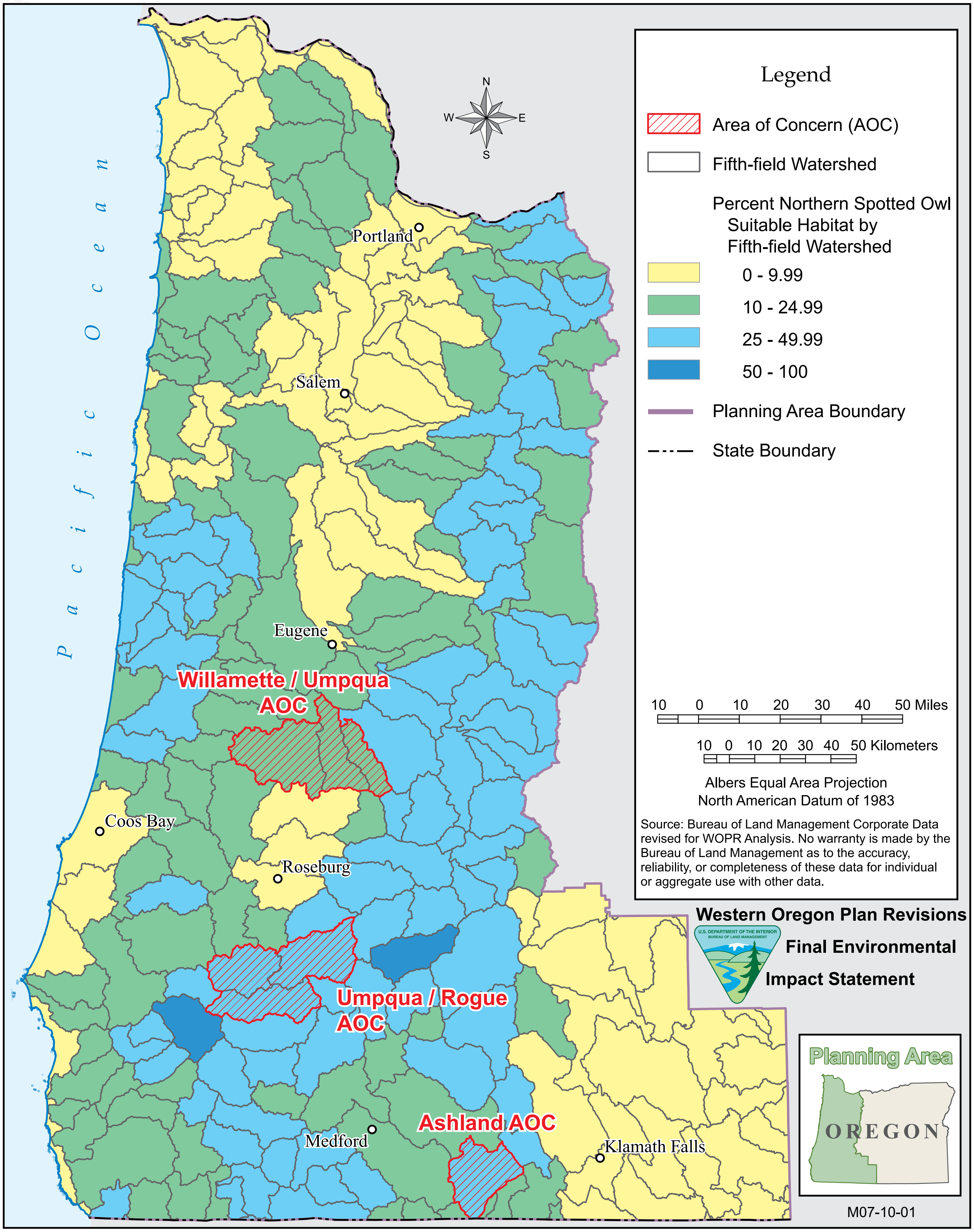
Map 3-5. The Current (2006) Proportion Of Northern Spotted Owl Dispersal Habitat, On All Land Ownerships, Within Each Fifth-Field Watershed Of The Planning Area

(Note: Watersheds that represent the South Willamette-North Umpqua, Umpqua-Rogue, and Ashland Areas of Concern also are indicated on this map.)



Map 3-6. The Current (2006) Proportion Of Northern Spotted Owl Suitable Habitat, On All Land Ownerships, Within Each Fifth-Field Watershed Of The Planning Area

(Note: Watersheds that represent the South Willamette-North Umpqua, Umpqua-Rogue, and Ashland Areas of Concern also are indicated on this map.)



quality in the extreme southern portion of the West Cascades Province allows these watersheds to support owl movement and survival better than is suggested by *Map 3-5*. In addition, *Map 3-6* suggests better connectivity between the West Cascades and Klamath Provinces, and less fragmentation among watersheds with better-quality dispersal habitat in the Klamath Province, than is suggested by *Map 3-5*. However, *Map 3-6* supports *Map 3-5* in illustrating the current limitation of dispersal habitat conditions in the Coast Range Province, and the apparent inadequacy of connectivity between watersheds in that province and watersheds in the Klamath and West Cascades Provinces.

Map 3-5 and *Map 3-6* also show, respectively, the portion of dispersal and suitable habitats within those watersheds that represent the three areas of concern. As shown in *Map 3-5 (The current [2006] proportion of northern spotted owl dispersal habitat, on all land ownerships, within each fifth-field watershed of the planning area),* only one of three watersheds within the Umpqua-Rogue Area of Concern currently supports sufficient dispersal habitat; habitat conditions in the other two watersheds in the Umpqua-Rogue Area of Concern and in the other two areas of concern are inadequate.

However, *Map 3-6* (*The current [2006] proportion of northern spotted owl suitable habitat, on all land ownerships, within each fifth-field watershed of the planning area)* indicates that spotted owl movement and survival through the Umpqua-Rogue and the Ashland areas of concern are facilitated by better-quality dispersal habitat in those watersheds, even though the quantity of dispersal habitat is inadequate. Both maps indicate that current habitat conditions in the South Willamette-North Umpqua Area of Concern are incapable of supporting owl movement and survival.

Therefore, current habitat conditions on all ownerships in the planning area do not meet Conservation Need 2 because, except in the West Cascades Province, they do not facilitate owl movement between large blocks of suitable habitat or ensure the survival of dispersing owls.

Conservation Need 3

A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the spotted owl's range, and a monitoring program to clarify whether these risk reduction methods are effective and to determine how owls use habitat treated to reduce fuels

Even though wildfire is one of the principal threats to the conservation of the northern spotted owl (Courtney et al. 2008, pp. 13-15), the scientific understanding of how northern spotted owls respond to wildfire is limited due, in part, to limited data, different methods of data collection, and differences between expected and observed owl uses of burned habitat (for example, see Courtney et al. 2004, Chapter 6, 4.7). This is especially true of fires that are less severe (i.e., are not stand-replacement fires) or occur in northern spotted owl habitats that are not yet suitable, or both.

According to the fire regime classification for western Oregon (see the *Fire and Fuels* section), the Coast Range and West Cascades Provinces are primarily within fire regimes III and V, which experience infrequent (every 35 to 200+ years) but severe (stand-replacement) fires, and the Klamath Province is primarily within fire regime I, which experiences more frequent (every 0 to 35 years) but less-severe (surface) fires.

On federally administered lands throughout the range of the northern spotted owl, between 1994 and 2003 stand-replacement fires removed 1.3% of spotted owl nesting habitat (Lint 2005, 56). While this loss of nesting habitat was negligible at the range-wide scale, loss of habitat to wildfire was locally severe where major fires occurred. Lint (2005, pp. 56-63) found that, on all federally administered lands in western Oregon between 1994 and 2003, the Klamath Province lost 6.6% of its northern spotted owl nesting habitat to stand-replacement wildfire, compared to a 0.8% loss in the West Cascades Province and no measurable loss in the Coast Range Province. The loss of habitat in the Klamath Province was due mainly to the Biscuit fire, which burned almost 500,000 acres in Oregon and California and was one of the largest fires in Oregon history. According to Courtney et al. (2004, 6-24 and 6-25), between 1994 and 2003, 50% of the natural disturbance habitat loss that occurred within the range of the northern spotted owl can be attributed to the Biscuit fire. So the occurrences of fire between 1994 and 2003 could be interpreted only as a "snapshot" of fire occurrence, and extrapolation to longer term patterns of fire occurrence must be done with caution.

However, as is discussed in the Fire and Fuels section of this chapter, there is an emerging trend toward higher severity fires in southern Oregon due to past management practices that have fundamentally changed historic fuel conditions; i.e., southern Oregon will continue to experience fires that are higher in severity than typical of its fire regimes. This was supported by Davis (pers. com.), who found that, among the physiographic provinces in the planning area, the potential for high quality[7] northern spotted owl habitat to be lost to fire appeared to be substantially greater in the Klamath Province and the southern half of the West Cascades Province, than in the Coast Range Province or the northern half of the West Cascades Province[8].

To evaluate the potential loss of habitat due to catastrophic wildfire in the planning area, this analysis focused on the quantities of northern spotted owl habitat in high, low, and mixed fire severity regimes, and on the resiliency of these habitats to withstand fire. Because the BLM "adaptive management effort" referenced in the recovery plan (USDI USFWS 2008a) is confined to BLM-administered lands, this analysis evaluated these variables only on BLM-administered lands.

Fire Severity

A high severity burn typically consumes most of the vegetation in the burn area — a stand replacement fire. High fire severity presents a high risk of loss of northern spotted owl habitat. In contrast, a low severity burn typically consumes mostly ground litter and surface fuels, and causes little or no damage to surrounding trees. In a mixed severity burn, portions of the burn area might receive little or no damage to vegetation, whereas other portions receive substantial damage and all stages in between.

See *Table 3-27 (Associations between northern spotted owl habitats, structural stages and fire severity regimes) for general relationships among these factors.* Although they are not exact, these relationships provide a sufficient basis to evaluate the current conditions and trends with respect to this conservation need.

Fires in the mature structural stages generally are of low severity. This is because such stands have relatively high, closed canopies that inhibit development of understory vegetation and reduce fuel loads. This lessens the likelihood of a heat-intensive burn and commonly places the canopy above the reach of a cooler ground fire (USDA USFS 1982). Structurally complex forests typically are subject to mixed severity burns because such stands exhibit forest openings that foster the growth of understory vegetation and, consequently, higher fuel loads and higher-temperature burns (USDA USFS 1982). Structurally complex stands also exhibit multiple canopy layers that foster the movement of fire into the crown canopy. Because spotted owl suitable habitat generally falls within the mature or structurally complex structural stages, it generally is not subject to high severity fire.

Table 3-27. Associations Between Northern Spotted Owl Habitats, Structural Stages, And Fire Severity Regimes.

Northern Spotted Owl Habitats	Structural Stages	Fire Severity Regimes
Dispersal	All Young High Density	High
	Mature Single Canopy	Low
Suitable	Mature Multiple Canopy	Low
	All Structurally Complex	Mixed

[7]In this context, "high quality" spotted owl habitat is defined as lands that support at least 60 percent suitable habitat within a 0.50-mile radius circle (Davis pers. comm.)

[8]Davis (pers. comm.) measured the relative fire risk of a stand as a function of its biological and geographical condition, the area frequency of lightening strikes, and its distance from the nearest road.

evaluated only in the Klamath Falls Resource Area and the Medford District where there is an emerging trend toward higher severity fires.

A fire resilient stand has legacy trees. The stand structural stages that exhibit fire resiliency are: mature, structurally complex, stand establishment with legacy, young high density with legacy, and young low density with legacy structural stages.

Current Habitat Conditions

Fire severity is discussed separately for the southern and northern portions of the planning area due to the regional differences in fire severity regimes discussed above. See *Table 3-28 (Acres of northern spotted owl suitable and dispersal habitat on BLM-administered lands currently [2006] in low, high and mixed fire severity regimes in the southern and northern portions of the planning area).*

Table 3-29 shows the acres of northern spotted owl habitat in the Medford District and the Klamath Falls Resource that currently have fire resiliency.

No conclusions are made with respect to current habitat conditions because there are no established thresholds related to this conservation need. However, since the threat to spotted owl habitat from fire is likely to increase due to current forest conditions and future climatic changes (Courtney et al. 2008, ii and 13-15), and the U.S. Fish and Wildlife Service has identified habitat loss from fire as one of its primary concerns with respect to spotted owl recovery (USDI USFWS 2008a, 12), Conservation Need 3 establishes a need to increase, over time, the quantities of northern spotted owl habitat in the low and mixed fire severity regimes, and with fire resiliency.

Conservation Need 4

In areas of significant population decline, the application of the full range of survival and recovery options for

Table 3-28. Acres Of Northern Spotted Owl Suitable And Dispersal Habitat On BLM-Administered Lands Currently (2006) In Low, High, And Mixed Fire Severity Regimes In The Southern And Northern Portions Of The Planning Area

Portions of the Planning Area	Suitable Habitat (acres)		Dispersal Habitat (acres)		
	Low	Mixed	High	Low	Mixed
Southern Portion (Medford District and Klamath Falls Resource Area of the Lakeview District)	251,000	205,000	288,000	253,000	205,000
Northern Portion (Salem, Eugene, Roseburg, and Coos Bay Districts)	235,000	339,000	586,000	343,000	339,000

Table 3-29. Acres Of Northern Spotted Owl Suitable And Dispersal Habitat On BLM-Administered Lands Currently (2006) With Fire Resiliency In The Medford District And The Klamath Falls Resource Area

BLM-administered Lands	Suitable Habitat (acres)	Dispersal Habitat (acres)
Medford District	423,000	612,000
Klamath Falls Resource Area (Lakeview District)	32,000	38,000

this species in light of significant uncertainty

Information on northern spotted owl fecundity, survival, and population trends in the planning area was provided by Anthony et al. (2004) and was summarized above. In western Oregon, the area of "significant population decline" during 1985-2003 appeared to have been confined to the northern half of the planning area (where BLM-administered lands fall primarily within the Salem and Eugene Districts). However, the findings by Anthony et al. (2004) now are four years old, and there is a time lag between when a population change occurs and when it statistically is verified. For this reason, this analysis addresses the entire planning area.

Although Anthony et al. (2004) is the most comprehensive evaluation of northern spotted owl populations available to the BLM, the habitat block analysis described above, under Conservation Need 1, provides a credible estimate of the number of currently-functional spotted owl nest territories in the planning area. As described previously, when at least 50% of both a 500-acre core area and the associated mean provincial home range area support suitable habitat, that area could support a breeding pair of spotted owls, regardless of whether or not spotted owls actually occupy the area. The blocks of suitable habitat shown in *Map 3-4 (The current [2006] distribution of large and small habitat blocks for the northern spotted owl on all land ownerships in the planning area*) include 3,820,400 acres on all land ownerships. Since a block of suitable habitat is, by definition, capable of supporting at least one breeding pair, these habitat blocks are capable of supporting approximately 1,698 breeding pairs of spotted owls (based on the provincial home range sizes estimated by Thomas et al. 1990, 198). The large blocks of suitable habitat shown in *Map 3-4* include 2,428,300 acres on all land ownerships; those blocks of habitat are capable of supporting approximately 1,079 breeding pairs of spotted owls within clusters of 20 or more breeding pairs.

No conclusions are made with respect to survival and recovery options because there are no established thresholds related to this conservation need.

Northern Spotted Owl Critical Habitat

The Endangered Species Act of 1973, as amended, requires the U.S. Fish and Wildlife Service to designate critical habitat to the maximum extent prudent and determinable concurrently with listing a species as endangered or threatened. The U.S. Fish and Wildlife Service published its most recent final rule on northern spotted owl critical habitat on July 13, 2008 (USDI USFWS 2008b).

The final rule designated 44 critical habitat units (CHUs) in western Oregon, of which 25 CHUs include BLM-administered lands in the planning area. These CHUs include 688,900 acres of BLM-administered lands of which 656,300 acres (95%) are capable of supporting forest. Of these forest-capable acres, 358,400 acres (55%) currently support northern spotted owl suitable habitat, and an additional 58,600 acres (9%) currently support spotted owl dispersal habitat.

Marbled Murrelet

The marbled murrelet (*Brachyramphus marmoratus*) was federally listed as threatened by the U.S. Fish and Wildlife Service in October 1992 (Federal Register 1992b, 45328-45337). A recovery plan was finalized in 1997 (USDI USFWS 1997). The recovery plan outlines the conservation strategy for the species. A draft rule for the revision of critical habitat was published in September 2006 (Federal Register 2006d). In March, 2008, the U.S. Fish and Wildlife Service declined to make changes to critical habitat based on this proposal; therefore, critical habitat remains as designated in 1996.

The short-term actions that are necessary to stabilize the murrelet population according to the recovery plan include:

- maintain occupied habitat
- maintain large blocks of suitable habitat
- maintain and enhance buffer habitat
- decrease risks of nesting habitat loss due to fire and windthrow
- reduce predation
- minimize disturbance

The long-term conservation needs for the murrelet according to the recovery plan include:

- increase productivity (abundance, ratio of juveniles to adults, and nest success) and population size
- increase the amount (stand size and number of stands), quality, and distribution of suitable nesting habitat
- protect and improve the quality of the marine environment
- reduce or eliminate threats to survivorship by reducing predation in the terrestrial environment and anthropogenic sources of mortality at sea

The U.S. Fish and Wildlife Service (USDI USFWS 1997) estimates that recovery of the marbled murrelet will require at least 50 years.

Six conservation zones were designated in the marbled murrelet recovery plan (USDI USFWS 1997). The recovery objectives for the marbled murrelet are measured in each conservation zone with the objective of ensuring a well-dispersed population of marbled murrelets. Conservation Zone 3 (in its entirety) and the northern half of conservation Zone 4 overlay the planning area. See *Figure 3-64 (Marbled murrelet conservation zones)* (USDI USFWS 1997). Conservation Zone 3 extends from the Columbia River, south to North Bend, Oregon; extending 1.2 miles out to sea and approximately 35 miles inland (coinciding with "Zone 1", as designated by the Northwest Forest Plan). Conservation Zone 4 extends from North Bend, Oregon to the southern end of Humbolt County, California; extending 1.2 miles out to sea and approximately 35 miles inland (coinciding with "Zone 1", as designated by the Northwest Forest Plan).

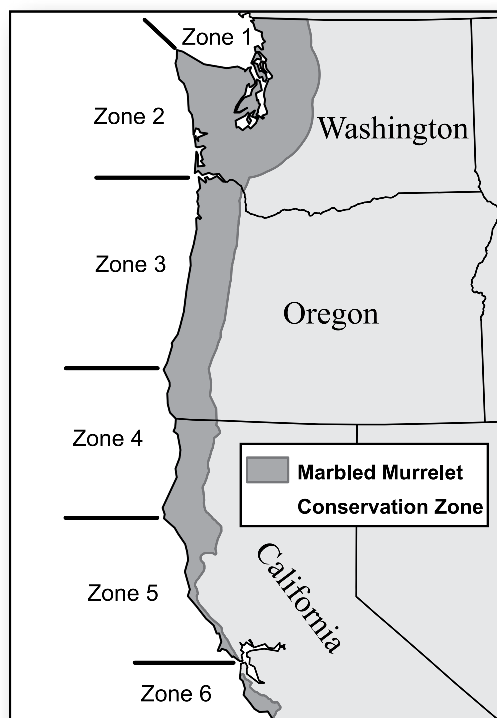


Figure 3-64. Marbled Murrelet Conservation Zones

The following recent documents summarize the condition of the marbled murrelet across its range and are incorporated by reference:

- evaluation report for the five-year status review of the marbled murrelet in Washington, Oregon, and California (McShane et al. 2004)
- marbled murrelet five-year review (USDI USFWS 2004b)
- status and trends of populations and nesting habitat for the marbled murrelet (Huff et al. 2006)

A panel of scientific experts was convened by the U.S. Fish and Wildlife Service to evaluate, synthesize, and interpret the information pertaining to the relevant scientific issue concerning the marbled murrelet. The threats to marbled murrelets and any changes since the 1992 listing were also evaluated. The report was used in the five-year status review (USDI USFWS 2004b) of the marbled murrelet. The status review sought to answer the following questions:

- Does the currently listed distinct population segment meet the criteria established in the U.S. Fish and Wildlife Service 1996 Distinct Vertebrate Species Policy?
- Is there new information about the threats or population status of the marbled murrelet?
- If so, does the new information suggest that a change in listing status may be warranted?

The U.S. Fish and Wildlife Service determined that:

- The Washington, Oregon, and California populations do not constitute a discrete population from the remainder of the species and therefore do not constitute a distinct population segment.
- All of the threats to the species identified in the listing are still relevant; new information confirms the importance of predation in limiting nesting success; and new gill-netting regulations in California and Washington may reduce impacts to the species.

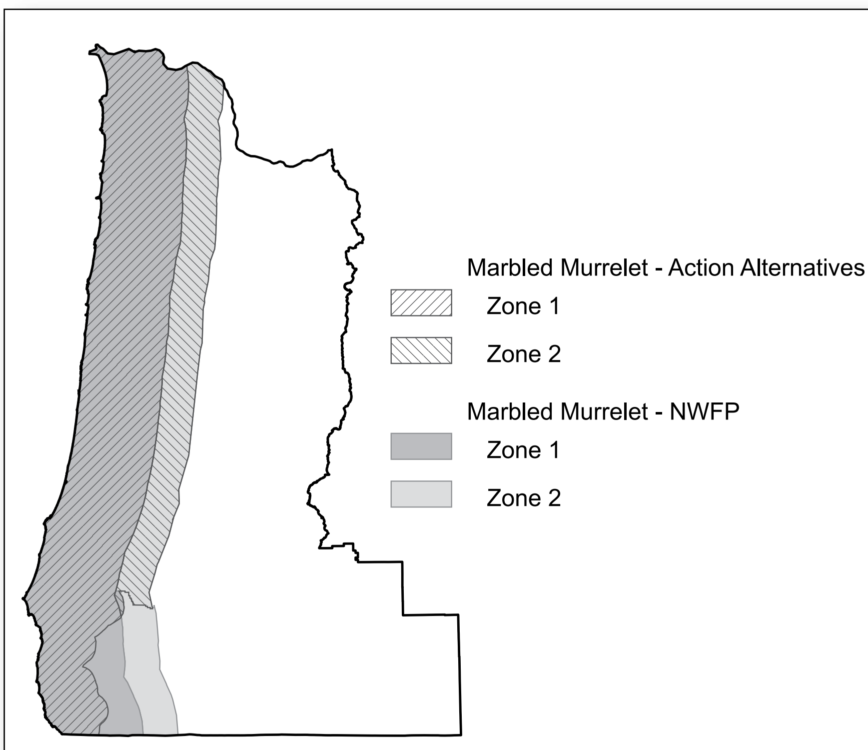


Figure 3-65. Range Of The Marbled Murrelet Within The Planning Area

The marbled murrelet remains listed as a threatened species at this time (USDI USFWS 2004b).

The Northwest Forest Plan established two management zones for the marbled murrelet. Zone 1 extended from the coast to approximately 35 miles inland. Zone 2 extended from the eastern boundary of Zone 1 to approximately 50 miles inland from the coast. Combined, these zones include 14,825 square miles. See *Figure 3-65 (Range of the marbled murrelet within the planning area)*.

Systematic surveys in the Klamath province have indicated that marbled murrelets are likely confined to the hemlock-tanoak vegetation zone (USDA and USDI 2002). The portion formally considered part of the range of the marbled murrelet in the Medford District is highlighted in *Figure 3-65. (Range of the marbled murrelet within the planning area)*.

The range of the marbled murrelet for this management plan includes approximately 6,010,000 acres in Zone 1 and 2,536,000 acres in Zone 2, and incorporates portions of the Salem, Eugene, Roseburg, and Medford Districts, and incorporates the Coos Bay District in its entirety.

A report by Huff et al. (2006) regarding the effects of the first 10 years after the implementation of the Northwest Forest Plan on the population and habitat of the marbled murrelet was completed as part of the Northwest Forest Plan's 10-year effectiveness monitoring effort. The team reported that:

- There was an estimated marbled murrelet population of 22,000 birds for coastal waters adjacent to the Northwest Forest Plan area.
- The available sampling effort was insufficient to detect significant population change.
- The highest densities of marbled murrelets occurred along the Oregon and northern Californian coasts.
- The lowest densities of marbled murrelets occurred from the Mendocino and Humboldt county line south to San Francisco Bay.
- Habitat models predicted that marbled murrelet nesting habitat is more likely at sites that:
  — are closer to the sea;
  — are on relatively flat terrain;
  — are topographically cooler;
  — have relatively few conifers that are greater than or equal to 10 inches (diameter at breast height);
  — have greater basal areas of trees that are greater than or equal to 10 inches (diameter at breast height); or
  — have greater basal areas of trees that are greater than or equal to 30 inches (diameter at breast height).
- Inland management Zone 2 (furthest from the coast) accounted for less than 2 percent of the estimated high-quality habitat on federally administered lands.
- Only 13% of the federal lands provide more than medium-quality nesting habitat for the marbled murrelet.

Nelson et al. (2006) completed a recent review of marbled murrelet biology and nesting habitat. The results included:

- Marbled murrelets are secretive, noncolonial nesters that forage at sea and nest inland.
- The majority of marbled murrelets nest within 37 miles of the coast, although nests have been documented up to 52 miles inland in Washington and 47 miles inland in Oregon (Espinosa, pers. comm. 2007).
- The most important component in the nesting habitat for the marbled murrelet is the presence of large platforms (i.e. limbs or other structures that are at least 4 inches in diameter with a substrate [moss or other duff] capable of forming a nest cup).
- Other important factors include vertical and horizontal cover location with respect to forest openings or edge, and height of platform. Platforms should be high enough to provide for jump-off departures and open enough to provide for stall landings, while still providing protection from predators and the weather.
- Nest trees documented in the Northwest Forest Plan area are greater than 19 inches (diameter at breast height) and greater than 98 feet tall. Nest trees are typically taller than the average non-nest tree.
- Vertical cover (cover above the nest) is typically above 70%.

Nest stands typically possess a high density of large trees with platforms, have multiple canopy layers, and are typically older. Studies summarized for Oregon indicate that the density of trees with platforms and the number of platforms in general were the most important variable in predicting marbled murrelet nesting habitat at the stand level.

Actual nests and behaviors indicate that marbled murrelets select old-growth forests for nesting. The proportion of older forest (mature and old growth) on the landscape and size of the forest patch were greater in occupied sites than unoccupied sites. Marbled murrelets nest in landscapes with larger stands with less edge, farther from logged areas than random watersheds. Habitat modeling efforts have shown that distance from the coast is an important factor in determining marbled murrelet occurrence. Patches of suitable nesting trees of only a few acres and with only a few suitable nesting trees are thought to be capable of supporting marbled murrelet nesting. The resolution and attributes of the vegetation maps used in this planning effort limited the identification of small stands with only a few suitable nesting trees.

For this plan revision, marbled murrelet nesting habitat was modeled as those stands in the mature (with multilayered canopy) and structurally complex structural stages of forest within the range described in *Figure 3-65 (Range of the marbled murrelet within the planning area)*.

Mature stands in the western hemlock and tanoak retention zones are those that contain more than 23 trees per acres with a diameter at breast height greater than or equal to 20 inches. In the Douglas fir zone, mature stands are those with more than 11 trees per acre with a diameter at breast height greater than or equal to 20 inches.

There are approximately 377,000 acres of marbled murrelet nesting habitat within the planning area; 156,000 acres are greater than 200 years of age. See *Table 3-30 (Summary of marbled murrelet nesting habitat on BLM-administered lands within the planning area)*.

Studies to determine the characteristics of marbled murrelet nesting habitat at the landscape scale include:

- McShane et al. (2004, 4-103) reported that "[a]t the landscape level, areas with evidence of occupancy tended to have higher proportions of large, old-growth forest, larger stands and greater habitat complexity, but distance to the ocean (up to about 37 miles [60 km]) did not seem important."
- Elevation had a negative association in some studies with marbled murrelet habitat occupancy (Burger 2002). Hamer and Nelson (1995) sampled 45 nesting trees in British Columbia, Washington, Oregon, and California and found the mean elevation to be 1,089 feet (332 meters).

Table 3-30. Summary Of Marbled Murrelet Nesting Habitat On BLM-Administered Lands Within The Planning Area

BLM Districts	Habitat-Capable (acres)	Nesting Habitat		Existing Old Forests[a]	
		(acres)	Percent of Habitat-capable	(acres)	Percent of Total Nesting Habitat
Salem	214,000	80,000	37	9,000	11
Eugene	148,000	50,000	34	25,000	51
Roseburg	180,000	99,000	55	51,000	52
Coos Bay	301,000	122,000	41	57,000	47
Medford	49,000	26,000	53	14,000	56
Totals	**892,000**	**377,000**	**42**	**156,000**	**41**

[a]Forested stands greater than 200 years of age; a component of total nesting habitat.

- Multiple radar studies (Burger 2001, Cullen 2002, Raphael et al. 2002, and Steventon and Holmes 2002) in British Columbia and Washington have shown radar counts of marbled murrelets to be positively associated with total watershed area, increasing amounts of late-seral forests, and with increasing age and height class of associated forests.
- The radar counts of marbled murrelets are also negatively associated with increasing forest edge and areas of logged and immature forests (McShane et al. 2004).
- There are also several studies concluding marbled murrelets do not pack into higher densities within remaining habitat when nesting habitat is removed (Burger 2001, Manley et al. 2001, and Cullen 2002).

Studies about the relationship between the proximity of human-modified habitat and an increased abundance of avian predators and increased predation on marbled murrelet nests include:

- Luginbuhl et al. (2001, p. 565) reported in a study, which used simulated marbled murrelet nests, that "[c]orvid numbers were poorly correlated with the rate of predation within each forested plot." Luginbuhl et al. (2001, p. 569), conclude, "that using measurements of corvid abundance to assess nest predation risk is not possible at the typical scale of homogenous plots (0.5 to 1.0 km^2 in our study) [0.19 to 0.39 mi^2]. Rather this approach should be considered useful only at a broader, landscape scale on the order of 5 to 50 km^2 [1.93 to 19.31 mi^2] (based on the scale of our fragmentation and human-use measures)".
- Artificial marbled murrelet nest depredation rates were found to be highest in western conifer forests where stand edges were close to human development (De Santo and Willson 2001, and Luginbuhl et al. 2001).
- Bradley (2002) found increased corvid densities within 3 miles of an urban interface (probably due to supplemental feeding opportunities from anthropogenic activities).
- Golightly et al. (2002) found extremely low reproductive success for marbled murrelets nesting in large old-growth blocks of redwoods in the California Redwoods National and State Parks. Artificially high corvid densities from adjacent urbanization and park campgrounds are suspected to be a direct cause of the high nesting failure rates for marbled murrelets in the redwood parks (Golightly et al. 2002).
- If the surrounding landscape has been permanently modified to change the predators' numbers or densities due to agriculture, urbanization, or recreation, and predators are causing unnaturally high nest failures, then reproductive success of the marbled murrelet may remain depressed. Because corvids account for the majority of depredations on marbled murrelet nests and corvid density can increase with human development, corvid predation on marbled murrelet habitat is a primary impact consideration. The threat of predation on marbled murrelet populations (both nests and adults) appears to be greater than previously anticipated (McShane et al. 2004).

The present population estimates for the marbled murrelet include 9,500 birds (± 3,000) in Oregon and 23,700 birds (± 5,200) within the conterminous United States (Huff et al. 2003, Strong 2003a, and Strong 2003b). Spiech and Wahl (1995) concluded that marbled murrelet populations in Puget Sound are lower now than they were at the beginning of this century, and total estimates for Washington are still about 9,800 marbled murrelets (Huff et al. 2003). Ralph and Miller (1995) estimated the California population to be approximately 6,500 birds, and this estimate remains within the statistical confidence interval (Strong 2003a and 2003b).

The estimates of marbled murrelet populations that are based on monitoring data have fluctuated between approximately 5,800 and 7,800 birds in Conservation Zone 3 and between approximately 3,600 and 4,900 birds in Conservation Zone 4. See *Table 3-31 (Marbled murrelet population estimates for Conservation Zones 3 and 4)* and *Figure 3-64 (Marbled murrelet population estimates in Conservation Zones 3 and 4)*. Conservation Zones 3 and 4 overlay the planning area. See *Figure 3-67 (Marbled murrelet conservation zones)* (USDI USFWS 1997). Estimates are based on at-sea monitoring (USFWS pers. comm. 2006).

Studies on the demographic trends of the marbled murrelet include:

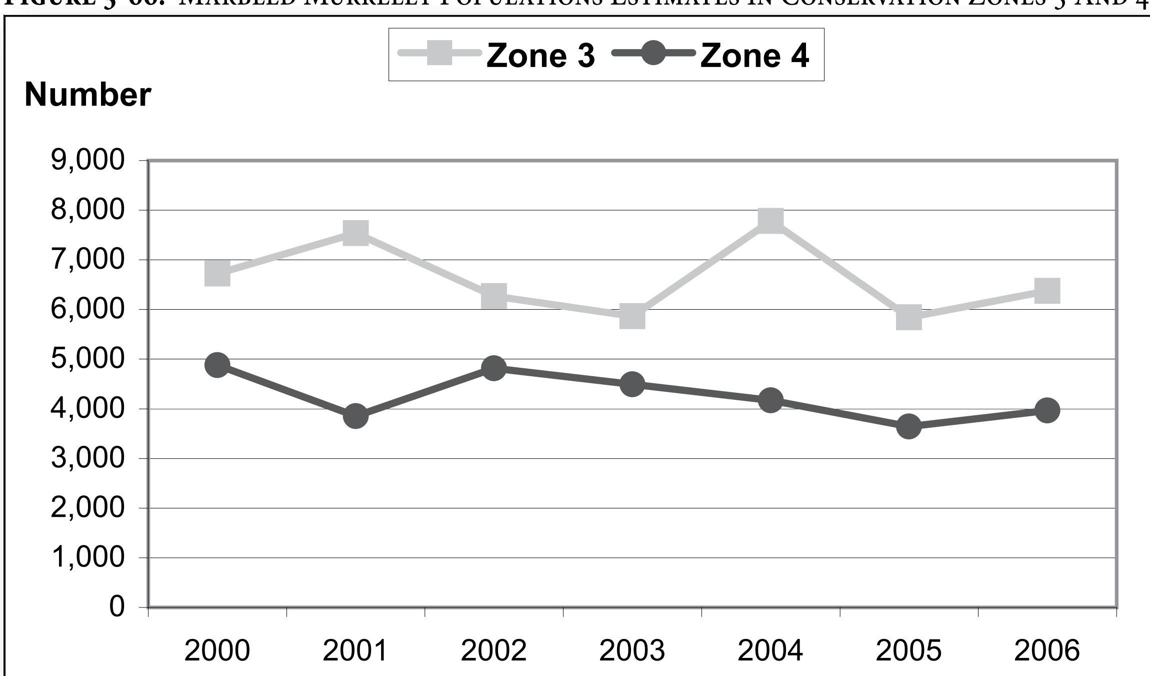
- Beissinger (1995) constructed a demographic model of the marbled murrelet and concluded that the population may be declining at rates of 4 to 6 percent per year, but this estimate is hampered by the possibility that the age-ratio data used in the model are reflective of a relatively temporary decline due to unusual ocean conditions (Ralph et al. 1995).
- Boulanger et al. (1999) found that change in adult survivorship is the single most important factor when projecting demographic trends for marbled murrelets.
- Similarly, Strong and Carten (2000) suggest that there may have been a 50 percent decline from 1992 to 1996 in the Oregon population, but the population appears to have stabilized since then (Strong 2003a and 2003b).
- Ralph et al. (1995) summarized some of the reasons for variability in population estimates among researchers, including differences in methodology, assumptions, spatial coverage, and survey and model errors.

Table 3-31. Marbled Murrelet Population Estimates For Conservation Zones 3 And 4

Year	Conservation Zones			
	Zone 3		Zone 4	
	Density[a]	Number of Birds	Density[a]	Number of Birds
2000	10.9	6,724	10.9	4,880
2001	12.2	7,538	8.6	3,851
2002	10.2	6,271	10.8	4,816
2003	9.5	5,866	10.0	4,495
2004	12.6	7,781	9.3	4,169
2005	9.5	5,843	8.1	3,642
2006	10.3	6,375	8.9	3,968

[a]Density equals the number of birds per square mile.

Figure 3-66. Marbled Murrelet Populations Estimates In Conservation Zones 3 And 4



- Lank et al. (2003) states that "[r]egardless of the approaches taken to estimate [(sic) vital rate] parameter values, the output from the Leslie Matrix models representing survivorship and fecundity values for all populations in Washington, Oregon and California (Beissinger and Nur 1997) suggest negative population growth rates." Present at-sea surveys for effectiveness monitoring have a 95 percent chance of detecting annual population changes of ± 20 percent or greater.

McShane et al. (2004) produced a demographic model of marbled murrelet populations in Washington, Oregon, and California by each of the six conservation zones. Similar to previous studies, they found that populations in all conservation zones are in decline with mean annual rates of decline between 2.1 percent and 6.2 percent. The highest rates of decline were in Zone 6 at the southern extent of the range. Furthermore, they conclude it is likely that populations in Zone 5 and 6 could become nonviable in the near future.

At the conservation zone scale, marbled murrelet abundance is positively correlated with the estimated amount of inland habitat (McShane et al. 2004). The precise number of acres of nesting habitat in Washington, Oregon, and California is unknown. However, suitable habitat for the marbled murrelet on federal lands is estimated at 2,223,048 acres of which 154,838 acres (7 percent) are classified as remnant habitat within the listed range of this species (McShane et al. 2004). Approximately 93 percent of the suitable habitat occurs on federal lands.

There are 233 known occupied marbled murrelet sites on BLM-administered lands within the planning area. Surveys are currently being conducted in conjunction with timber sales. See *Table 3-32. (Occupied marbled murrelet sites on BLM-administered lands within the planning area)*.

The marbled murrelet recovery plan identified the primary threats to the species as:

- predation
- loss of nesting habitat
- by-catch in gill nets
- oil pollution both chronic and from major spills

More recently, McShane et al. (2004) has concluded that all of these threats are still present, although loss of nesting habitat, particularly on federal lands, has declined, and the new gill-netting regulations in northern California and Washington have reduced the threat from by-catch in gill nets. The threat from oil pollution continues to be unpredictable and effects are variable. New information on predation indicates a high threat level due to limiting marbled murrelet nesting success (Hebert and Golightly 2003, Peery et al. 2004, Luginbuhl et al. 2001, Marzluff and Restani 1999).

Marbled murrelets, adult and chicks, appear to be fairly tolerant of disturbance, both visual and auditory. Several studies noted changes in adult feeding behaviors, but not nest abandonment. Chicks appear to be very tolerant of visual and auditory disturbance, habituating very quickly. The predominant response of marbled murrelet chicks to disturbances is to freeze or flatten out in the nest cup. Noise disturbance to nest sites is thought to be minimal, although much is unknown (Nelson et al. 2006).

The recovery plan states that four of the six zones must be functional in order to effectively recover the marbled murrelet in the short term and long term (e.g., to maintain viable populations that are well distributed). However, based on the newest population estimates, it appears only three of the zones contain relatively robust numbers of marbled murrelets (Zones 1, 3, and 4). Zones 1 and 4 contain the largest number of marbled murrelets compared to the other four zones, but areas of concern remain. Of the population in Zone 4, there were 10 percent killed in oil spills in 1997 (Bentivoglio et al. 2002; Ford et al. 2002).

Table 3-32. Occupied Marbled Murrelet Sites On BLM-Administered Lands Within The Planning Area

District	Number of Occupied Marbled Murrelet Sites
Salem	34
Eugene	20
Roseburg	15
Coos Bay	164
Medford	0
Total	**233**

Marbled murrelets in Conservation Zones 3, 5, and 6 are also experiencing significant declines in reproduction, numbers, and distribution, resulting in reduced population viability. Marbled murrelets have suffered variously from past oil spills that killed a large number of birds (Zone 3) (Ford et al. 2002), extremely small population sizes (Zones 5 and 6), and alarmingly low reproductive rates (Zone 6) (Peery et al. 2002). In at least two of these four zones (Zones 5 and 6), these factors taken singly or in combination have brought the status of the species to a point where recovery in Conservation Zones 5 and 6 may be precluded (Beissinger 2002). The poor status of marbled murrelet populations in the southern zones emphasizes the importance of supporting marbled murrelet populations in Zones 1 and 2 in order to achieve marbled murrelet recovery objectives.

Critical habitat was designated for the marbled murrelet in January 1996 and encompasses 1,515,300 acres of land in Oregon. Of this, 1,338,200 acres are federally administered (Federal Register 1996a, 26256-26320). The U.S. Fish and Wildlife Service is currently reviewing the critical habitat designation. A proposed rule that revises designated critical habitat was published on July 31, 2008 (Federal Register 2008b). The proposal removes approximately 250,000 acres of critical habitat in northern California and Oregon based on new information indicating these areas do not meet the definition of critical habitat.

Critical habitat includes those lands that may be needed for a species' eventual recovery and delisting. Critical habitat units were identified based on the need to protect current nesting habitat and provide for future development of the primary constituent elements necessary for the conservation of the marbled murrelet. The primary constituent elements include individual trees with potential nesting platforms and forested areas within 0.5 miles that possess a canopy height of at least one-half the site-potential tree height (Federal Register 1996a, 26264). Approximately 463,000 acres of critical habitat occur on Bureau of Land Management managed lands. See *Table 3-33* (*Summary of critical habitat units and marbled murrelet nesting habitat on BLM-administered lands within the planning area)* and *Map 3-7 (Critical habitat for the marbled murrelet within the planning area).* Also see *Appendix H- Wildlife* for detailed information on the effects of the alternatives on specific critical habitat units.

Sage Grouse

Sage grouse (*Centrocercus urophasianus*) were once found throughout most of the sagebrush (*Artemisia* sp.) habitat of eastern Oregon (Hagan 2005). There are currently no known populations within the planning area but there are four historically known sage grouse leks within the Klamath Falls Resource Area. The last of these leks was occupied in 1993 (Hagen 2005). The historic range for sage grouse encompasses 630,000 acres (all ownerships) in the Klamath Falls Resource Area as shown in *Figure 3-67* (*Historic range of sage grouse within the planning area*).

Map 3-7. Critical Habitat As Of 1996 For The Marbled Murrelet Within The Planning Area

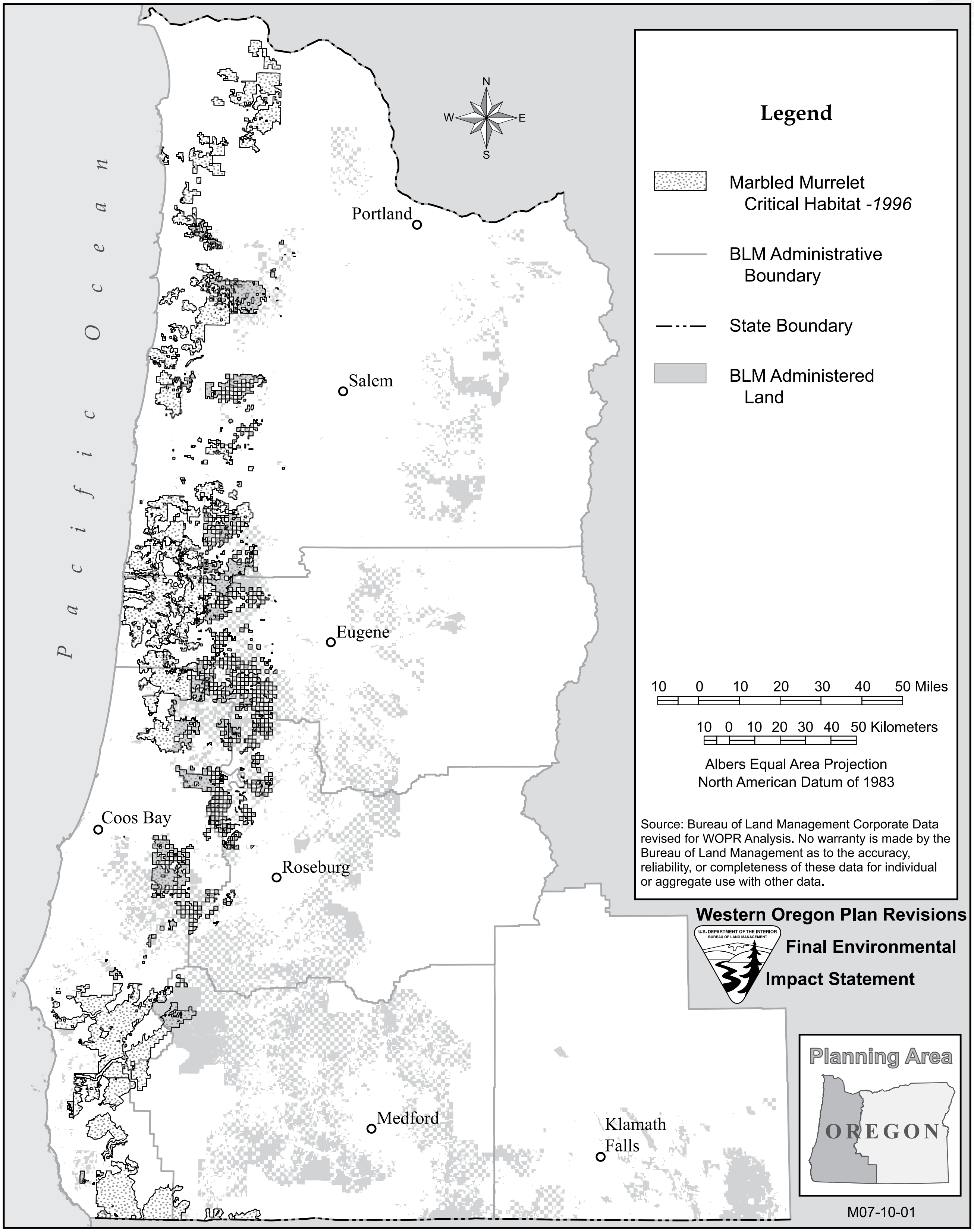


Table 3-33. Summary Of Critical Habitat Units (1996)And Marbled Murrelet Nesting Habitat On BLM-Administered Lands Within The Planning Area

Critical Habitat Unit	Habitat-Capable (acres)	Nesting Habitat (acres)	Nesting Habitat (%)
CA-01-e	14	10	71
OR-01-c	7,217	5,025	70
OR-02-b	11	1	9
OR-02-c	3,526	1,898	54
OR-02-d	25,937	6,731	26
OR-02-e	38,666	20,858	54
OR-03-a	41	41	100
OR-03-c	8,530	4,012	47
OR-04-a	1,300	802	62
OR-04-b	1,084	940	87
OR-04-c	13,388	8,012	60
OR-04-d	20,073	11,097	55
OR-04-e	50,534	27,656	55
OR-04-f	20,109	12,220	61
OR-04-g	15,368	8,354	54
OR-04-i	79,983	40,807	51
OR-04-j	56,450	30,882	55
OR-04-k	25,919	16,083	62
OR-06-a	39	26	67
OR-06-b	49,904	28,609	57
OR-06-c	4,608	3,524	76
OR-06-d	16,178	8,792	54
OR-07-a	2,366	1,252	53
OR-07-b	2,171	990	46
OR-07-d	1,840	845	46
OR-07-f	15,611	8,616	55
OR-07-g	2,086	984	47
Totals	**462,953**	**249,069**	**54**

Suitable sage grouse habitat occurs on BLM-administered lands in two units, the Campbell and the Gerber blocks within the Klamath Falls Resource Area. The Campbell block contains less than 10% BLM- administered land and will not be analyzed further because of the dispersed nature of the BLM-administered lands. The Gerber block contains 117,949 acres of which 71% (83, 276 acres) are on BLM-administered lands. There is a third block within the boundaries of the planning area, Devils Garden, but there is no BLM-administered land within this block so it will not be analyzed further. See *Figure 3-68* (*Sage grouse habitat management blocks within the Klamath Falls Resource Area*).

Ecological Site Inventory data does not contain sufficient information to differentiate between the individual habitat needs (lekking, nesting, brood rearing, and wintering). Therefore, they are lumped together and referred to as suitable sage grouse habitat. Potential habitat includes sage brush communities, meadows, ephemeral wetlands, and non-forested riparian habitats.

Figure 3-67. Historic Range Of Sage Grouse Within The Planning Area

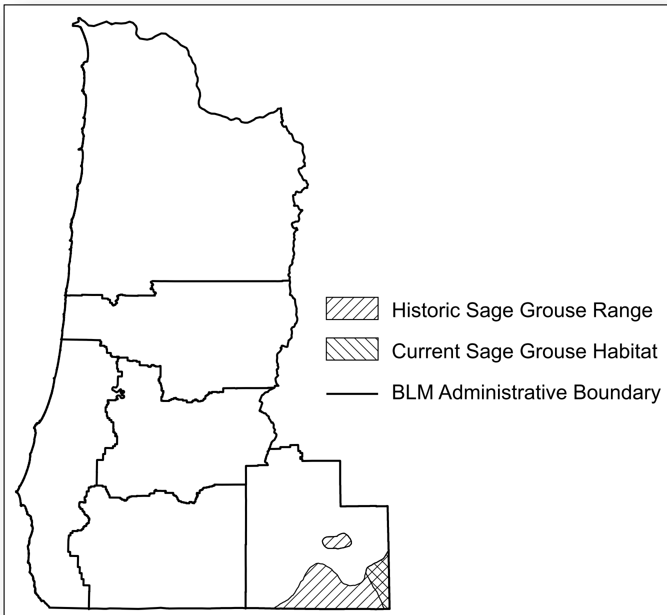
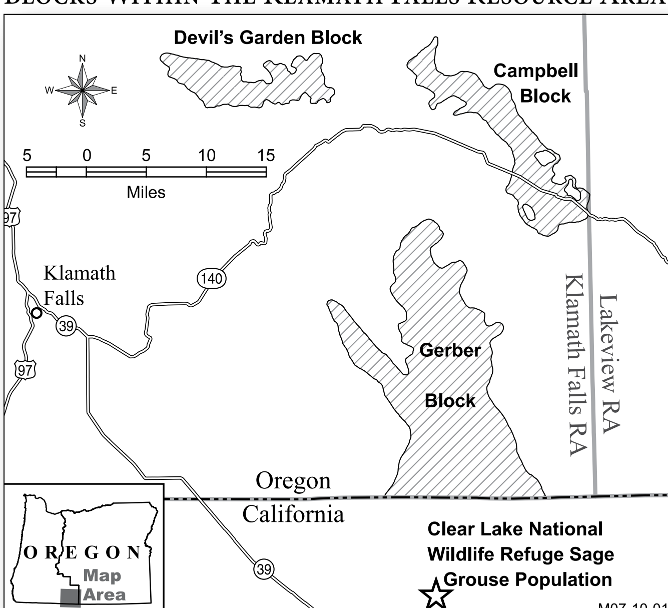


Figure 3-68. Sage Grouse Habitat Management Blocks Within The Klamath Falls Resource Area



Approximately 47,000 acres of habitat-capable land (including all biological and behavioral needs: lekking, nesting, brood rearing, and wintering habitat) was identified on BLM-administered lands using data derived from the Ecological Site Inventory as shown in *Table 3-34* (*Sage grouse habitat on the Gerber block, Klamath Falls Resource Area*). The Gerber block contains approximately 28,000 acres of habitat that is currently suitable for sage grouse and an additional 19,000 acres that could be developed or converted to suitable habitat. Gerber is the largest and most important block of sage grouse habitat-capable land within the planning area.

The major threat to the species is habitat modification and its resultant effects on reproductive capacity and predation of sage grouse (Holloran and Anderson 2005, Gregg et al. 1994, Hagen 2005). Within Oregon, since the 1940s, the sage grouse population has exhibited an overall decline (Hagan 2005, Gregg et al. 1994). However, population indices (e.g., lek counts, lek searches, brood production, and wing collections) in the last decade have shown a stable to slightly increasing population (Hagan 2005).

Between 2002 and 2004, the U.S. Fish and Wildlife Service received multiple petitions to list one or more sage grouse populations. In 2005, the U.S. Fish and Wildlife Service came out with a combined finding that the petitions were not warranted (Federal Register 2005a, p. 2244). Concurrent with the status reviews, there was an assessment of the nationwide condition of the sage grouse. Connelly et al. (2004) compiled a comprehensive review of the status of the sage grouse and sagebrush habitats entitled *Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats*.

The Oregon Department of Fish and Wildlife, in conjunction with the BLM and other land management organizations, produced the *Greater sage-grouse conservation assessment and strategy for Oregon: a plan to maintain and enhance populations and habitat* (Hagan 2005). The information contained within the Oregon conservation assessment regarding natural history and habitat condition is incorporated by reference. The following is a brief synopsis:

Table 3-34. Sage Grouse Habitat On The Gerber Block, Klamath Falls Resource Area

Unit	Total BLM Area	Habitat-Capable[a]		Habitat[b]		Non-habitat	
	(acres)	(acres)	(%)	(acres)	(%)[c]	(acres)	(%)[c]
Gerber Block	83,276	47,143	57	27,707	59	19,436	41

[a] Vegetative communities that would likely develop into, or could be converted into, sage grouse habitat.
[b] Provides for all biological and behavioral needs – lekking, nesting, brood rearing, and wintering.
[c] Percent of habitat-capable.

- Sage grouse are a sagebrush obligate species. Sagebrush provides important habitat components necessary for their nesting and diet. There are three main habitat requirements for the sage grouse: breeding (lekking and nesting), brood rearing, and over-wintering habitat.
- Males attract females by displaying (strutting) on open sites called leks, which are used annually. Leks are typically devoid of or contain short vegetation. Adjacent sagebrush provides escape cover.
- Females use areas rich in forbs to facilitate egg development. Nesting habitat consists of a sagebrush community containing sagebrush and a herbaceous understory of grasses and forbs. Nests are typically located under sagebrush plants.
- Cover, both overhead and vertical, is critical to nesting success. Good habitat provides concealment from predators, herbaceous forage for females prior to egg laying and during nesting, and insect forage for chicks.
- When broods move off the nest, they move to more open sagebrush habitat that still maintains a rich growth of grasses and forbs and has at least 15% canopy closure. Chicks feed on forbs and invertebrates. Later in the summer, broods move to moister habitats where succulent vegetation is still available.
- Winter diets consist mainly of sagebrush. Sage grouse may congregate in areas of higher canopy closure and taller sagebrush.
- Oregon sagebrush habitats have been reduced 21% from the late 1800s. The lack of connectivity (contiguity) between patches compounds the loss of habitat. High viability patches are those that have greater than 2,500 acres of contiguous habitat.
- The greater loss of sagebrush habitat in eastern Oregon has been due to the conversion of such habitat to agricultural and grazing uses. Fire and seeding with nonnative species continue play a significant role in converting sagebrush habitat to grasslands. Roads and utility corridors play an additional role in habitat degradation by providing corridors and perches for predators, spreading nonnative vegetation, and introducing disturbances. Human disturbances, both low intensity such as bird-watching and high intensity off-highway vehicle use, may cause lek or nest abandonment.

Bald Eagle

The bald eagle of North America (*Haliaeetus leucocephalus*) was delisted under the Endangered Species Act in 2007 (Federal Register 2007, 37345) in Oregon. Breeding and wintering populations occur throughout the planning area and are addressed in the Pacific States Bald Eagle Recovery Plan (USDI USFWS 1986).

Bald eagles in the Pacific Northwest nest predominantly in conifer stands adjacent to or near large rivers or other large bodies of water (USDI USFWS 1986, Anthony et al. 1982, Buehler 2000, Federal Register 2006a, 71 FR 8239).

- Distances to water bodies from nests vary, but could extend up to 1,378 yards in portions of the planning area (USDI USFWS 1986, Buehler 2000, Anthony et al. 1982). Vessely et al. (2001) modeled potential nesting habitat up to 3 kilometers (1.9 miles) away from water.
- Nesting habitat can encompass a wide range of stand types, but they all can be described as having a variety of canopy layers and some component of large diameter or old-growth trees. Anthony et al. (1982) found that the diameters of nesting trees vary by forest types, but, invariably, they were some of the largest trees in the stand. The average diameters of nesting trees varied between:
  — 41 inches (diameter at breast height) in Oregon mixed conifer stands
  — 46 inches in ponderosa pine forests
  — 69 inches in Douglas fir forests.
- Douglas fir is the dominant species for nesting trees west of the Cascade Mountains, and ponderosa pine is dominant east of the Cascade Mountains (Anthony et al. 1982).

Fish, waterfowl, jackrabbits, and carrion provide the most common source of food for eagles in the Pacific Northwest (USDI USFWS 1986). Nesting sites, roosts, and wintering areas tend to be associated with sources of food (Anthony et al. 1982, USDI USFWS 1986, Buehler 2000, Federal Register 2006a, 8242), although overwintering area locations may also be driven by remoteness (Federal Register 2006a, 8239; USDI USFWS 1986).

There are 3,600 miles of streams and 291,000 acres of ponds and lakes on BLM-administered lands that provide foraging habitat for the bald eagle. There are approximately 442,000 acres of BLM-administered lands that are capable of providing eagle nesting and roosting habitat in the planning area (those forest-capable lands within 2 miles of, and within sight of, foraging waters). Approximately 54 percent of those acres are currently providing bald eagle nesting and roosting habitat. See *Table 3-35 (Potential bald eagle nesting habitat within the planning area)*.

Communal roosts are selected for and favor those stands that have a high degree of stratification (Anthony et al. 1982). Roost trees are the largest trees in the stand or have open branching patterns, provide visibility, and may be close to a consistent food source (Anthony et al. 1982, Buehler 2000).

There are 149 bald eagle nesting trees on BLM-administered lands within the planning area. These nests are contained within 89 known territories (Isaacs and Anthony 2005). Monitoring data indicates that bald eagle numbers have increased steadily since 1973 (Isaacs and Anthony 2005). See *Table 3-36 (Summary of the 2005 monitoring data for the bald eagle)* for the current population data for the management zones that overlap the planning area (Isaacs and Anthony 2005). Monitoring data indicates that the bald eagle population and productivity numbers are increasing (Anthony and Isaacs 2007).

There are 177 bald eagle management areas designated on BLM-administered lands within the planning area. They range in size from 4 to 960 acres and total 17,966 acres. See *Table 3-37 (Bald eagle management areas within the planning area)*. Bald eagle management areas are designed to protect existing nest sites, winter and communal roosting areas, and potential nesting habitat.

Western Snowy Plover

The Pacific Coast population of the western snowy plover (*Charadrius alexandrinus nivosus*), hereafter referred to as the snowy plover, is listed as threatened under the federal Endangered Species Act (Federal Register 1993,12864) and by the state of Oregon (ODFW 2006). The primary threats to the snowy plover were identified as the loss and degradation of habitat from human activities (Federal Register 1993, 12864).

Table 3-35. Potential Bald Eagle Nesting Habitat Within The Planning Area

BLM Administrative Unit	Habitat-Capable (acres)	Nesting Habitat (acres)	Nesting Habitat (%)
Coos Bay District	44,517	20,741	47
Eugene District	31,728	14,684	46
Medford District	146,912	76,036	52
Roseburg District	56,276	33,030	59
Salem District	140,000	80,251	57
Klamath Falls Resource Area[a] (of the Lakeview District)	22,841	14,841	65
Totals	**442,274**	**239,583**	**54**

[a] The amount of habitat-capable and nesting habitat presented is only for the western portion of the Klamath Falls Resource Area.

Table 3-36. Summary Of The 2005 Monitoring Data For The Bald Eagle

Bald Eagle Conservation Zones	Breeding Areas Surveyed (number)	Breeding Areas Occupied (number)[a]	Occupied Breeding Areas with Known Outcomes	Successful Breeding Areas (%)[b]	5-year Average of Successful Breeding Areas (%)	Young/Breeding Area (number)	5-year Average of Young/ Breeding Area (number)	Young/Successful Breeding Pair (number)
10 – Columbia River (OR)	12	11	71	70.0	63.8	1.00	1.04	1.43
11 – High Cascades	69	64	63	61.9	65.7	0.94	1.01	1.51
12 – Willamette Basin	63	61	55	70.9	68.8	1.15	1.17	1.62
13 – Oregon Coast	93	91	90	72.2	70.0	1.11	1.10	1.54
22 – Klamath Basin	134	129	119	60.5	62.2	0.87	0.96	1.43
23 – CA/OR Coast	25	22	20	70.0	67.3	1.05	1.05	1.50

[a]Where one or two adults and a nest were observed.
[b]Breeding areas where one or more nestlings or fledglings were observed.

Table 3-37. Bald Eagle Management Areas Within The Planning Area

BLM Administrative Unit	Bald Eagle Management Areas #	Bald Eagle Management Areas Total Acres
Coos Bay District	26	769
Eugene District	73	8,266
Medford District	21	1,091
Roseburg District	25	3,682
Salem District	10	2,227
Klamath Falls Resource Area[a] (Lakeview District)	22	1,931
Total	**177**	**17,966**

[a] The amount of habitat-capable and nesting habitat presented is only for the western portion of the Klamath Falls Resource Area.

The snowy plover occurs along the Pacific Coast from British Columbia, Canada to Baja California, Mexico; and at interior areas in Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma, and north-central Texas (Federal Register 1993, 12864; Page et al. 1995). The coastal population is genetically distinct from the interior population (Federal Register 1993, 12864; Federal Register 2006b and 20607).

The coastal population occurs within the geographic boundaries of the Salem, Eugene, and Coos Bay districts. The BLM manages snowy plover nesting and wintering habitat only on the Coos Bay District. The Coos Bay District manages 436 acres of snowy plover nesting and overwintering habitat, which is located on the Coos Bay North Spit (138 acres) and the New River Area of Critical Environmental Concern (298 acres). See *Figure 3-69 (Locations of the Pacific coast population of the western snowy plover on BLM-administered lands within the planning area).*

Snowy plovers nest above the high tide line on "wide-open sandy beaches, river mouths, or dredge spoils, often with scattered driftwood or vegetation. Driftwood, wrack, and native dune plants often harbor snowy plover food sources, and provide cover for chicks hiding from predators" (OPRD 2004, pp. 42-43) Much open sand habitat was lost in Oregon when European beachgrass (*Ammophila arenaria*) was introduced in the early to mid 1900s. European beachgrass created extensive vegetated foredunes that narrowed beaches and provided thick cover for predators.

The Coos Bay North Spit has been the most productive snowy plover breeding area since intensive monitoring began in the early 1990s. Unique to Oregon, snowy plover habitat on the Coos Bay North Spit is found along the beach, as well as inland of the ocean foredune on old dredge material deposits and restored open sand habitat. Through time, much of this habitat has been lost or degraded due to beachgrass encroachment. Most of the BLM-administered lands in this area are designated as an area of critical environmental concern. The Shorelands Plan (USDI BLM 2005a) contains direction for plover management. Management measures were developed in cooperation with the U.S. Fish and Wildlife Service and Oregon State agencies. Management measures include recreational restrictions, predator control, outreach activities, and habitat restoration.

In cooperation with the Army Corps of Engineers, the Oregon Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service, the BLM has restored and maintained approximately 76 acres of habitat inland of the ocean foredune of the Coos Bay North Spit. A variety of methods have been used to remove European beachgrass and other invasive plant species from these habitat restoration areas (including heavy equipment, saltwater treatments, hand pulling, and herbicides). In addition to the habitat restoration areas, snowy plovers also nest on the adjacent ocean beach.

Snowy plover numbers have increased on the Coos Bay North Spit since active management measures and monitoring began in the early 1990s. The total number of fledglings has risen from a low of 3 in 1990 to a high of 35 in 2004 (Lauten et al. 2006). Plover reproductive success is measured by the number of chicks fledged per male and is currently estimated at 1.57 fledglings per male at the Coos Bay North Spit, which is approximately 10% below the 15-year average of 1.71 fledglings per male (Lauten et al. 2006).

Snowy plovers also use a long, relatively isolated stretch of beach from the southern portion of Bandon's beaches to Floras Lake. This approximately 16-mile length of beach is managed under several jurisdictions including 5.75 miles that are included in the BLM New River Area of Critical Environmental Concern. The New River Area of Critical Environmental Concern Management Plan (USDI BLM 2004a) contains direction for plover management. Management measures were developed in cooperation with the U.S. Fish and Wildlife Service and Oregon State agencies. Management measures include recreation restrictions, predator control, outreach activities, and habitat restoration.

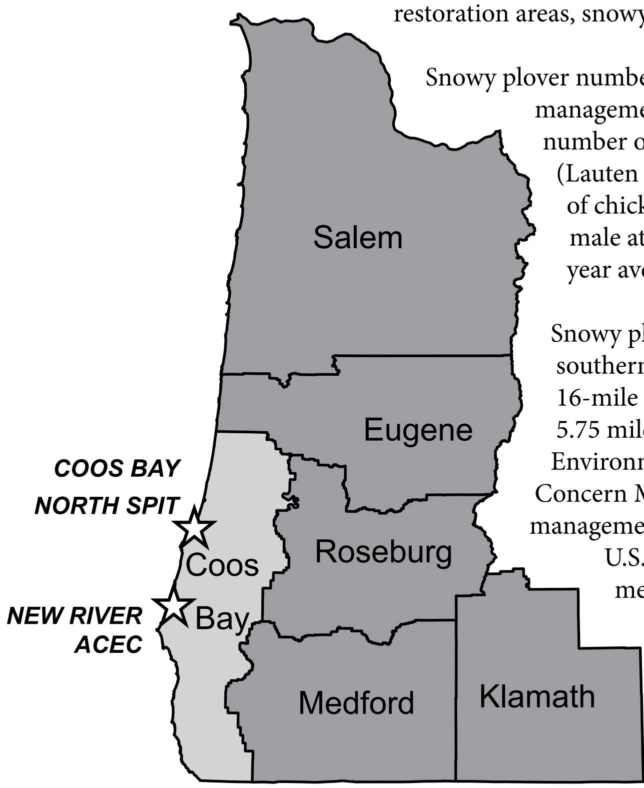


Figure 3-69. Locations Of The Pacific Coast Population Of The Western Snowy Plover On Blm-Administered Lands Within The Planning Area

Approximately 120 acres of habitat (nearly 2.75 miles in length) have been restored and maintained using heavy equipment, burning, and hand pulling to remove European beachgrass and other invasive plant species in the New River Area of Critical Environmental Concern. In addition, the BLM cooperatively manages approximately 1 mile of ocean beach and inland snowy plover habitat north of Floras Lake.

Over the past several years, locations of snowy plover activity have varied in the New River area. In general, numbers have increased on the New River spit, including the area of critical environmental concern since active management measures and monitoring began in the early 1990s. The total number of fledglings associated with the New River spit has risen from a low of zero in 1993 to a high of 21 in 2004 (Lauten et al. 2006). This fledgling rate has increased through time and is currently at 1.33 chicks per male at New River, which is 49% higher than the 15-year average of 0.89 fledglings per male (Lauten et al. 2006). Predation is a greater problem at this location than other Oregon snowy plover sites (Lauten et al. 2006). The New River area is the only location with nonnative red fox (*Vulpes vulpes*) present in the area. The beaches also abut extensive ranch lands with sheep and cattle operations.

The final rule for listing the snowy plover (Federal Register 1993, 12864) and the draft recovery plan (Federal Register 2001a) provide comprehensive discussions of the following threats to the snowy plover:

- loss or degradation of habitat through over-utilization for commercial, recreational, scientific, or educational purposes
- disease and predation
- inadequacy of existing regulatory mechanism
- other natural or manmade factors affecting their continued existence

The state of Oregon describes threats to the snowy plover as habitat degradation, introduction of nonnative vegetation, beach development, resource extraction, human disturbance, and predation (OPRD 2004).

Beaches are unstable habitats, changing with each winter storm event and are constantly being broken down and renewed. Human activities (building jetties and seawalls, and stabilizing dunes) modify or eliminate these natural destabilizing cycles (OPRD 2004). The introduction of European beachgrass has stabilized foredunes and prevented the replenishment of the open sand areas thus diminishing the availability of snowy plover habitat and changing the natural vegetative and sand dynamics (OPRD 2004, Federal Register 2001a). Beachgrass also provides cover for predators, which benefit from its dense growing habit.

Nest losses due to predation at some sites on the Oregon coast have been as high as 68% (Stern et al. 1990; Hogan 1991; Federal Register 1993, 12871). Predator numbers are thought to increase with increased human presence for a number of reasons:

- Trash near nesting areas attracts such predators as crows, ravens and rats.
- European beachgrass, and the subsequent vegetation changes to dune plant communities results in increased hiding cover.
- Greater human presence may lead to an increase in human disturbance, which can flush snowy plover adults and chicks from nests thereby increasing their vulnerability to predation.

Human activity has been documented as a major threat to the breeding success of the snowy plover (OPRD 2004). Human disturbance, either on foot or in off-highway vehicles, may flush birds from nests, resulting in nest abandonment or lengthening of the incubation period. As adult plovers stay off the eggs for extended periods of time due to disturbance, eggs and birds may be trampled or crushed and adult plovers may be separated from broods. Critical habitat was designated for the Pacific coast population of the snowy plover in 2005 (Federal Register 2005b, 26970). The primary constituent elements for the designated critical habitat units are:

- sparsely vegetated areas above daily high tides that are relatively undisturbed by the presence of humans, pets, vehicles, or human–attracted predators
- sparsely vegetated sandy beach, mud flats, gravel bars, or artificial salt ponds that are subject to daily tidal inundation, but not currently under water, that support such small invertebrates such as crabs, worms, flies, beetles, sand hoppers, clams, and ostracods
- surf or tide cast organic debris (such as seaweed or driftwood) located on open substrates (such as those mentioned above) (Federal Register 2005b, 56994)

Table 3-38. Critical Habitat For The Pacific Coast Populations Of The Western Snowy Plover

Critical Habitat Units	Total Area (acres)	Federal Area (acres)	BLM Area (acres)	Habitat Capability[a] (number of breeding plovers)
OR 9 – Coos Bay North Spit	278	278	138	54
OR 10A – Bandon to Floras Creek	632	304	178	54

[a]Number of breeding plovers that the critical habitat unit is capable of supporting if managed properly (Federal Register 2005b, 56999).

These primary constituent elements provide essential habitat for invertebrate food sources, and provide shelter from predators and inclement weather. Two designated critical habitat units for the snowy plover (OR 9 and OR 10A) contain BLM-administered lands in the Coos Bay District. See *Table 3-38 (Critical habitat for the Pacific coast populations of the western snowy plover)* and *Figure 3-69 (Locations of the Pacific coast population of the western snowy plover on BLM-administered lands within the planning area)*.

Special Status Species

The BLM special status species include those species that are federally listed or federal candidate species, state-listed species, or federally delisted species.

The primary resource management objectives of the BLM special status species policy are to:

- conserve species and the ecosystems on which they depend.
- ensure that actions requiring authorization and approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species under the provisions of the Endangered Species Act.
- use all methods and procedures necessary to improve the condition of special status species and their habitats to a point where their special status recognition is no longer warranted.

There are two categories of BLM-designated special status species:

- **Sensitive Species.** In Oregon and Washington, the BLM sensitive species are those taxa that have federal-listed, federal-candidate, state-listed or state-candidate (plant) status; or have a Natural Heritage rank of G1-G3, N1-N3, T1-T3, or S1-S2 and are on the Oregon Heritage List 1 or 2.
- **Strategic Species.** Species that are not included as federal-listed, federal-candidate, or state-listed; but have a Natural Heritage rank of G1-G3, N1-N3, T1-T3, or S1-S2 and are on the Oregon Heritage List 3.

As of January 24, 2008, there were 98 sensitive (amphibians, reptiles, birds, invertebrates, and mammals) documented or suspected to occur within the planning area. See *Appendix H - Wildlife*. Between 24 and 50 species occur in each district. See *Table 3-39 (Animal special status species in BLM districts within the planning area)*.

Federally-Listed Threatened and Endangered Species

The federally listed threatened northern spotted owl, marbled murrelet, and snowy plover are addressed individually within this FEIS and will not be discussed in detail under *Special Status Species*. There are other federally listed threatened and endangered, or federal candidate animal species that either occur on the periphery of the planning area (i.e. in the ocean) or inhabit habitats that constitute a very small portion of the planning area. See *Table 3-40 (Documented or suspected federally listed animal species within the planning area that are not typically found in forested habitat)* and *Table 3-41 (Habitat requirements for federally listed animal species within the planning area that are not typically found in forested habitat)*.

Bureau Sensitive Species

Bureau sensitive species within the planning area are discussed based on five broad categories of habitat types: (1) westside forest habitats, (2) habitat on the Eastside Management Lands (i.e. east side of the Klamath Falls Resource Area), (3) non-forested habitats, (4) riparian habitats, and (5) forest floor habitats. See *Appendix H – Wildlife* for more information about these habitats.

Westside Forest Habitat

The Bureau sensitive species that are generally associated with forested habitats have been categorized based on their association with habitat found in the physiographic provinces (i.e. Coast Range, West Cascades, Klamath, and Eastern Cascades physiographic provinces) and structural stages (i.e. stand establishment, young, mature, and structurally complex) as previously described in *Forest Structure and Spatial Pattern*. Refer to *Figure 3-12 (Physiographic provinces and BLM-administered lands within the planning area)* and *Table 3-2 (Structural stage subdivisions)*. Even though there is habitat from the Eastern Cascades physiographic province included in this broad category, it is still referred to as "westside forest habitat" because the Eastern Cascades comprises approximately 2 percent of the BLM-administered lands within the planning area (see *Figure 3-11. Percent of BLM-administered land within each of the physiographic provinces within the planning area*). The current condition of Westside forested habitat is also described in *Forest Structure and Spatial Pattern*. Refer to *Table 3-3 (Current structural stage abundance on forested lands)*, *Table 3-4 (Current mean patch size by structural stage by province)*, and *Table 3-5 (Current connectance on BLM-administered lands by structural stage)* in the *Forest Structure and Spatial Pattern* section of this chapter.

Table 3-39. Animal Special Status Species In BLM Districts Within The Planning Area

Status[a]	Districts					
	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls
	Birds					
FE/FT	2	3	2	4	2	1
Sensitive	7	11	7	20	8	17
Total	**9**	**14**	**9**	**24**	**10**	**18**
	Amphibians and Reptiles					
FE/FT	0	0	0	0	0	0
Sensitive	5	4	2	3	5	4
Total	**5**	**4**	**2**	**3**	**5**	**4**
	Invertebrates					
FE/FT	2	1	0	1	1	0
Sensitive	18	13	8	14	13	14
Total	**20**	**14**	**8**	**15**	**14**	**14**
	Mammals					
FE/FT	1	0	0	4	0	0
Sensitive	4	4	5	4	4	6
Total	5	4	5	8	4	6
Grand Total	**39**	**36**	**24**	**50**	**33**	**42**

[a] FE - federally listed as endangered FT - federally listed as threatened

Table 3-40. Documented Or Suspected Federally Listed Animal Species Within The Planning Area That Are Not Typically Found In Forested Habitat

Status [a]	*Scientific Name*	Common Name
FT	*Branchinecta lynchi*	Vernal pool fairy shrimp
FT	*Charadrius alexandrinus nivosus*	Western snowy plover
FT	*Eumetopias jubatus*	Steller sea lion
FT	*Speyeria zerene hippolyta*	Oregon silverspot butterfly
FE	*Balaenoptera musculus*	Blue whale
FE	*Eschrichtius robustus*	Gray whale
FE	*Icaricia icarioides fenderi*	Fender's blue butterfly
FE	*Megaptera novaeangliae*	Humpback whale
FE	*Pelecanus occidentalis californicus*	California brown pelican

[a] FT - federally listed as threatened FE - federally listed as endangered

Table 3-41. Habitat Requirements For Federally Listed Animal Species Within The Planning Area That Are Not Typically Found In Forested Habitat

Common Name	Habitat Conditions
Vernal pool fairy shrimp	• Small, cooler ephemeral pools (ODFW 2006) • Found on BLM-administered lands in the Medford District • Recovery plan and designated critical habitat available (USDI USFWS 2005 and Federal Register 2006c:7118-7166
Western snowy plover	• Coastal beaches • Found on BLM-administered lands in the Coos Bay District
Steller sea lion	• Marine habitats including coastal waters near shore and over the continental slope • Sometimes rivers as ascended in pursuit of prey • Terrestrial habitats include beaches that are commonly used as rookeries and haul outs (NatureServe 2006)
Oregon silverspot butterfly	• Salt spray meadows • Host plants – early blue and western blue violets (*Viola* spp.) (ODFW 2006) • Recovery plan and designated critical habitat available (USDI USFWS 2001b, Federal Register 1980:44935-44938)
Blue whale	• Mainly pelagic • Generally prefers cold waters and open seas (NatureServe 2006)
Gray whale	• Mostly in coastal and shallow shelf waters • Young are born in lagoons and bays (NatureServe 2006)
Fender's blue butterfly	• Seasonally wet native prairies in Willamette Valley • Host plant is Kincaid's lupine (*Lupinus sulphureus kincaidii*) (ODFW 2006) • Critical habitat available (Federal Register 2006:63861-63910)
Humpback whale	• Pelagic and coastal waters • Sometimes frequents inshore areas such as bays (NatureServe 2006)
California brown pelican	• A coastal, marine species rarely found inland • Roosts on sandy shores and offshore rocks • Nests on island and offshore rocks (Marshall et al. 2003)

Eastside Management Land Habitat

Those lands on the east side of the Klamath Falls Resource Area that occur outside of the O&C portion are referred to as the Eastside Management Lands and were categorized into habitat associations to facilitate effects analyses. Some habitat associations were further sub-divided by age class to facilitate a more in-depth analysis. See *Table 3-42 (Habitat on Eastside Management Lands)*.

Non-forested Habitat

Non-forested and special habitat types are found throughout the planning area and typically include such features as: rock outcrops, cliffs, talus areas, westside grasslands, westside shrublands, herbaceous wetlands, vernal pools/ponds, bodies of open water (e.g., ponds, small lakes, reservoirs, and rivers), agricultural lands, coastal dunes/open sand, coastal grasslands, saltmarshes, and marine. Approximately 4 percent (104,486 acres) of the planning area is currently non-forested habitat. However, the abundance and distribution of the different types of non-forested habitat, such as those previously listed, have not been mapped or quantified.

Riparian Habitat

Riparian habitat typically includes the aquatic ecosystems and adjacent upland areas that directly affect it or are affected by it. The existing condition of riparian habitat is described in the *Fish* section of this chapter, including *Figure 3-85 (Current riparian conditions by BLM district*). The current condition of the aquatic component of riparian habitat is discussed in the *Water* section of this chapter.

Forest Floor Habitat

Forest floor habitat is found in westside forests and Eastside Management Land forests of all structural stages. The relative quality of forest floor habitat is generally more developed in mature and structurally complex stands. In mature and structurally complex stands, the amount of down wood material is typically more abundant and of larger sizes than in younger stands and there is also a more developed canopy to regulate soil temperature and soil moisture.

Taxa such as some amphibians, reptiles, and invertebrates are associated with forest floor habitat and respond to changes in canopy cover, down wood, and soil moisture.

Fisher

The west coast population of the fisher (*Martes pennanti*) was petitioned for listing under the federal Endangered Species Act in 2000. In 2004, the U.S. Fish and Wildlife Service found that listing was

Table 3-42. Habitat On Eastside Management Lands

	Age Class (acres)			
Habitat Associations	**Open**	**Young**	**Medium**	**Old**
Grassland	3,368	0	493	158
Juniper	27,855	487	30,307	22,278
Ponderosa Pine	38,725	1,357	9,734	26,121
Sagebrush	387	0	11	90
White Fir	2,323	859	842	1,834
Water	5,037	-	-	-
Uncategorized	123	13	80	200
Total	**77,818**	**2,716**	**41,466**	**50,902**

"warranted but precluded" by higher priority actions (Federal Register 2004, 18770). Subsequently, the fisher was added to the U.S. Fish and Wildlife Service's candidate species list (Federal Register 2004, 18770). Within the planning area, the fisher has been documented to occur in three districts (Coos Bay, Eugene, and Medford) and suspected to occur in two others (Klamath Falls and Roseburg). See *Appendix H - Wildlife*.

Fisher historically occurred throughout the Cascades Range, Coast Range, the Siskiyou Mountains, and Blue Mountains of Oregon (Bailey 1936). Fishers have declined since the late 1800s and early 1900s as a result of overtrapping, loss of habitat, and predator control programs (Aubry and Lewis 2003). Aubry and Lewis (2003) recognized two disjunct populations of fisher within the planning area—one in the southern Cascade Range and another in the northern Siskiyou Mountains. The southern Cascade fisher population is separated from the northern Siskiyou Mountains population by Interstate Highway 5, large expanses of non-habitat (non-forested and agricultural lands), and the populated Rogue River Valley.

Genetic studies found the population in the southern Cascades originated from animals that were introduced from British Columbia and Minnesota at various times from the 1960s through the early 1980s (Aubrey and Lewis 2003). Genetic analysis has determined that "[t]he high degree of relatedness among fishers in the southern Cascade Range (R-.56) is consistent with the hypothesis that this population is small and isolated" (Aubry et al. 2003).

Small population sizes and isolation make the "Oregon populations vulnerable to extirpation" (Federal Register 2004, 18789). Recent survey efforts in southwestern Oregon have detected fisher in the landscape between the southern Cascades and other northern Siskiyou Mountains population centers, but the extent of connectivity between the two populations is still believed to be limited (Aubrey et al. 2004; Aubrey and Lewis 2003; Federal Register 2004, 18771).

Forest structure and associated prey are thought to be the critical features of habitat requirements for the fisher (Buskirk and Powell 1994). Powell (1993) (as cited in Federal Register 2004, 18773) stated "that forest type is probably not as important to fishers as the vegetative and structural aspects that lead to abundant prey populations and reduced fisher vulnerability to predation, and they may select forest that have low and closed canopies." The fisher selects habitat based on factors measured at the home-range scale or higher and is strongly associated with forest cover (Carroll et al. 1999). The fisher uses different forest structures for different stages of its life. The four stages of life include:

- natal sites (where young are born and weaned)
- maternal habitat (where young are raised)
- resting sites
- foraging habitat

Aubry and Raley (2002) found that female fishers use trees (alive or dead) with hollows created by heart rot for natal sites. Natal den trees ranged from 61 to 138 centimeters (24 to 54 inches) in diameter, with an average of 93 centimeters (37 inches) (Aubry and Raley 2002). Weir and Harestad (2003) reported natal dens in cottonwoods averaging 103 centimeters (40 inches) in diameter. The U.S. Fish and Wildlife Service (Federal Register 2004, 18774) cited studies in northern California reporting average diameters of natal den trees of 62.5 to 295 centimeters (24 to 116 inches).

Maternal dens were located in cavities in live trees and snags, between the bole and sloughing bark, on mistletoe brooms, on rodent nests, and in hollow logs that were greater than 50 centimeters (20 inches) in diameter (Aubry and Raley 2002). Approximately 56% of natal and maternal den sites in the southern Cascades study were located in unmanaged forests, 38% in managed forests (some evidence of past harvest activities), and 6% in second growth forests (Aubry and Raley 2002). For analysis purposes, maternal habitat was synonymous with natal habitat.

Rest sites occur predominantly in live trees. Aubry and Raley (2002) found that mistletoe brooms were used more than any other platform or microsite. Snags and down logs were also used as resting sites (Aubry and Raley 2002, Zielinski et al. 2004, Yeager 2005). In the southern Cascades, resting sites were found in unmanaged forests 63% of the time, in managed forests 22% of the time, and in managed second growth forests 25% of the time (Aubry and Raley 2002). In the Klamath Province of northern California, Yeager (2005) determined that rest sites were located in trees with a significantly larger diameter at breast height than the average diameter at breast height of the four largest trees on a plot (0.4 hectare [1 acre]) that was centered on the rest site structure.

Trees providing rest sites in the Shasta-Trinity National Forest and the Hoopa Valley Indian Reservation averaged from 87 to 124 centimeters (34 to 40 inches) in diameter at breast height (Yeager 2005). Rest sites in northern California averaged approximately 118 centimeters (46 inches) in diameter (Zielinski et al. 2004). Resting structures need to be sufficiently large in diameter to provide resting substrates that can accommodate the large-bodied fishers. Trees must be old enough for ecological processes to form cavities of sufficient size to be of use to fishers (Zielinski et al. 2004). Zielinski et al. (2004) described resting locations in their coast study areas of northern California as being best distinguished from random locations by having large trees, dense canopies, and large diameter snags.

Foraging habitat is a function of coarse woody debris and stand structural complexity, which translates into a diverse prey base (Weir and Harestad 2003, Buskirk and Powell 1994). The fisher is a predator of small- to medium-sized mammals and birds. They also feed on a variety of vegetable matter, including berries and nuts (Powell and Zielinski 1994). Fungal spores found in fisher scats indicate that fishers may also directly consume fungi (Zielinski et al. 1999). Throughout their range, fishers commonly feed on ungulate carrion (e.g., deer, elk, moose, and cattle), especially in the winter, when other prey species are less available.

Fishers may select prey based upon their availability (Banci 1989). Fishers tend to occur in habitat that provides both prey numbers and the opportunity to capture them (Powell 1993, as cited in Federal Register 2004, 18772; Weir and Harestad 2003).

Literature reviews have shown that home ranges for fishers vary up to 122 square kilometers (47 square miles) for males and 53 square kilometers (20 square miles) for females (Banci 1989, Powell and Zielinski 1994). Zielinski et al. (2003) found that home ranges averaged 5,806 hectares (14,350 acres) for males and 1,498 hectares (3,700 acres) for female fisher in their coastal study area (northern California). Approximately 76% of the home range was composed of mature and older Douglas fir and true fir habitat types (Zielinski et al. 2004). Fishers avoid habitats without overstory or shrub cover (Weir and Harestad 2003; Federal Register 2004, 18773).

Approximately 2.2 million acres of BLM-administered lands within the planning area are commercial forest lands capable of growing into fisher natal (including denning) and foraging habitat. See *Table 3-43 (Available fisher natal habitat on BLM-administered lands within the planning area) and Table 3-44 (Available fisher foraging habitat on BLM-administered lands within the planning area)*. Within the planning area, fisher natal habitat currently comprises 25 percent (543,000 acres) of the BLM forest lands capable of developing into natal habitat. Forests older than 200 years comprise 65 percent (351,000 acres) of natal habitat and 16 percent of the habitat-capable acres. It is assumed that natal habitat older than 200 years is of a better quality because of the increased time that it has had to develop decadent features (e.g., snags and trees with large cavities) than natal habitat less that is less than 200 years old.

Foraging habitat constitutes 62 percent (1,356,000 acres) of the BLM forest lands capable of developing into foraging habitat. The Medford District contains the most fisher foraging habitat at approximately 612,000 acres. See *Table 3-44 (Available fisher foraging habitat on BLM-administered lands within the planning area).*

In their finding on the petition to list the fisher, the U.S. Fish and Wildlife Service concluded that habitat loss and fragmentation appeared to be significant threats to the fisher (Federal Register 2004, 18780). Timber harvesting is a primary threat (Powell 1993) by reducing the amount of suitable natal and foraging habitat, fragmenting the remaining landscape, and changing the forest structure. Timber management activities tend to simplify stands by reducing species diversity, removing snags and down wood, and creating simple canopy structures (Federal Register 2004, 18778-18779).

Land Birds

"The temperate rain forests of the Pacific Northwest support the highest abundance of birds of any coniferous forest system in North America" (Altman 1999). There are potentially 164 species of birds that could occur within the planning area (Olson et al. 2001). See *Table 3-45 (Land bird occurrence within the forest habitat types of found within the planning area.)*.

Detailed descriptions of the habitat needs and conservation concerns of land birds are detailed in *Birds of Oregon* (Marshall et al. 2003), *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001), and in the numerous species accounts contained within the *The Birds of North America* (Poole and Gill 2002).

Table 3-43. Available Fisher Natal Habitat On BLM-Administered Lands Within The Planning Area

BLM Districts	Habitat-capable	Natal Habitat		Natal habitat 200 years of age and older	
	(acres)	(acres)	(%)[a]	(acres)	(%)[b]
Salem	365,000	48,000	13	30,000	63
Eugene	296,000	51,000	17	38,000	75
Roseburg	399,000	156,000	39	119,000	75
Coos Bay	302,000	84,000	28	57,000	68
Medford	788,000	197,000	25	101,000	51
Klamath Falls Resource Area[c]	47,000	8,000	17	6,000	75
Totals	**2,197,000**	**543,000**	**25**	**351,000**	**65**

[a] Percentage of habitat-capable acres
[b] Percentage of natal habitat
[c] Western (O&C) portion of the resource area

Table 3-44. Available Fisher Foraging Habitat On BLM-Administered Lands Within The Planning Area

BLM Districts	Habitat-capable	Foraging Habitat	
	(acres)	(acres)	% of habitat-capable acres
Salem	365,000	196,000	54
Eugene	296,000	134,000	45
Roseburg	399,000	227,000	57
Coos Bay	302,000	149,000	49
Medford	788,000	612,000	78
Klamath Falls Resource Area of the Lakeview District (western O&C portion of the resource area)	47,000	38,000	81
Totals	**2,197,000**	**1,356,000**	**62**

Threats facing land birds include loss of habitat, habitat fragmentation, declining populations, and forest simplification (Altman 1999, Marshal et al. 2003, Rich et al. 2004, Pashley et al. 2000). Past management practices (including clearcutting, commercial thinning, fire suppression, salvage, slash burning, and herbicide use) has tended to simplify the forest habitat (Altman 1999). More recent management has begun to improve habitat structure and diversity by recognizing the need to provide for diverse forest structures (including legacy trees, snags, down wood, multiple canopy layers, and variable densities of tree retentions).

The U.S. Fish and Wildlife Service recognizes two group of birds of management concern, outside of the endangered species listing process, including birds of conservation concern and game birds below desired condition. See *Table 3-46* (*Birds of conservation concern within the western Oregon plan revision planning area*) and *Table 3-47* (*Game birds below desired condition within the western Oregon plan revision planning area*).

The Oregon/Washington Partners in Flight has developed a tiered scheme of segregating species into management groups based on forest conditions and habitat attributes. Focal species are then identified for each group (Altman 1999, 2000a, and 2000b; Altman and Holmes 2000). "By managing for a group of species representative of important components in a functioning…forest ecosystem, many other species and elements of biodiversity also will be conserved" (Altman 1999).

Data is not available to analyze all the possible combinations of groups of forest conditions and habitat attributes described in the conservation strategies. Habitat for land birds is discussed based on three broad categories: (1) westside forested land bird habitat, (2) nonforested habitat, and (3) land bird habitat on Eastside Management Lands (i.e., east side of the Klamath Falls Resource Area).

Westside Forested Land Bird Habitat

Westside land bird habitat includes habitat found in the Coast Range, West Cascades, Klamath, and Eastern Cascades physiographic provinces. Even though there is habitat from the Eastern Cascades physiographic province included in this broad category, it is still referred to as "westside forest habitat" because the Eastern Cascades only comprise 9 percent of the BLM-administered lands within the planning area (see *Figure 3-11. Percent of BLM-administered land within each of the physiographic provinces within the planning area*).

Effects analysis for westside land bird habitat was based on the habitat associations and structural stages described in *Table 3-48* (*Habitat associations and structural groups for land birds on westside lands*).

The structural stages used in the land bird analysis are identical to those used in *Forest Structure and Spatial Pattern* except that "mature with multilayered canopy and structurally complex" is a combination of both mature stands with multilayered canopies and structurally complex stands. The amount of habitat within each westside habitat association for land birds is described in *Table 3-49 (Abundance of westside land bird habitat).*

Legacy Components

Legacy components for land birds (as well as for other wildlife species) include snags, coarse woody debris, and live remnant trees. Forests with legacy components include those that are either: mature & structurally complex, young with structural legacies, or stand establishment with structural legacies. The amount of forest with legacy components within each westside habitat association is described in *Table 3-49 (Abundance of westside land bird habitat).*

Table 3-45. Land Bird Occurrence Within The Forest Habitat Types Found In The Planning Area

Habitat	Number of Bird Species
Montane mixed conifer	107
Southwest Oregon mixed conifer-hardwood	161
Westside oak and dry Douglas fir and woodlands	119
Westside lowlands and conifer-hardwood	120
Mixed conifer	116
Lodgepole pine	83
Ponderosa pine	131

Table 3-46. Birds Of Conservation Concern Within The Western Oregon Plan Revision Planning Area

Common Name	Scientific Name	Birds of Conservation Concern[a]	
		BCR 5[b]	BCR 9[c]
Black swift	*Cypseloides niger*	X	X
Flammulated owl	*Otus flammeolus*	X	X
Lewis's woodpecker	*Melanerpes lewis*	X	X
Long-billed curlew	*Numunius americanus*	X	X
Marbled godwit	*Limosa fedoa*	X	X
Peregrine falcon	*Falco peregrinus*	X	X
Whimbrel	*Numenius phaeopus*	X	X
White-headed woodpecker	*Picoides albolarvatus*	X	X
Yellow-billed cuckoo	*Coccyzus americanus*	X	X
Black oystercatcher	*Haematopus bachmani*	X	
Black turnstone	*Arenaria melanocephala*	X	
Black-footed albatross	*Phoebastria nigripes*	X	
Olive-sided flycatcher	*Contopus cooperi*	X	
Red knot	*Calidris canutus*	X	
Short-billed dowitcher	*Limnodromus griseus*	X	
Brewer's sparrow	*Spizella breweri*		X
Burrowing owl	*Athene cunicularia*		X
Gray vireo	*Vireo vicinior*		X
Greater sage-grouse (*Columbia Basin population only*)	*Centrocercus urophasianus*		X
Prairie falcon	*Falco mexicanus*		X
Snowy plover (*except where endangered*)	*Charadrius alexandrinus*		X
Swainson's hawk	*Buteo swainsoni*		X
Tricolor blackbird	*Agelaius tricolor*		X
Williamson's sapsucker	*Sphyrapicus thyroides*		X
Yellow rail	*Coturnicops noveboracensis*		X

[a]Compilation of tables 8,9, and 41 in: USFWS. 2002. Birds of Conservation Concern 2002. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 99 pp.

[b] Bird Conservation Region 5 (Northern Pacific Rainforest) - Includes West Cascades, Coast Range, Willamette Valley, and Klamath physiographic provinces; Salem, Eugene, Roseburg, Coos Bay, and Medford BLM Districts.

[c]Bird Conservation Region 9 (Great Basin) - Includes eastern Cascade physiographic province in Klamath Falls Resource Area (of the Lakeview BLM District.)

Table 3-47. Game Birds Below Desired Condition Within The Western Oregon Plan Revision Planning Area

Common name	Scientific Name
American Widgeon	*Anas americana*
Band-tailed Pigeon	*Columba fasciata*
Black Brant	*Branta bernicla nigricans*
Canada (Cackling) Goose	*Branta canadensis minima*
Canada (Dusky) Goose	*Branta canadensis occidentalis*
Greater Scaup	*Aythya marila*
Greater White-fronted Goose	*Anser albifrons frontalis*
Greater White-fronted Goose	*Anser albifrons gambelli*
Harlequin Duck	*Histrionicus histronicus pacificus*
King Rail	*Rallus elegans*
Lesser Scaup	*Aythya affinis*
Mallard	*Anas platyrhynchos*
Mourning Dove	*Zenaida macroura*
Northern Pintail	*Anas acuta*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
White-fronted (Tule) Goose	*Anser albifrons elgasi*
Wood Duck	*Aix sponsa*

Table 3-48. Habitat Associations And Structural Stages For Land Birds On Westside Lands

Habitat Association[a]	Description
Western Conifer	Dry to moist coniferous forest; generally in the Coast Range, Willamette Valley, West Cascades, and Klamath Provinces
Western Hardwood	Hardwood-dominated stands in the Coast Range, Willamette Valley, West Cascades, and Klamath Provinces
Eastside Conifer	Conifer dominated stands in the Eastern Cascades Province
Eastside Hardwood	Hardwood dominated stands in the Eastern Cascades Province
Eastside Ponderosa Pine	Ponderosa pine dominated stands in the Eastern Cascades Province
Structural Stage	**Description**
Structurally Complex	Structurally complex structural stage
Mature with multi-layered canopy and structurally complex	Mature with multi-layered canopy and the structurally complex structural stages
Young Forest	Young and mature structural stages
Stand Establishment	Stand establishment structural stage

[a]Habitat association was further analyzed for these five habitats, based on structural group.

Table 3-49. Abundance Of Habitat For Westside Land Birds

Habitat Association	Structural Stage (acres)				
	Stand Establishment	Young	Mature with multi-layered canopy and structurally complex	Structurally Complex	Forest with Legacy Components
Western Conifer	123,605	686,733	793,982	447,576	992,816
Western Hardwood	17,652	170,472	188,575	83,613	293,840
Eastern Conifer	1,235	4,170	30,763	7,345	34,560
Eastern Hardwood	278	1,169	181	125	961
Eastern Ponderosa Pine	3,571	4,064	1,070	367	5,795

Nonforested Habitat

Nonforested habitat is found throughout the planning area and typically includes such features as: rock outcrops, cliffs, talus areas, westside grasslands, westside shrublands, herbaceous wetlands, vernal pools/ponds, bodies of open water (e.g., ponds, small lakes, reservoirs, and rivers), agricultural lands, coastal dunes/open sand, coastal grasslands, salt marshes, and marine. Approximately 4 percent (104,486 acres) of the planning area is currently non-forested habitat. However, the abundance and distribution of the different types of non-forested habitat, such as those previously listed, have not been mapped or quantified.

Land Bird Habitat on Eastside Management Lands

Those lands on the east side of the Klamath Falls Resource Area that occur outside of the O&C portion are referred to as the Eastside Management Lands and were categorized into habitat associations to facilitate effects analysis. Some habitat associations were further subdivided by age class to facilitate a more indepth analysis. See *Table 3-42 (Habitat on Eastside Management Lands)* in the *Wildlife-Special Status Species* section.

Partners-in-Flight Conservation Strategies

Habitats and focal species described in the conservation strategies have been assigned to appropriate habitat association/structural groups. See *Appendix H - Wildlife* and the table entitled *Matrix relating Partners-in-Flight focal land bird species to habitat analysis groups.*

Oregon/Washington Partners-in-Flight provide habitat objectives that are expected to serve as the foundation for developing conservation strategies to ensure functional ecosystems with healthy populations of birds (Altman 1999). They are derived from the current knowledge about bird-habitat relationships (Altman 1999). However, these objectives are not regulatory (Altman 1999).

Habitat objectives from the land bird conservation strategies of the Oregon/Washington Partners-in-Flight for the western Oregon forests include (Altman 1999):

- Maintain existing old-growth forests and manage the landscape for 15 percent old-growth forest conditions.
- Maintain 15 percent, or more, of the landscape in a mature forest condition.
- Maintain 20 to 40 percent of the landscape in a young forest condition.
- Maintain 20 to 40 percent of the landscape in a stand establishment condition.

Habitat objectives from the land bird conservation strategies of the Oregon/Washington Partners-in-Flight for the eastern Oregon forests include (Altman 2000a):

- Maintain existing ponderosa pine forests and manage to provide at least 30 percent in a mature or older condition by 2025, or be on trend to accomplish.
- Maintain existing mixed conifer forests and manage to provide at least 25 percent in a mature or older condition by 2025, or be on trend to accomplish.
- Maintain existing oak-pine forests.

Habitat objectives from the land bird conservation strategies of the Oregon/Washington Partners-in-Flight for the western lowland Oregon forests include (Altman 2000b):

- Maintain existing grassland-savannah, oak woodland, and chapparal habitats.

Habitat objectives from the land bird conservation strategies of the Oregon/Washington Partners-in-Flight for the Columbia Basin include (Altman and Holmes 2000):

- Maintain existing shrub-steppe habitats and manage to provide at least 50 percent in a late-seral condition.
- Maintain existing riparian habitats.

Deer and Elk

Deer (*Odocoileus sp.*) and elk (*Cervus elaphus*) occur across the planning area. Two species of deer (Columbian white-tailed deer (*Odocoileus virginianus leucurus*) and mule and black-tailed deer (*Odocoileus hemionus*)) occur within the planning area. This includes two subspecies of *Odocoileus hemonius*. Columbian black-tailed deer (*Odocoileus hemionus columbianus*) occurs west of the crest of the Cascades and mule deer (*Odocoileus hemionus*) occurs east of the Cascades (ODFW 2003a, Verts and Carraway 1998). Two subspecies of elk are found within the planning area. Roosevelt elk (*Cervus elaphus roosevelti*) occur west of the Cascades and Rocky Mountain elk (*Cervus elaphus nelsoni*) is found east of the Cascades (ODFW 2003b, Verts and Carraway 1998). For management purposes, the Oregon Department of Fish and Wildlife divides the range of the two subspecies along State Highway 97 (ODFW 2003b).

There are two populations of Columbian white-tailed deer in Oregon—one along the Columbia River in the Clatsop, Columbia, and Multnomah counties; and a second population in Douglas County (Verts and Carraway 1998; Federal Register 2003, 54647; USDI USFWS 1983). These populations were among the first species listed under the Endangered Species Act. In 2003, the U.S. Fish and Wildlife Service determined that (Federal Register 2003, 43658):

- Columbia River and Douglas County populations were “distinct population segments.”
- Douglas County population had reached recovery goals and no longer warranted listing.

The Columbia River population is still listed as a federally endangered species (Federal Register 2003: 43658). All subspecies of elk and of mule and black-tailed deer are classified as game animals by the state of Oregon.

Columbian White-Tailed Deer

White-tailed deer inhabit more mesic habitats (Smith 1987, Verts and Carraway 1998). White-tailed deer in the Columbia River population are found on the islands of the Columbia River and on the bottomlands that are adjacent to the river (USDI USFWS 1983). Preferred habitats are plant communities that provide both forage and cover, including the park forest community (Suring 1975, Suring and Vohs 1979, USDI USFWS 1983). White-tailed deer in Douglas County is found in habitats associated with riparian areas (Ricca 1999 and 2003, Smith 1987, USDI USFWS 1983). The U.S. Fish and Wildlife Service (1983) suggests that the oak woodland/ grassland ecotone is very important to white-tailed deer in Douglas County. Open areas, oak savannah, and grasslands are important for feeding (Ricca 1999 and 2003).

White-tailed deer in both populations consume a variety of forbs, shrubs, grasses, and other plants (in order of preference) (Federal Register 2003, 43647; Whitney 2002).

The BLM manages 6,100 acres of Columbian white-tailed deer habitat on the North Bank Habitat Management Area, in the Roseburg District. See *Figure 3-70 (North Bank Habitat Management Area in the Roseburg District)* (USDI BLM 2001a). This area was acquired in 1994 with the expressed purpose of providing secure habitat (habitat managed primarily for the Columbian white-tailed deer).

Mule/Black-Tailed Deer

Mule/black-tailed deer occur across a broad range of habitat types from the Coast Range and Cascade Mountains to the desert shrublands, generally occupying open habitat types (Verts and Carraway 1998, ODFW 2003a). On the west side of the Cascades, black-tailed deer prefer dense, early-seral communities (Verts and Carraway 1998, Brown 1961, Bender et al. 2004). Hanley (1984) found that where black-tailed deer overlapped elk, they preferred the more xeric habitat. During summer, both mule and black-tailed deer may be found at higher elevations—migrating to lower elevations in the fall and winter (McCullough 1960 [Verts and Carraway 1998], ODFW 2003a). In the Coast Range, where winters are less severe, seasonal migration does not occur. Cover is an important habitat component for each subspecies and is provided by stands of dense vegetation (Kremsater and Bunnell 1992, ODFW 2003a).

Figure 3-70. North Bank Habitat Management Area in the Roseburg District

Both subspecies are characterized as browsers, foraging in the younger seral stages (Hanley 1984, Verts and Carraway 1998, Anderson and Wallmo 1984). Forbs are an important component of the summer diets of mule deer. In winter, sagebrush (*Artemisia* sp.), bitter-brush (*Purshia tridentata*), rabbit-brush (*Chrysothamnus* sp.), juniper (*Juniperus* sp.), mountain-mahogany (*Cercocarpus* sp.), and winterfat (*Eurotia lanata*) are common components (Verts and Carraway 1998).

Winter range and associated forage are important components for those mule and black-tailed deer herds that migrate (ODFW 2003a). The BLM has identified 193,000 acres of winter range to be managed with consideration for deer. See *Table 3-50 (Deer management areas within the planning area)* and *Figure 3-71 (Deer habitat management areas on BLM-administered lands within the planning area)*. Threats to deer include loss of forage habitat, loss of hiding cover, and unregulated road use. Unregulated road use causes an increase in deer vulnerability during hunting seasons, increases the potential for illegal kills, and provides opportunities for other disturbances to foraging, fawning, breeding, and resting habitat.

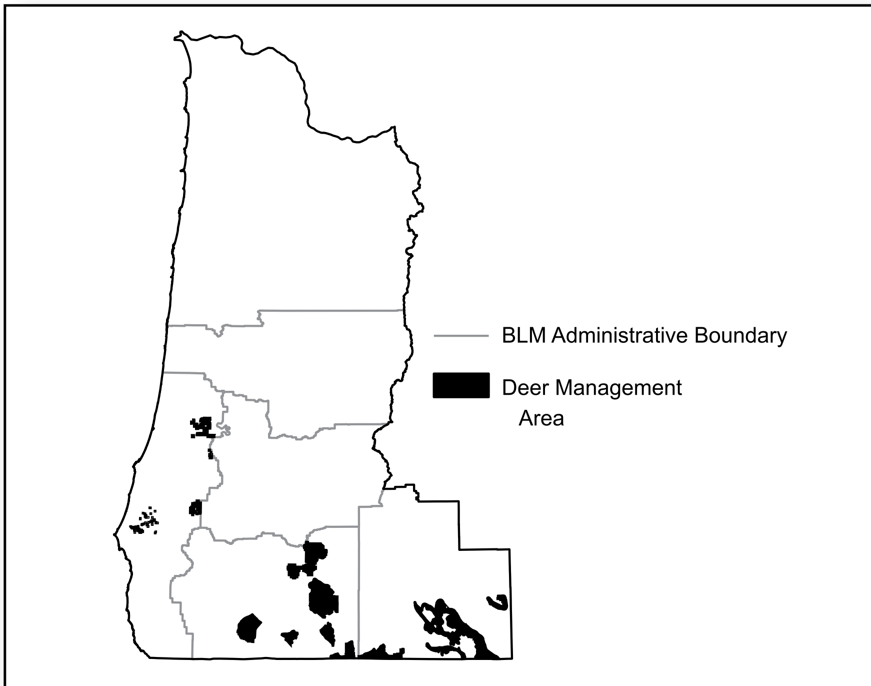
Elk

Elk are found across a wide range of habitats within the planning area. The dominant factors for elk occurrence are the availability of forage and hiding cover (Harper et al. 1987, Verts and Carraway 1998). Early-seral habitat provides important foraging habitat (Verts and Carraway 1998, Witmer and Wisdom 1986, Hanley 1984). Like deer, elk will migrate from high elevation summer habitat to low elevation winter range in areas with harsh winter conditions. However, elk in the Coast Range do not display this migratory

Table 3-50. Deer Management Areas Within The Planning Area

BLM District	Deer Habitat Management Area	Concern	Total Area (acres)	BLM (acres)
Coos Bay	Camp Creek	Cover	12,600	12,500
	Edson Butte	Cover	4,100	4,100
	Millicoma Tree Farm N Edge	Cover	600	600
	Millicoma Tree Farm NE Edge	Cover	6,100	6,100
	Rock Creek	Cover	6,900	6,800
		Total Cover	**30,300**	**30,100**
Klamath Falls	Bly	Winter	17,500	4,500
	Bly Mt	Winter	46,000	6,300
	Hogback	Winter	18,000	2,300
	Horton Windy	Winter	25,000	8,000
	Keno Worden	Winter	8,400	600
	Lorella	Winter	14,600	4,100
	South Bryant	Winter	7,800	2,700
	South Gerber	Winter	41,400	4,900
	Stukel	Winter	12,500	1,800
	Swan Lake	Winter	20,800	6,500
	Topsy Pokegama	Winter	30,600	13,500
Medford	Little Applegate	Winter	14,200	11,100
	Little Butte Creek South	Winter	83,900	25,700
	Burnt Peak	Winter	3,600	1,800
	Camel Hump	Winter	43,000	19,000
	Elk Creek	Winter	40,800	17,500
	Salt Creek	Winter	17,200	7,700
	Shady Cove West	Winter	14,100	8,900
	Williams	Winter	55,300	29,200
	Monument East	Winter	16,600	10,400
	Monument West	Winter	6,500	6,400
		Total Winter Habitat	**537,800**	**192,900**
		Total Cover & Winter Habitat	**568,100**	**223,000**

Figure 3-71. Deer Habitat Management Areas On BLM-Administered Lands Within The Planning Area



behavior (Verts and Carraway 1998, ODFW 2003b).

Elk forage on grasses, forbs, shrubs, and trees (ODFW 2003b, Hanley 1984, Verts and Carraway 1998, Findholt et al. 2004). Foraging habitat value decreases with distance from cover (Witmer and Wisdom 1986, ODFW 2003b). Cover was originally thought to provide both a hiding function and to ameliorate the effect of harsh weather (ODFW 2003b). Recent work in northeastern Oregon has shown that this is not the case (Cook et al. 1998). No positive effects of thermal cover were demonstrated. In fact, possible negative effects may occur (Cook et al. 1998). Cook et al. (2004) reviewed three other studies that looked at the effects of thermal cover and all studies failed to find any benefits.

Threats to elk include loss of forage habitat, loss of cover, and unregulated road access. Unregulated roads cause an increase in elk vulnerability during hunting seasons, increases the potential for illegal kills, provides opportunities for other disturbances during critical calving periods and winter, and causes elk to move away from available forage (ODFW 2003b, Rowland et al. 2000, Wisdom et al. 2004, Rowland et al. 2004, Cole 1996, Cole et al. 1997).

The BLM has identified 124,000 acres to be managed with consideration for elk winter habitat. See *Table 3-51 (Elk management areas within the planning area)* and *Figure 3-72 (Elk habitat management areas on BLM-administered lands within the planning area).*

Table 3-51. Elk Management Areas Within The Planning Area

District	Elk Hbitat Management Area	Concern	Total Area (acres)	BLM (acres)
Coos Bay	Camp Creek	Cover	12,600	12,500
	Edson Butte	Cover	4,100	4,100
	Millicoma Tree Farm North Edge	Cover	600	600
	Millicoma Tree Farm Northeast Edge	Cover	6,100	6,100
	Rock Creek	Cover	6,900	6,800
Salem	Bummer Ridge Elk Emphasis Area	Cover	3,600	3,600
	Luckiamute Elk Emphasis Area	Cover	2,000	2,000
		Total Cover	**35,900**	**35,700**
Medford	Burnt Peak	Winter	3,600	1,800
	Camel Hump	Winter	14,100	8,900
	Elk Creek	Winter	43,000	19,000
	Salt Creek	Winter	41,600	17,500
	Shady Cove West	Winter	17,200	7,700
	Mule Creek	Winter	20,900	19,400
	Far Out	Winter	9,300	8,900
	Peavine	Winter	27,400	26,300
	Elk Valley	Winter	24,200	14,300
		Total Winter Habitat	**201,500**	**123,700**
		TOTAL	**474,700**	**318,800**

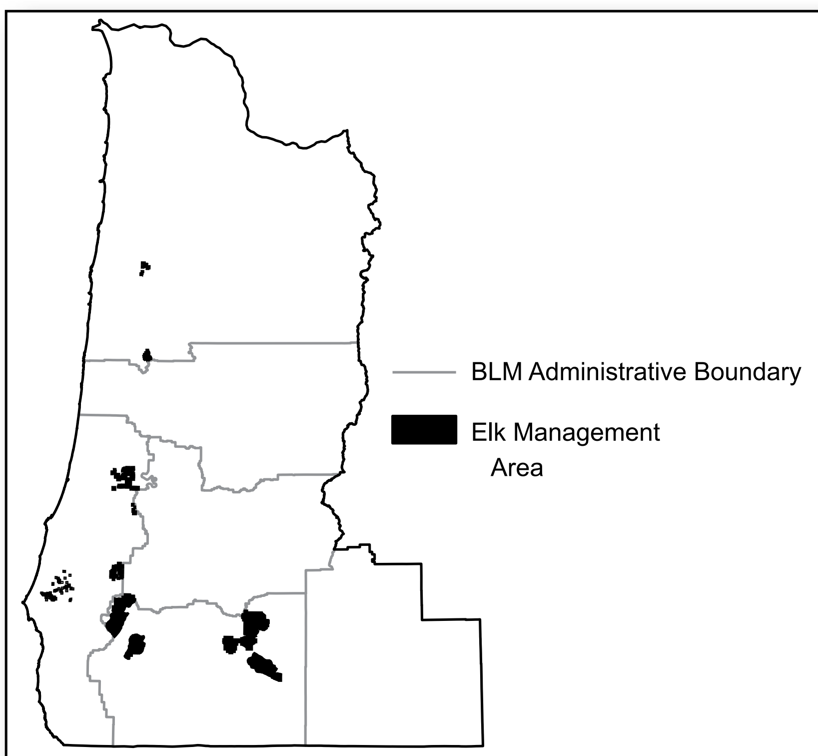


Figure 3-72. Elk Habitat Management Areas On BLM-Administered Lands Within The Planning Area

Water

Key Points

- Watersheds and subwatersheds (10,000 to 250,000 acres) are the most relevant scales to describe hydrologic processes and the cumulative effects of forest management.
- The BLM typically manages only a small percentage of the land and streams within any particular fifth/sixth field watershed.
- Streams that occur on BLM-administered lands are mostly smaller, headwater streams that are important to determining the condition of larger streams and rivers.
- Stream temperature 303(d) water quality listings often are made from mouth to headwaters and are the most common listing on BLM and intermingled private lands. More than 90% of BLM riparian forests provide excellent shading of the streams.
- Landsliding and road runoff are the primary routes of sediment delivery to stream channels.
- Forest management generally has little to do with enhancing peak flows at a fifth-field watershed scale.
- Changes to peak flows at small scales may occur through the removal of forest vegetation and the changes to infiltration and runoff caused by forest roads. As storm size increases, there is little evidence that forest harvest increases peak flows at any scale with recurrence intervals greater than six years.

There are 143,044 miles of streams and rivers within the planning area. See *Table 3-52* (*Miles of streams with BLM ownership within the planning area*). They occur in a variety of landscapes from coastal rain-influenced streams to snowmelt-influenced streams in the Cascades Mountains and in eastern Oregon near Klamath Falls. Within this distribution, there are 20,407 miles of streams and rivers and 218,199 acres of lakes, ponds, and wetlands on BLM-administered land. These water features support aquatic ecosystems under varying conditions according to past disturbance, topography, geomorphology, elevation, and physiographic province.

Large river basins are a mosaic of smaller watersheds linked by stream, riparian, and subsurface networks. Within basins, links among headwater tributaries and downstream channels are important paths for water, sediment, and disturbances.

The causes of change to hydrologic processes include removal of forest vegetation and changes to infiltration and the flow of surface and subsurface water. Changes in hydrologic processes are manifested in such water quality parameters as temperature and sediment.

Hydrologic features (including stream patterns, stream density, stream relief, stream bed and bank characteristics, and natural streamflow response) vary by physiographic province (FEMAT 1993, Appendix

Table 3-52. Miles Of Streams With BLM Ownership Within The Planning Area

Stream Periodicity	Planning Area Streams (miles)	BLM Streams (miles)	BLM Stream Miles (%)
Perennial[a]	57,626	6,728	**12**
Intermittent[b]	85,418	13,679	**16**
Totals	**143,044**	**20,407**	**14**

[a]Perennial streams have varying but continuous discharge year round. Their base level is at, or below, the water table.

[b]Intermittent streams are a nonpermanent drainage feature with a dry period, normally for three months or more. Flowing water forms a channel feature with well-defined bed and banks, and bed-forms showing annual scour or deposition, within a continuous channel network.

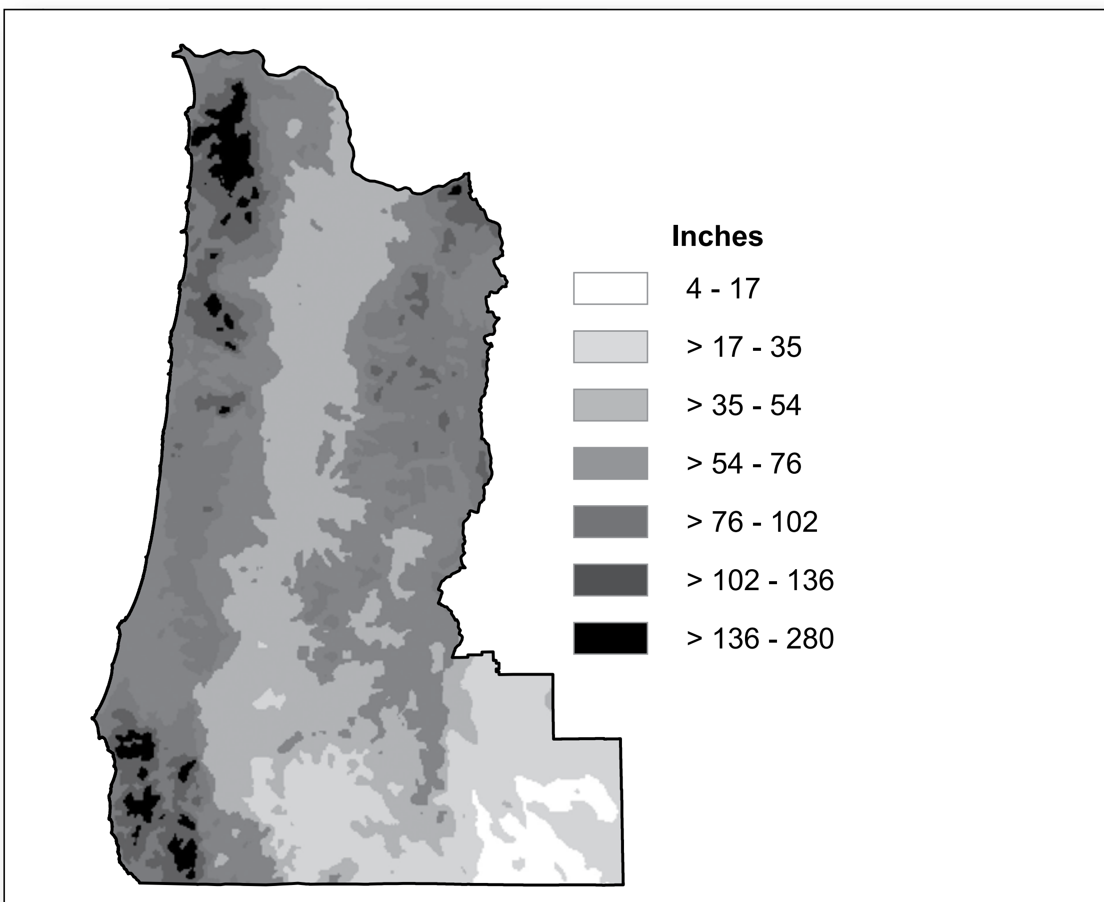
V-G). Riparian vegetation community types also reflect differences in geology, landforms, aspect, soil mineralogy and development, and influencing hillslope processes.

Climate factors, such as precipitation and temperature, interact with physiography to provide the setting for hydrologic processes and disturbance events. Peakflow results from the rainfall of winter storms moving onshore from the Pacific Ocean, snowmelt, and also from convective storms (southern part of the state).

There is great variation in the precipitation and temperature regimes within the planning area. See *Figure 3-73* (*Normal annual precipitation*). Typically, moisture-laden maritime fronts move onshore from the west. These fronts drop moisture as they move east and encounter mountains. Temperatures vary with proximity to the ocean, changes in elevation, and latitude.

- The Coast Range provides intense rapid lift and receives annual precipitation depths varying from 40 inches to greater than 180 inches. Heavy precipitation amounts (combined with steep landforms, concave headwalls, thin soils, weak bedding planes, and weathering) contribute to high landslide frequency. Snowfall seldom occurs in the Coast Range but, when it does, it is usually transitory and above 2,000 feet of elevation.
- The Willamette Valley has less precipitation because storm fronts drop much of their moisture as they move over the Coast Range. The mildness of the Willamette Valley and other western Oregon inland valleys causes snow to be rare even though moisture is relatively abundant.

Figure 3-73. Normal Annual Precipitation



- The West Cascades Mountains and Klamath Mountains see an increase in precipitation because storm fronts gain moisture as they move over the valley and have renewed uplift. Precipitation amounts vary from 80-100 inches in the north Cascades, to 50-60 inches in the south Cascades and Klamath region. Precipitation drops rapidly to less than 45 inches in the eastern Klamath Mountains. Temperatures are lower and moisture is still abundant, so snow is more frequent. Intermittent snow accumulation occurs in the western Cascade Mountains from 1,500 to 3,500 feet in the north, and from 2,000 to 4,500 feet in the south Cascades and Klamath Mountains. Winter snow pack occurs in the high and eastern Cascade Mountains.
- Once over the Cascade Mountains, precipitation diminishes rapidly to less than 15 inches on the eastern edge of the planning area near Klamath Falls. Eastern Oregon receives most of its winter precipitation in the form of snow, although the lower annual precipitation makes the actual snowfall amounts much lower than in the Cascade Mountains.

More than 85% of peak flows from rain and rain-on-snow occur in winter between November and February (Cooper 2005). Snowmelt from winter accumulation in upper elevations occurs in the spring, and thunderstorms bring precipitation in the summer.

A drainage basin is an area of land that catches precipitation falling within its perimeter and moves the precipitation downslope as surface or subsurface flow under the influence of gravity to a creek, stream, or river, until the water drains into an ocean or a closed basin lake.

Hydrologic units (HUC) are a way of classifying drainage basins (Seaber et al. 2007) in a manner that nests them into a multi-level hierarchical drainage system.

- The largest hydrologic unit of classification divides the nation into 21 major geographic regions with an average size of 177,000 square miles. These geographic areas contain either the drainage area of a major river, or the combined drainage areas of a series of rivers.
- An intermediate unit is called a watershed. They are generally 40,000 to 250,000 acres in size. There are 260 watersheds in the planning area. Of these, 176 watersheds contain BLM ownership.
- The smallest hydrologic unit is called a subwatershed, which ranges from 10,000 to 40,000 acres in size.

See *Table 3-53* (*Major river basins within the planning area*) for the major river basins within the planning area and the number of BLM watersheds within each basin province.

Dunne et al. (2001) have proposed that watersheds and subwatersheds are the most relevant for describing hydrologic processes and the effects for cumulative watershed effects analysis.

Geographic areas must be large enough to capture an assemblage of small source areas within mountainous terrain with varying forest environments. These headwater source areas contribute to a range of stream channels, from juvenile steep gradient channels confined by hillslopes, to more well-developed, low-gradient alluvial types with associated floodplains (Montgomery and Buffington 1997). Typically, the watershed scale is necessary to typify the complexity of stream development.

In mountainous areas, streams gain size in a downstream direction and become perennial at a high enough watershed area and difference in relief where the water table stays above the surface.

Downstream mainstem streams at the lower end of watersheds are normally low gradient, except for geologic disconformities. These streams are receptors of the combination of nonpoint pollutants (e.g., temperature and sediment) associated with management activities. Typically, within the planning area, these mainstem streams involve less than 40% of the total stream network and are in areas where a cumulative effect on water would occur.

Table 3-53. Major River Basins Within The Planning Area

Hydrologic Unit Code (HUC)	River Basin	Total Area (square miles)	Proportion within the Planning Area	Number of Watersheds
170800	Lower Columbia: The drainage into the Pacific Ocean including downstream tributaries including the Sandy River (Oregon)	6,250	22%	24
170900	Willamette	11,400	12%	48
171002	Northern Oregon Coastal: The drainage into the Pacific Ocean from the Columbia River Basin boundary to the Umpqua River Basin boundary	4,312	100%	34
171003	Southern Oregon Coastal: The drainage into the Pacific Ocean from and including the Umpqua and Rogue River basins to the Smith River Basin boundary (California and Oregon)	12,582	100%	72
180102	Klamath: The Klamath River Basin (California and Oregon)	15,500	32%	23

The BLM typically manages only a small percentage of the land and stream miles within any particular watershed. See *Figure 3-74* (*Contrasting BLM ownership in the Evans Creek and Eagle Creek watersheds*). The combined actions across all ownerships determine the total impacts to the physical, chemical, and biological condition of downstream rivers. The intermingled land ownership pattern within the planning area can also make it difficult to separate out the amount of impact caused by any particular owner.

Stream type and size are important because:

- The BLM-administered lands are more heavily concentrated in headwaters, typified by small, typically steep-gradient high-energy streams.
- Forest roads that cross small streams are potential flow and sediment delivery augmentation points.
- Many small streams on BLM-administered lands do not flow continuously by late summer.
- Small streams are important in determining the condition of larger streams and rivers.
- Floodplains are associated with larger streams.
- The BLM often manages a small percentage of the riparian areas along larger streams.

See *Table 3-52* (*Miles of streams with BLM ownership within the planning area*) for the miles of streams within the planning area by stream periodicity. See *Table 3-54* (*Stream type descriptions*) for the primary stream type descriptions and their relative proportion within the planning area.

Water Quality

High-quality water is essential for consumptive use and survival, growth, reproduction, and the migration of individuals that comprise aquatic and riparian communities (FEMAT 1993, V-14). This includes an abundance of cold (generally, less than 64°F), well-oxygenated water that is present at all times of the year, and is also free of excessive amounts of suspended sediments (Sullivan et al.1987) and other pollutants (Cordone and Kelley 1961, Lloyd et al. 1987).

Figure 3-74. Contrasting BLM Ownership In The Evans Creek And Eagle Creek Watersheds

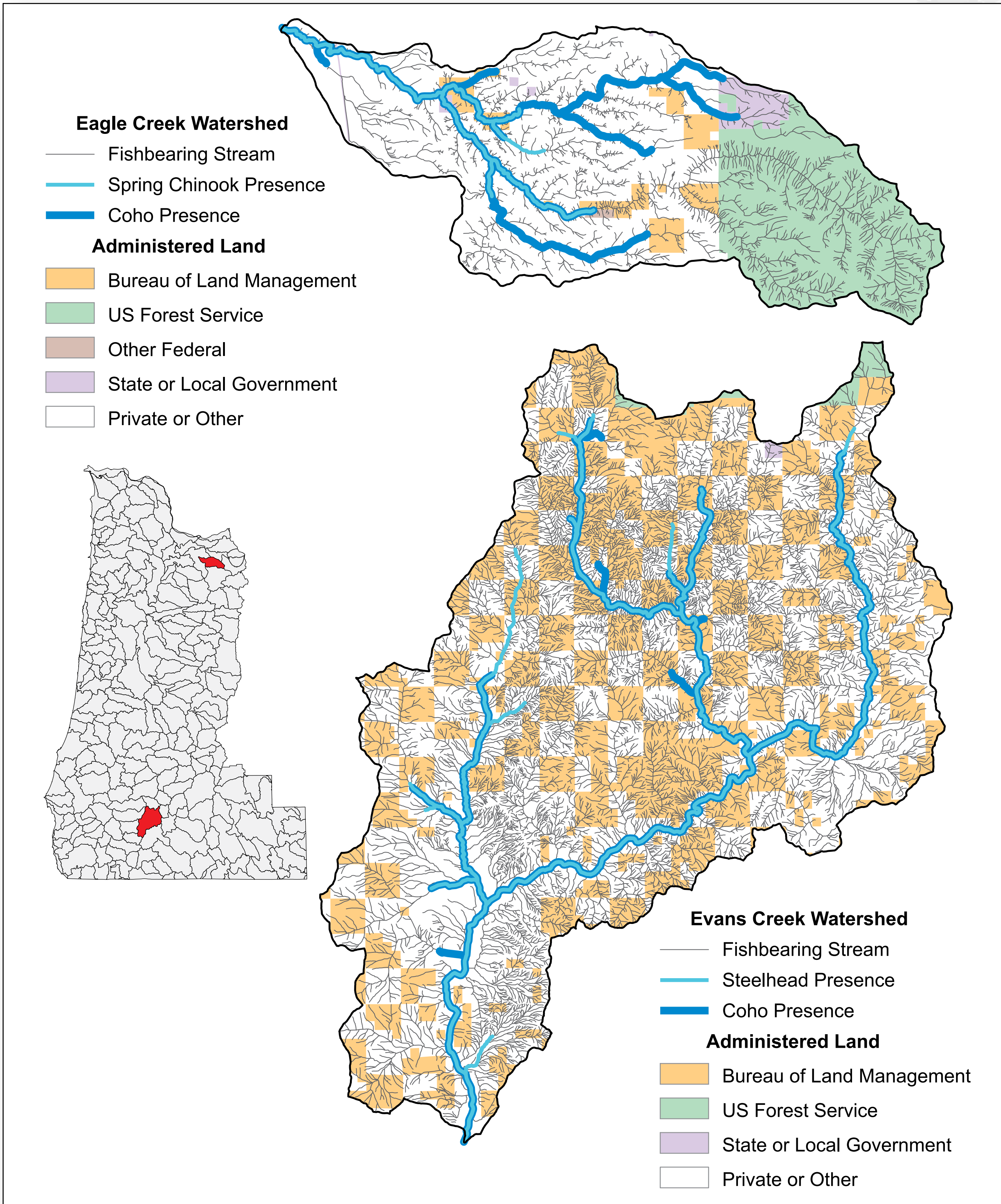


Table 3-54. Stream Type Descriptions

Primary Stream Types	Gradient (feet)	Confinement	Valley Bottom Type	Relative Proportion Within the Planning Area
Cascade	> 20%	Confined	None	60%[a]
Steep	4 to 20%	Confined	None	
Step-pool	2 to 3.9%	Moderately confined	None or narrow, and occasional floodplain feature	40%
Pool-riffle	< 2%	Unconfined	Narrow to wide and floodplains present	
Braided	< 4%	Unconfined	Wide and floodplains present	
Flat	< 2%	Confined	Narrow to wide	

[a]ODEQ estimates 85% in this category for 1 to 3 order streams (ODEQ 2004b).

The Clean Water Act (§ 101[a]) was intended to restore and maintain the physical, chemical, and biological integrity of the nation's waters. The Oregon Department of Environmental Quality is responsible for developing water quality standards and determining where there is impairment of Oregon's streams and lakes as outlined in DEQ's 2004/2006 integrated report. By agreement with the Oregon Department of Environmental Quality, the BLM is recognized as a designated management agency for implementing the federal Clean Water Act (as amended by the Water Quality Act of 1987) on BLM-administered lands in Oregon. This includes selecting appropriate best management practices to maintain water quality for the variety of ongoing forest activities.

Of the 143,044 miles of streams and rivers within the planning area, there are 10,611 miles of streams that are listed as impaired (303[d] listed) for at least one water quality measure. Of these, 948 miles (9%)[8] occur in watersheds with BLM ownership. See *Table 3-55 (Miles of BLM streams on the Oregon Department of Environmental Quality 303[d] list*) and *Figure 3-75* (*303[d] listed streams within the planning area*). The most common listing on BLM-administered lands is water temperature.

Stream Temperature

Highly shaded streams often enjoy cooler stream temperatures due to reduced input of solar energy (Brown 1969, Beschta et al. 1987, Holaday 1992, Lee et al. 2004). Increased stream temperatures can result from removal of shade-producing riparian vegetation along fish-bearing streams and smaller tributary streams that supply cold water to the fish-bearing streams (Beschta et al. 1987, Bisson et al. 1987). Stream morphology, flow, climate, and geographic location also influence stream temperature.

The key factors that produce highly shaded streams include:

- The trees that are closest to a stream channel, including overhanging branches, provide the most shade.
- Narrower riparian areas with closely spaced trees have nearly the same shading effect as wider riparian areas with broadly spaced trees.
- There is little shade gained from trees that are more than 100 feet away from a stream's edge.
- The majority of riparian forests along perennial streams on BLM-administered land are well stocked stands, 40 to 150 years of age, that are tall and dense enough to offer shade.

Solar radiation is the most important source of radiant energy affecting stream temperature (Brown 1969, Beschta 1997). Effectiveness of streamside vegetation to provide shade varies with topography, stream orientation, extent of canopy opening above the channel, and forest structure (USDA USDI 2005b).

Table 3-55. Miles Of BLM Streams On The Oregon Department Of Environmental Quality (ODEQ) 303(d) List

ODEQ 303(d) Listing	Stream Impairment Identified on BLM Streams (miles)	Affected BLM Fifth-Field Watersheds (number)
Temperature	760	105
Dissolved oxygen	108	29
Bacteria	77	26
Sediment	44	7
Heavy metals	28	4

Note: Based on ODEQ's 2004-2006 303(d) list.

Forest trees near stream channels and dense stands can block solar radiation and cast shadows across the stream. Angular canopy density is the measure of canopy closure, projected in a straight line from the stream surface to the sun, as it varies through the day. The angular canopy density value for a given buffer depends on the spacing and depth of crowns in the forest canopy. As vegetation becomes more open through wider spacing, more width of vegetation is needed to achieve the same angular canopy density for the similar vegetation with closer spacing. Higher angular canopy density is achieved with a combination of higher canopy density and/or increased buffer strip width. See *Figure 3-76* (*Angular canopy density and buffer widths for small streams within the planning area*) (Brazier and Brown 1972) to see how angular canopy density varies with riparian area width.

Disturbance plays an important role in the density of riparian forests. Climate variation, windstorms, landslides, floods, and insect and disease infestations are disturbance agents within the planning area. Tree blowdown is the most common, especially when regeneration harvests are adjacent to riparian leave areas. Topography (such as narrow valleys, ridges, or saddles) exposed to the prevailing wind can channel windflow and cause damaging effects. Ordinarily, riparian buffers along perennial streams are in relatively sheltered valley locations. A study by Steimblums et al. 1984 examined 40 sites in the West Cascades from 1-15 years after harvest, where blowdown was present, and found the percentage of windthrow was from 11

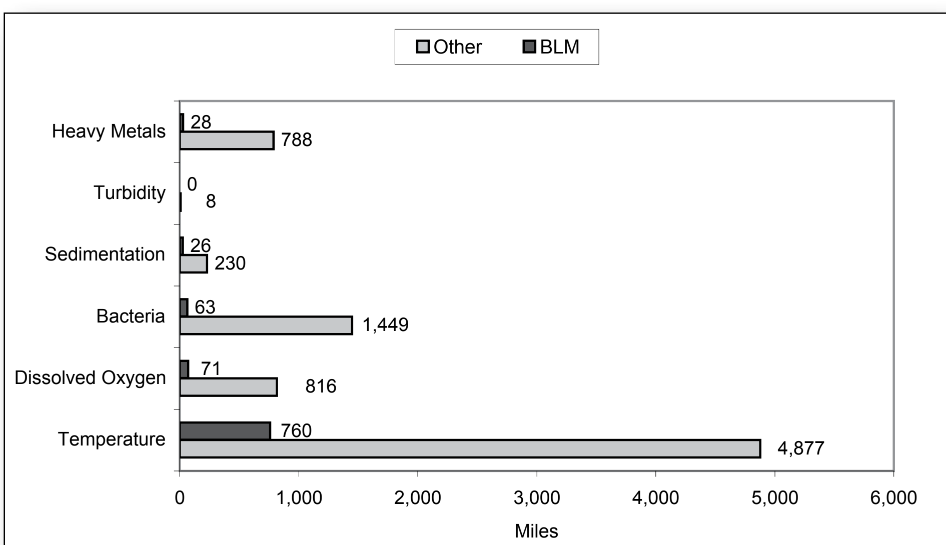
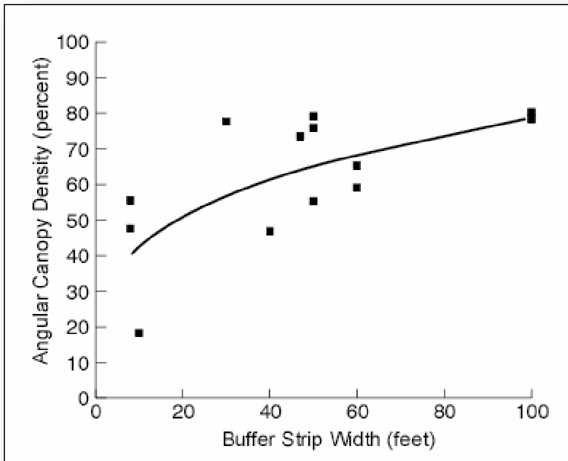


Figure 3-75. 303(D) Listed Streams Within The Planning Area

Figure 3-76. Angular Canopy Density And Buffer Widths For Small Streams Within The Planning Area



to 54 percent within forest species groups. In order of most to least windfirm were western red cedar, western hemlock, Douglas-fir and the true firs. When study results are converted from percentage of trees lost to the effect on angular canopy density, it suggests that a wider riparian leave area width is needed to provide the same amount of shade. See *Figure 3-77 (Angular canopy density and buffer widths with blowdown for small streams within the planning area.)*. Comparing *Figures 3-77* and *3-78,* it can be seen that the buffer strip width must increase from approximately 100 feet to 120 feet to maintain the same angular canopy density of 80%. Disturbance, such as blowdown, results in forest canopy gaps where greater width of the riparian leave area is required to provide a similar shade density.

Angular canopy density is also related to the effective stream shade. See *Figure 3-78 (Angular canopy density and stream shade*) (Park 1991). Effective shade is the total solar radiation blocked from reaching the stream over a 24-hour period (USDA USDI 2005b). Effective shade is defined as:

$$\frac{\text{Total Solar Radiation} - \text{Total Solar Radiation Reaching the Stream}}{\text{Total Solar Radiation}}$$

Effective shade is influenced by slope steepness, vegetation species composition, tree height vegetation density, tree distance from the stream bank, and stream width. Thus, although riparian vegetation is a physical barrier between the stream and incoming solar radiation, only a portion of the riparian canopy contributes to effective shade (USDA USDI 2005b). The relationship and interplay of the variables that affect effective shade can be simplified, to some degree, using geometry and computer models that simulate shade (Boyd 1996, Park 1993).

See *Figure 3-79* (*Stream shade and change in water temperature*) for an illustration of the results of modeling

Figure 3-77. Angular Canopy Density And Buffer Widths With Blowdown For Small Streams Within The Planning Area.

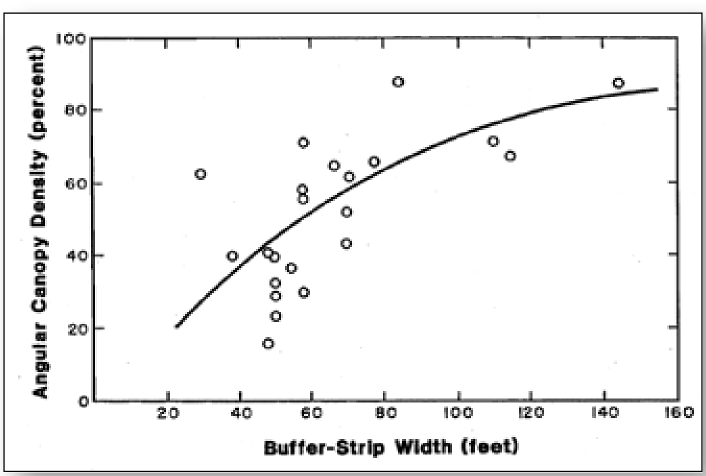
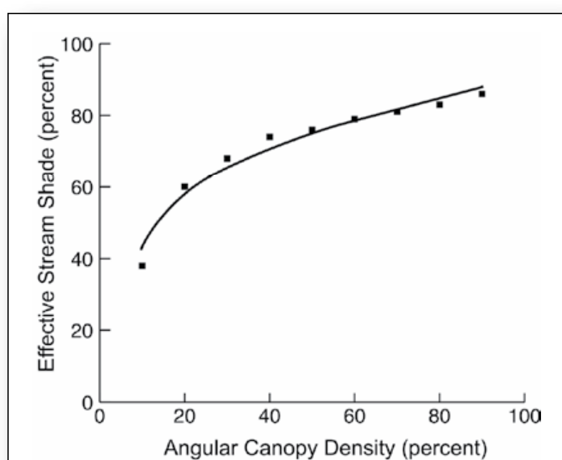


Figure 3-78. Angular Canopy Density And Stream Shade



to represent the downstream change in water temperature relative to effective shade (USDA USDI 2005b). This figure illustrates that as effective shade increases beyond 40%, there is a corresponding reduction in stream temperature to a point (e.g., approximately 80%) beyond which further reduction in stream temperature as a function of shade may not be measurable (Boyd 1996). Furthermore, as is shown in Figures 3-103, 3-104 and 3-105, for this 80% angular canopy density and 80% effective shade level, there is marginal improvement in stream shade for riparian areas wider than 100 feet, or 120 feet with blowdown. This marginal improvement is due to the variables of total solar radiation reaching a stream being diminished by the blocking ability of the riparian forest.

One way of describing these riparian management areas is by assigning average primary and secondary shade zone distances. See *Table 3-56* (*Shade zones*) for the primary and secondary shade zone distances of riparian trees as a function of tree height and slope steepness.

The period of greatest solar heating occurs between 10 a.m. and 2 p.m. Vegetation that intercepts solar radiation between these hours is critical for providing stream shade (USDA USDI 2005b). This vegetation constitutes the primary shade zone. During the morning and afternoon hours, trees outside the primary shade zone can also provide stream shade (USDA USDI 2005b). This area is referred to as the secondary shade zone. See *Figure 3-80* (*Relationship of primary and secondary shade zones*) for an illustration of these two shade zones (USDA USDI 2005b).

Site potential tree heights vary among tree species, with mature conifers being substantially taller than mature hardwoods. Soil quality, aspect, elevation, and physiographic province are also important in determining site potential tree height capability. See *Figure 3-81* (*Riparian tree heights by physiographic province and percent of BLM area*) for the range of tree heights for site potential conifers by each physiographic province within the planning area.

Both the young and mature structural stage classes of forests have tree heights and crown areas that provide effective shading. This is because the tree heights are tall enough to cast shadows from 20 to 100 feet, and the stand density is normally higher than in older forests. Higher density leads to greater sun-blocking ability and greater shade quality. Forests provide the most shade when tree crowns grow closed, and somewhat less shade (through stand competition and individual tree mortality) as the trees mature over time.

Natural fire has been suppressed during the last century, and prescribed fire interacts with the landscape in different ways. These small and large disturbances over time have influenced the trajectory of forest stands. The historical percentage of old growth forest at a given time within the planning area ranged from 35 to 80% (Agee 1993).

Riparian forest microclimate (air temperature and relative humidity) gradients for unmanaged forests and riparian buffers are greatest within 33 feet of streams. For riparian buffers beyond 66 feet of streams, evidence for increasing air temperature or relative humidity is not distinguishable from the upslope (Rykken et al. 2007). Chan et al. (2004) found that the greatest change in microclimate was from stream center to 15 feet, and there were few differences in treatment plots outside this area. Their findings indicate that buffers beyond 15 feet from the stream channel are moderating microclimate more slowly, and that thinning

Table 3-56. Shade Zones

Shade Zones	Height of Riparian Tree	Shade Zone Distance from Edge of Stream		
		Slope < 30%	Slope 30 to 60%	Slope > 60%
Primary	< 20 feet	12 feet	14 feet	15 feet
	20 to 60 feet	28 feet	33.feet	55 feet
	> 60 to 100 feet	50 feet	55 feet	60 feet
Secondary		>50 feet	>55 feet	>60 feet

Source: USDA USDI 2005b

Figure 3-79. Stream Shade And Change In Water Temperature

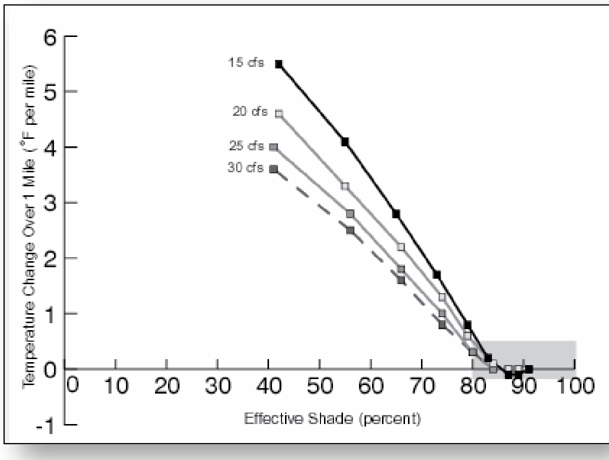


Figure 3-80. Relationship Of Primary And Secondary Shade Zones

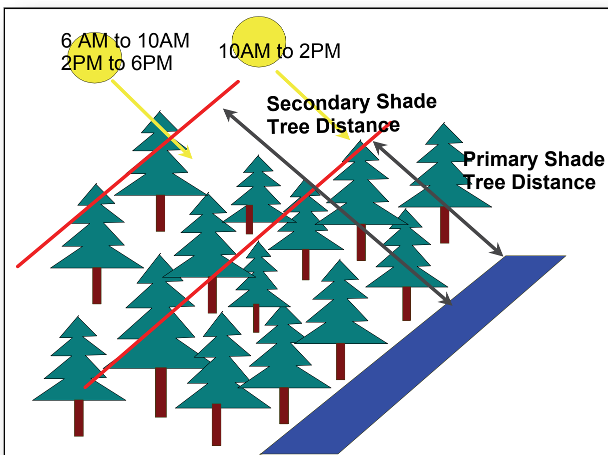
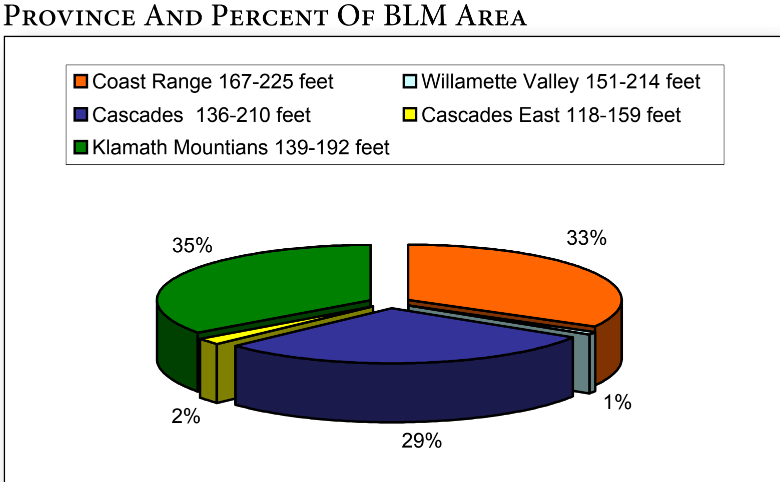


Figure 3-81. Riparian Tree Heights By Physiographic Province And Percent Of BLM Area



to 40 trees per acre may not significantly raise soil or air temperatures, or decrease relative humidity.

The composition and pattern of riparian forest land varies within the planning area. In prelogged riparian forests in the Coast Range, less than 45% of riparian areas were in old forests (Ripple et al. 2000). Sample plots show that historic crown closure was greater than 70% with stands consisting of:

- 49% conifer
- 30% conifer-dominated mixed stands
- 19% hardwood-dominated and mixed stands
- 2% nonforest

Although infrequent, large-scale natural disturbances occur within riparian areas. Sampled plots in the Coast Range show that the five disturbances which altered regeneration of shade-intolerant species occurred in the last 100 years for each mile of stream since a stand-replacing fire (Nierenberg and Hibbs 2000).

Nierenberg and Hibbs (2000) also found that 52% of riparian areas along first to fourth order streams on the first terrace had no trees. This suggests that early competition from shrubs following a stand-replacing fire, lack of a seed source, or infrequent large floods causing deposition are factors that control the dominance and the seral stage of vegetation close to the stream. With increasing distance from these streams, the amount of hardwoods and nonforest decreases. This is evidence that hardwoods and shrubs are the largest limiting factor to conifer growth in or near stream areas, and that historic conifer abundance in unmanaged riparian areas is lower than widely believed.

Harvesting practices during the period from the 1950s to 1980s often removed much of the standing marketable timber from riparian areas along larger streams. This is because transportation systems were first developed along ridge tops and valley bottoms before more difficult midslope roads were attempted. During the 1970s, there was a large salvage program within riparian areas because the breaking up of debris jams was thought to benefit fish migration. This thinking was reversed by the early 1980s, but much of the long-lasting stream-structural-forming large wood (such as western red cedar and Port-Orford-cedar) had been removed.

The Northwest Forest Plan's 10-year monitoring report titled *Northwest Forest Plan – The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results* (Haynes et al. 2006) reported that condition scores for 161 of the 250 sampled watersheds improved from 1994 to 2003. The change in watershed condition scores was attributed primarily to changes in the riparian vegetation, specifically the number of large trees in the riparian areas. The number of large trees increased an estimated 2 to 4% during this time, which was most likely the result of tree growth into the greater than 20-inch diameter at breast height category (Gallo et al. 2005).

Shade in the riparian areas along perennial streams on BLM-administered lands continues to improve, because there has been little regeneration harvesting (limited to small-scale species conversion) in riparian areas in the last 20 years. The OPTIONS modeling indicates that, of the riparian trees within 100 feet of all perennial and intermittent fish-bearing streams, the trees are currently as follows:

- 4% in the stand establishment structural stage
- 41% are young
- 28% are mature
- 27% are structurally complex

Based on near stream riparian forest structure alone at a plan level, there is a high confidence that 80% effective shade goals are currently being met on more than 90% of the riparian management areas. In many cases, BLM thinning treatments along perennial streams have left high levels of canopy closure or retention areas adjacent to streams and waterbodies. The area beyond 100 feet, or 120 feet with blowdown (as shown in *Figures* 3-103, 3-104 and 3-105) has little effect on increased shading of streams, particularly when a thinned forest stand is left to provide additional tree shading.

Dissolved Oxygen

High loading of fine organic matter, such as tree branches and needles, when combined with sediment and increased water temperature can deplete dissolved oxygen in small mountain streams (Wringler and Hall 1975). However, these streams are often steep with high turbulence, which quickly replenishes the dissolved oxygen (Ice 1978). A review of the oxygen requirements of aquatic organisms does not attribute changes in intergravel dissolved oxygen to management activities in the Pacific Northwest (Chapman and Mcleod 1987).

The growth and respiration of attached algae cause day and night fluctuations in dissolved oxygen concentrations. Algae photosynthesis releases oxygen into the water during the day and respiration consumes oxygen at night, which contributes to a dissolved oxygen depression. This cyclic process is limited to low-gradient river systems where nutrient inputs have caused extensive algae growth on the stream bottoms. Algae growth is most apparent during low flows, which may be aggravated by organic inputs and higher stream temperatures.

Bacteria

In forested and rangeland settings, the total coliform and fecal coliform bacteria are monitored depending on the extent of human and animal use. Many of the coliform bacteria include an array of aerobic and anaerobic bacteria, and many of those are nonpathogenic or associated with human waste. Fecal coliform are bacteria that are found in the gut of warm-blooded animals. A variety of diseases may be spread by these bacteria. The presence of coliform bacteria in the water on BLM-administered lands is associated with wild animals, concentrated livestock use, or poor waste disposal by recreation users. In 1996, the state of Oregon adopted a water quality standard based on *Escherichia coli* (E. coli), recognizing E. coli as an indicator of pathogenic potential (Cude and Curtis 2005.) Dispersing activities away from water normally solves bacteria concentrations, because soils act as a filtering system.

Sediment

The planning area is underlain by portions of five physiographic provinces with geologic features that lead to differences in soil development:

- The Coast Range is part of a large, uplifted basin. Much of the soils in this region are derived from sedimentary rock and are shallow to moderately deep, moderately steep to very steep, gravelly and loamy soils.
- The Cascade Province was created by two volcanic episodes resulting in the West Cascades (earliest) and the high Cascades (latest). Mountain rock types include basalt, andesite and associated tuffs, and tephra. Erosion of these systems has produced fine and coarse sediment-based soil parent material, including large volcanic landslides deposits.
- The Willamette Province lies between the Cascade and Coast mountain ranges in western Oregon. This province includes almost the entire Willamette River drainage, a tributary to the Columbia River. Along the valley floor, the river has recent alluvial terraces and floodplains; further out, the river has old valley fill and ancient high terraces. The area is bounded by low elevation hills.
- The Klamath Province is the most geologically complex province in southwestern Oregon. This province is comprised of very old (over 144 million years) sedimentary, volcanic, and metamorphic rocks. The rocks are locally and regionally altered by heat and pressure, and have intrusions of granite and serpentine.
- The Eastern Cascades Province (Basin and Range) is dominated by volcanic rocks including basalts, tuffs, and tuffaceous sediments. Numerous large calderas in the southeastern part of the state erupted thick ash deposits, which were the source of voluminous stream-deposited sediments in the basin. As vast freshwater lakes receded from the Ice Age, there were fluvial and lacustrine deposits laid down in valley fill.

The Medford District within the Klamath Province includes an area of very erodible granitic, schist, and pyroclastic soils. The largest concentration of these soils that formed from decomposed schist and/or granite parent material occurs in Evans, Snow, Sugar, and Meadow Creeks; the upper portions of Williams Creek; and the headwaters of Birdseye Creek. Granitic soils are highly erosive. Once disturbed, these soils are extremely difficult to stabilize. Soils that formed in highly weathered, pyroclastic parent materials are predominantly in the foothills of the Cascades. Pyroclastic flows are fluid mixtures of hot rock fragments, ash, and gases that sweep down the flanks of volcanoes during eruptions. Pyroclastic soil parent material is coarse, with a sand and gravel texture, and has very high erodibility when disturbed.

On-site soil loss is a natural weathering process. Fragmental rock, soil, and organic material that are detached can be redistributed by gravity, wind, and water. When this material arrives at, is eroded from, or is transported in a waterbody, it is known as sediment. Sediment moves in water when water velocities are great enough to cause suspension and entrainment (i.e., mobilization). Sediment moves as a suspended load in a water column, or as larger particles rolling along the stream bottom. Sediment is freely transported through high-gradient stream reaches and is deposited on bars and channel margins in low-gradient streams.

Natural rates of on-site soil loss vary greatly within the planning area, depending on the physiographic area where differences in parent materials lead to differential rock and soil weathering. Equally important factors include landslope and shape where gravity assists a material's movement on steeper slopes. Ameliorating effects that slow down on-site soil loss include vegetation, soil surface organic matter, and/or surface rock content and roughness. Seasonal climatology with the variable effects of wind and water cause erosion in unprotected areas, and particularly large storms may trigger landsliding. Cleanup activities associated with landslides account for the largest portion of the annual sediment budget.

Only a portion of on-site soil loss results in delivery as sediment to a stream or waterbody. More often, soil is redistributed on the slope (Swanson et al. 1982). Sediment delivery depends on land and vegetation factors, as well as drainage density. When sediment is delivered, the stream channel geometry, slope, and substrate affect sediment movement through stream systems. In small stream channels, instream large woody debris functions as a long-term storage site for sediment deposits (Swanson et al. 1982). For these reasons, natural rates of sediment yields from watersheds are highly variable from year to year. For example, Flynn Creek Experimental Watershed, which served as a control in the Alsea study in the Coast Range, reported natural annual sediment yields that varied from 59 tons to 1,237 tons per square mile per year (Brown and Krygier 1971).

Fine sediment (particle sizes less than 2 millimeters) is of most interest, because it is more easily mobilized and capable of traveling the distances necessary to reach a stream or waterbody. Various studies show that average annual sediment yield from natural and human-made sources in the Coast Range Province varies from 200 to 800 tons per square mile per year, compared to the West Cascades Province where it varies from 100 to 500 tons (Swanson et al. 1982, Grant et al. 1991, Stallman et al. 2005).

Sediment Delivery from Roads

Forest management activities (including road building, timber harvesting, and site preparation activities) can lead to accelerated rates of erosion and sediment yield (FEMAT 1993, V-16). In one study on the USFS H. J. Andrews experimental forest, sediment input from roads accounted for 67% of the total annual sediment input (Swanson et al. 1982). This was attributed to poor road building practices of the time, compounded by large storm events.

Roads may divert water and sediment from natural paths through the watershed, introducing new and multiple flowpaths for water and sediment. Road networks can change the flow of water and sediment in a watershed through:

- road surfaces draining directly into streams
- roads intercepting road surface and hillslope water, and rerouting as concentrated flow with eroded sediment by way of ditchlines to streams (Wemple 1998, Jones et al. 2000). (If improperly installed, roadside ditch relief culverts can deliver water and sediments to streams.)
- floatable debris plugging stream crossing culverts during flood flows, causing water to impound behind the road fill with possible stream diversions or road failures
- road construction on steep and unstable ground, leading to accelerated rates of erosion in a watershed (Swanston and Swanson 1976, Reid and Dunne 1984)

Road runoff and landsliding are the primary routes of sediment delivery to stream channels. Road parent material, location, design, use, and density can be important in affecting the extent and magnitude of road-related sediment impacts (Reiter et al. 1995).

Roads differ in their inherent erodibility, or erosion potential, due to the geology of a parent material on which they are constructed. See *Figure 3-82 (Surface erosion classes within the planning area)* (Walker and King 1969). Sediment yields by erosion from older roads (> two years old) with undisturbed ditches are much smaller than sediment yields from newer roads (< two years old) or roads with disturbed ditches. See *Table 3-57 (Basic erosion rates for roads based on the underlying geology)*. The BLM controls approximately 14,000 miles of road within the planning area. Much of the road network length is on ridgetops or traverses areas well away from stream channels. See *Figure 3-83* (*Road distribution in a representative watershed*).

Sediment travel distances along roadways vary by geologic parent material and physiographic province as shown in *Table 3-58* (*Reported sediment travel distances along roadways*).

Primary road sediment sources include:

- Exposed surfaces that can erode, including roadways without surfacing and also poorly vegetated

Figure 3-82. Surface Erosion Classes Within The Planning Area

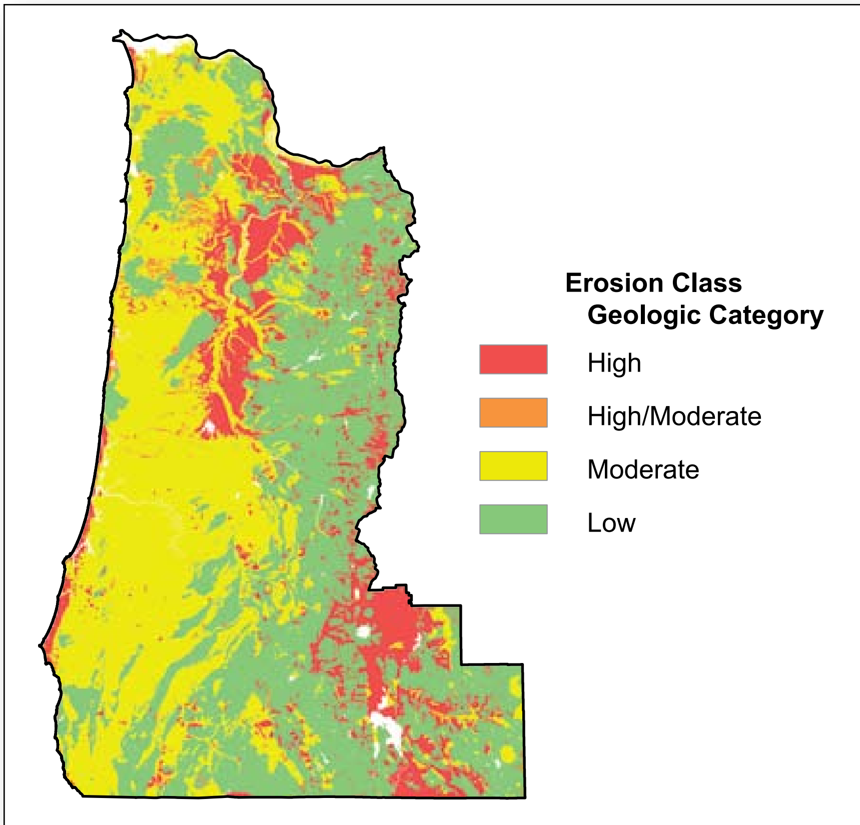


Table 3-57. Basic Erosion Rates For Roads Based On The Underlying Geology

Erosion Category	Geologic Parent Material	Erosion Rates (tons/acre/year) New Roads (0 to 2 years)	Erosion Rates (tons/acre/year) Old Roads (> 2 years)
High	• Mica schist • Volcanic ash • Highly weathered sedimentary rock	110	60
High/Moderate	• Quartzite • Coarse-grained granite	110	30
Moderate	• Fine-grained granite • Moderately weathered rock • Sedimentary rocks	60	30
Low	• Competent granite • Basalt • Metamorphic rocks • Relatively unweathered rocks	20	10

Note: Basic erosion rates (tons per acre per year) are an estimate of erodibility, which is based on the geologic parent material. This rate is for bare ground and is further reduced depending on road surface type, vegetation of cut -and fill-slopes, and traffic level.

Sources: Kochendorfer and Helvey 1984, Hayden et al. 1991, Megahan and Kidd 1972, Reid and Dunne 1984, Sullivan and Duncan 1980.

Figure 3-83. Road Distribution In A Representative Watershed

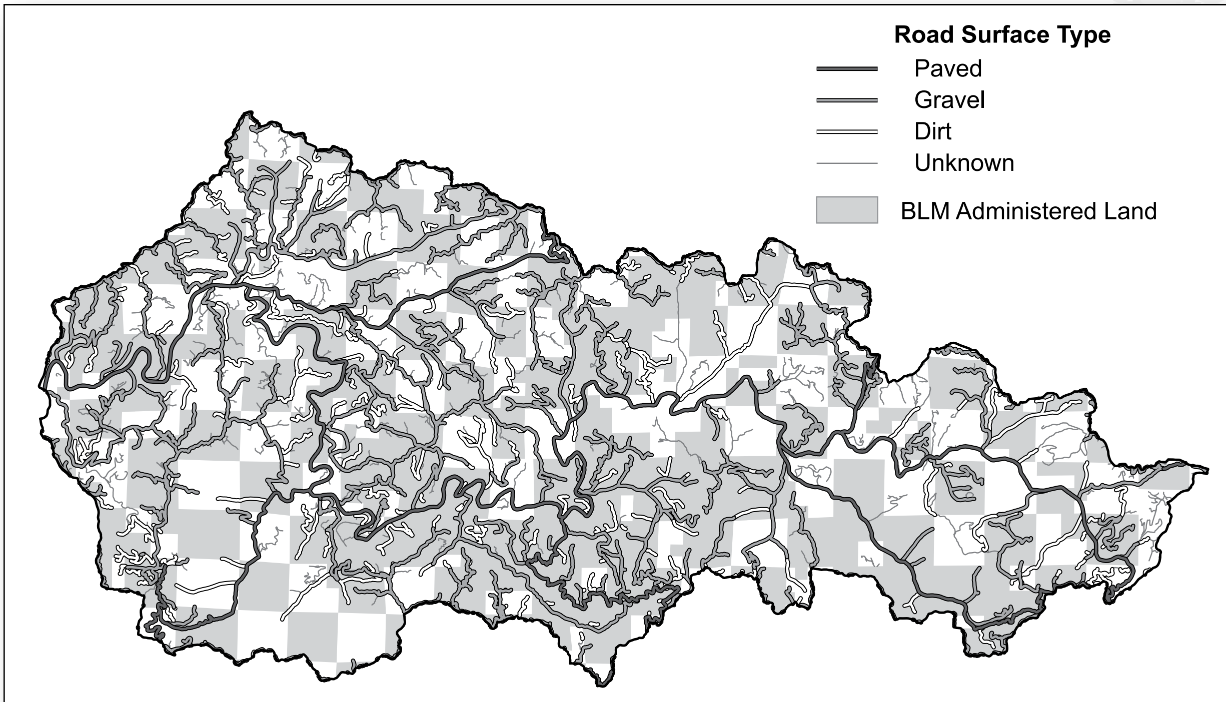


Table 3-58. Reported Sediment Travel Distances Along Roadways

Study	Geology	Location	Range (feet)	Mean (feet)
Brake et al. 1997	Sandstone/Siltstone	Culvert, road < 5 years old	3 - 132	31
		Culvert, road > 5 years old	0 - 76	17
Brake et al. 1997	Sandstone/Siltstone	Debris below culvert opening	< 33	
Packer 1967	Volcanics/Basalt	Below road fill slopes	35 - 127	
Burroughs and King 1989	Gneiss and Schist	Below road fill slopes	< 88	
Ketcheson and Megahan 1996	Granitic	Fill slope	1 - 217	12
		Rockdrain	4 – 111	12
Burroughs and King 1989	Granitic	Culvert	0 - 639	126
Swift 1986	Metamorphosed Igneous	Grass fill and forest litter	30 - 314	45
Swift 1986	Metamorphosed Igneous	Grass fill and brush barrier with brush barrier	2 - 287	34

cuts and fills. Erosion may result by overland flow from rainwater or snowmelt, or from concentrated flow in ditches. Of note is that:

— New road construction has much higher erosion than older roads (>two years old) if revegetation is not promptly completed.

— The BLM controls approximately 1,000 miles of natural surface road within the planning area that is more susceptible to erosion than roads with surfacing.

- Breakdown of the road tread by hauling on aggregate-surfaced roads. Winter haul is of particular concern since heavy trucks traveling over wet roads are more likely to break down the road tread. About 30 to 40% of the total BLM timber log truck miles occurs during the higher precipitation months (November-April). One study in the Cascades reported that 12 logging truck making round-trips each day of a work week during the November to January period resulted in a 17% increase in sediment yield (Luce and Black 2001).
- Inadequate ditch relief culverts, resulting in elevated ditch flow that can mobilize sediment to streams.
- Stream crossings with undersized pipes or crossings that traverse debris-flow streams. Roads in upland areas cross small seasonal streams more frequently and therefore have greater potential for delivery of fine sediment.
- Older roads in poor locations, or built without improved construction practices. Mid-slope roads with steep and unstable road cuts and deep fills (particularly those within the slide-out range of a stream channel) pose the highest risk for landslides. Older roads that were side-cast constructed, built on fills with organic material, or crossed slide-prone ground that have not yet failed are also at higher risk. In the West Cascades Province, road fill failures were found to represent the most frequent cause of debris flow initiation (Swanson et al. 1982).
- Road grading and blading of ditches. Studies show the following:

— Frequent road maintenance of ditchlines can increase sediment yields by removing an armor layer and the stabilizing vegetation (Luce and Black 2001). However, maintenance is necessary for safe travel and to prevent failure of the drainage system. One study showed that ditch-blading resulted in average sediment yield equal to 12 log trucks per day of winter haul traffic on aggregate roads (Luce and Black 2001). Effects are site specific to the travelway and recover rapidly.

Modeling was used to determine the effects of the alternatives on fine sediment delivery from roads within the stream influence zone. The model was based on the concept of using reference roads. See *Appendix J - Fish*.

The 185 watersheds with varying amounts of BLM-administered lands were included in the analysis. A 200-feet sediment delivery buffer was created around all stream channels in all ownerships. The BLM roads data layer, which includes roads on all lands, was intersected with the 200-feet sediment delivery buffer. Road segments that crossed streams were selected since they are most likely to deliver fine sediment to streams. The amount of potential fine sediment delivery was calculated for thousands of these road segments. Factors used to estimate the amount of fine sediment included road erodibility, road surfacing, vegetation on road cut and fill slopes, and traffic level.

See *Table 3-59* (*Potential fine sediment delivery from existing roads*) for the potential fine sediment delivery for the existing condition. Approximately 36% of all roads on BLM-administered lands are within the likely sediment delivery distance (5,096 miles of 14,273 total BLM miles). When considering all roads, the highest yield is from natural surface roads, which average 9.61 tons per square mile per year. The lowest yield is from paved roads, which average 1.58 tons per square mile per year.

See *Figure 3-84* (*Watersheds with the highest fine sediment delivery from roads)* for the highest (25%) fine sediment delivery watersheds that contain BLM-administered lands. Sediment delivery to stream channels

Table 3-59. Potential Fine Sediment Delivery From Existing Roads

Existing Roads[a]	Roads Within Fine Sediment Delivery Distance (miles)[b]		Potential Fine Sediment Delivery (tons/year)[c]		Watershed Potential Fine Sediment Delivery (tons/mile²/year)[c]	
	BLM	Other	BLM	Other	BLM	Other
Natural	1,738	15,874	23,050	233,054	0.86	8.75
Aggregate	2,590	22,938	28,938	30,765	1.09	1.15
Paved	767	2,436	8,277	33,807	0.31	1.27
Totals	**5,096**	**21,249**	**60,265**	**297,626**	**2.26**	**11.17**

[a]Includes BLM-controlled roads and private roads within the planning area from BLM GIS GTRN (roads) coverage.

[b]Includes road segments within 200 feet of a stream channel where ditch flow, carrying fine sediment, could enter streams.

[c]Planning criteria estimate in which calculations are based on surface type for each fifth-field watershed and summed for the planning area.

within these watersheds ranges from 34 to 77 tons per mile per year, which averages 43 tons per mile per year. Elsewhere, sediment delivery to stream channels ranges from zero to 43 tons per mile per year, which averages 17 tons per mile per year. The Klamath and Coast Range Provinces contain the highest number of these sensitive watersheds. This is likely due to underlying geology and landforms.

Sediment Delivery from Mass Wasting

Landslides occur on a small percentage of forest lands, over a variety of forest types, whether managed or unmanaged. Timber harvesting activities can influence the rate of shallow colluvial landsliding, mass failures, and debris torrents depending on the harvest location, type of harvest, design, and operation.

The BLM uses the timber productivity capability classification (TPCC) to screen for low forest productivity timberlands and landslide-prone areas, and withdraws them from general forest management. This classification is ongoing and periodically updated by silviculturalists and soil specialists based on interpretations of aerial photography and ground review. Approximately 89,937 acres of BLM-administered lands (3.8% of BLM-administered lands) within the planning area are withdrawn from harvest due to forest capability or land stability concerns. See *Figure 3-85 (Timber productivity capability classification withdrawn areas in a representative watershed)* for an example of a representative watershed with these withdrawals.

Most landsliding occurs during large storms when soils are fully saturated. Landsliding factors include:

- topography shape
- steepness of slope
- soil depth and texture

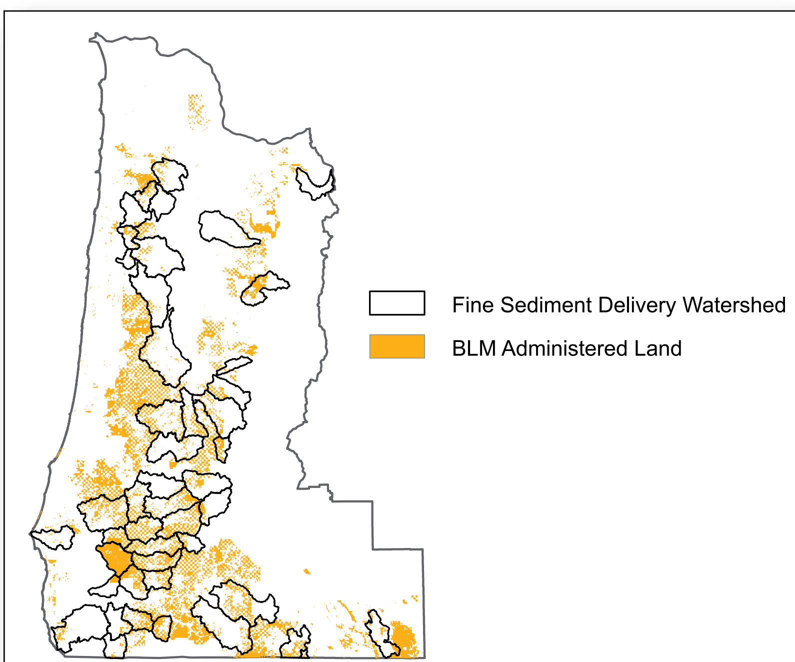


Figure 3-84. Watersheds With The Highest Fine Sediment Delivery From Roads

- underlying rock bedding planes
- forest cover
- water runoff pathways

Western Oregon has the highest hazard for landslides in the planning area where failures occur more frequently on steep slopes over 70 to 80% (ODF 1999). Basal area retention of forest trees can be important in preventing landslides on unstable terrain. Retention trees transpire water and intercept moisture in their canopies, and live roots increase soil strength, both of which increase stability. For the 1996 extreme storms, landslide densities and size in the Coast Range were the highest for regeneration harvests that were zero to 9 years old, lower for mature forests, and lowest for forested areas between 10 to 100 years (ODF 1999). In another Coast Range study (Miller and Burnett 2007), reported landslide density for unforested areas and forests <10years of 21.76 per square mile; mixed forests 10-80 years and 4 to 20 inches DBH and hardwoods of 8.03 per square mile; and large forests >80 years and 20-inches DBH of 6.47 per square mile. Landslide area ranged from 0.002 acres to 12 acres, with a mean of 0.25 acres.

Miller (2003), Miller and Benda (2005) and Miller and Burnett (2007) have developed a GIS-based mass wasting hazard model for western Oregon and throughout the planning area to estimate the susceptibility to shallow colluvial landsliding and wood recruitment to stream channels. Although the model was used to predict landslides for different forest age-classes, regeneration harvest is of more interest in forest management, because of increased landslide susceptibility on fragile ground for a short period of time. After regeneration harvest, the root strength of dead roots declines, whereas root reinforcement of live roots increases as the new forest stand grows. Root strength drops to a low point in seven years in the Northwest's coniferous forests and then improves rapidly (Ziemer 1981). Susceptible landslide areas and probability of failure are highly correlated with extreme storms and forest vegetation at that time. For recently regeneration-harvested forests, with no large storms in the regrowth period, the vegetation and root reinforcement increases; and after 10 years, lowers the landslide susceptibility substantially, similar to mixed forests or hardwood stands (Ziemer 1981, Miller and Burnett 2007).The mass wasting hazard model

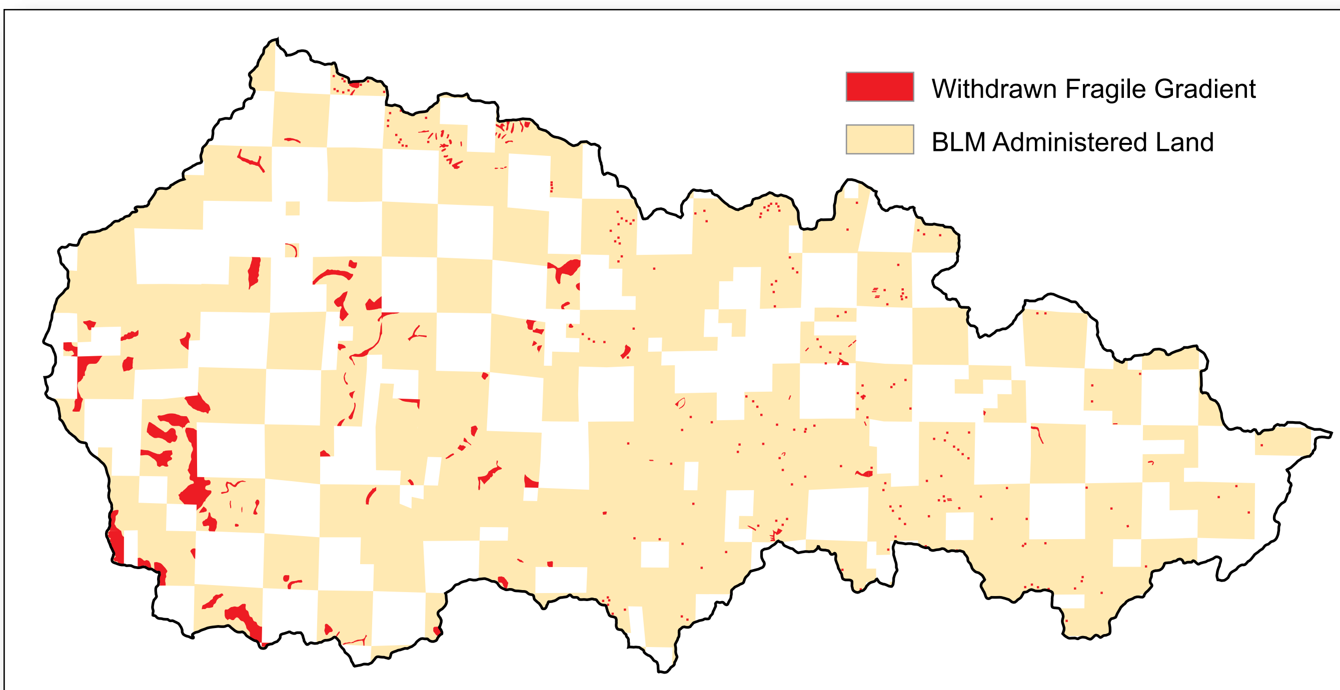


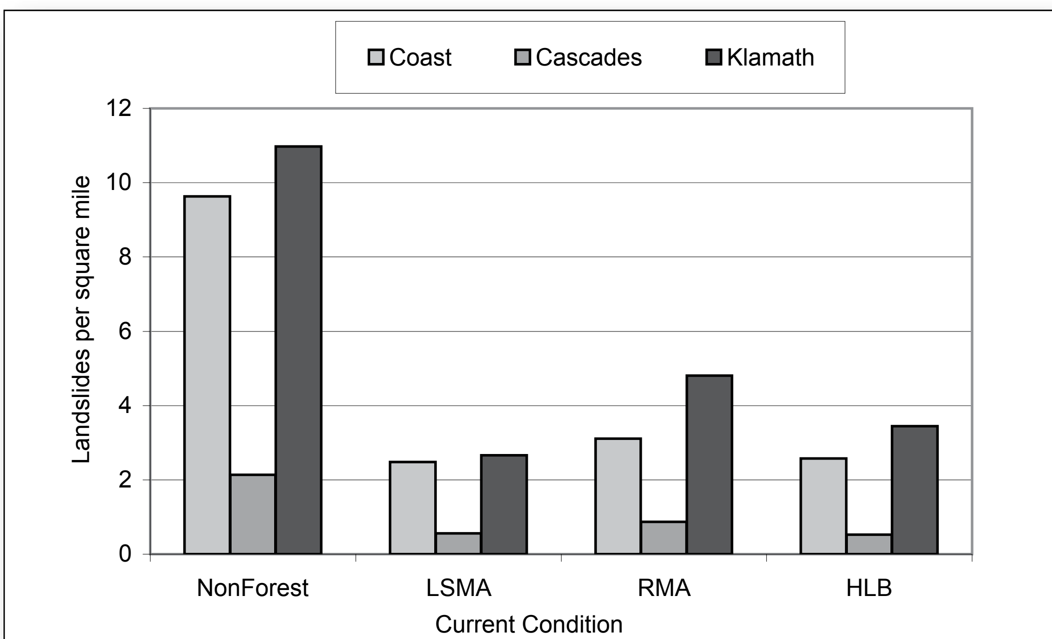
Figure 3-85. Timber Productivity Capability Classification Withdrawn Areas In A Representative Watershed

was calibrated using landslide inventories from the Coast Range, West Cascades, and Klamath Provinces. Observed landslides from the 1996 storms in the Coast Range and 1997 storms in the Cascades and Klamath Mountains were matched with topographic attributes. These storms are considered infrequent or extreme storms with 70-year to 100-year return periods. Of particular importance is the steepness of slope, watershed convergence, and source area.

Relative landslide density was modeled for the plan revision. For a forest cover type, the landslide model isolates susceptible topographic areas and reports a landslide density, based on the calibration landslide dataset where landslides have been observed. The dataset is further modified by the influence of roads. See planning criteria in *Appendix J - Fish*. Further, the landslide density model determined which susceptible topographic areas may deliver to a stream channel. *Figure 3-86* (*Relative landslide density that could deliver to stream channels on BLM-administered lands*) shows a bar graph of relative landslide densities by province for the current conditions of non-forest area, riparian management area, late-successional management area, and the harvest land base. Across the planning area, the relative landslide density varies, being higher within the Klamath Province, somewhat lower in the Coast Range Province, and lowest in the Cascade Provinces. Within provinces, non-forest has the highest relative landslide density, followed by riparian areas, with the late-successional management areas and the harvest land base being the lowest and relatively comparable. Timber productivity capability classification withdrawals were not separated in these results. In intensively managed landscapes, a range of relative landslide densities that could deliver to a stream channel, as modeled, varied from 0 to 15 landslides per square mile.

Fire effects on sediment yields vary, depending on fire severity, frequency, climate, vegetation, and geomorphic factors such as topography, geology, and soils (Swanson 1981). Soil erosion after fires can vary from 0.4 to 2.6 tons per acre per year in prescribed burns. More intense wildfires can create soil erosion that is an order of magnitude higher (Megahan and Molitor 1975). Recovery rate is rapid as grass, forbs, and

Figure 3-86. Relative Landslide Density That Could Deliver To Stream Channels On BLM-Administered Lands



Relative landslide densities are weighted averages for non-forest, recent harvest areas, young forest, and mature forest for a set of watersheds comprising each province. Landslide delivery is to stream channels <20% gradient. (LSMA: Late-successional management area, RMA: riparian management area, and HLB: harvest land base) shrubs occupy the site. Swift (1986) found that sediment travel distances on a burned forest floor may vary from zero to 198 feet, with an average of 96 feet.

Many older roads on poor locations (i.e., with inadequate design and maintenance) pose high risks of erosion and sedimentation to stream channels and habitats from mass failure (FEMAT 1993, V-16). Where failures occurred, these landslides have been the most important source of management-accelerated delivery of sediment to anadromous fish habitats within the planning area (Ice 1985, Swanson et al. 1985).

Landslides are highly correlated with flood flows. The largest floods in the last half century were the 1953 flood, 1955-1956 floods, the 1964 flood (all long duration, high intensity, rain-on-snow events); the February 1996 flood (long duration, high intensity, rain-on-snow event); November 1996 flood (short duration, high intensity, rain event); and the January 1997 event (high intensity rainfall and snowmelt). See *Figure 3-87* (*November 1996 precipitation return period for western Oregon*) for the return period for daily precipitation for western Oregon for the November 1996 storm (Oregon Climate Service).

Observed landslides from an aerial reconnaissance survey of 83 watersheds in the Coast Range and West Cascades Provinces from the February 1996 storm revealed that 36% of the observed landslides were associated with roads, and 65% of all landslides resulted in stream torrents (Weaver and Hagans 1996). Based on samples in wildland Forest Service watersheds, failed stream crossings from the 1996 floods depended on the size of the storm events with more debris torrents occurring during the larger February 1996 event (Furniss et al. 1997). In the Furniss study, the most common failure mechanism in the West Cascades was debris torrents. In the Coast Range, channel bed mobilization from high rainfall was the most common failure mechanism. Woody debris obstructions and culvert capacity exceedance were also important failure mechanisms.

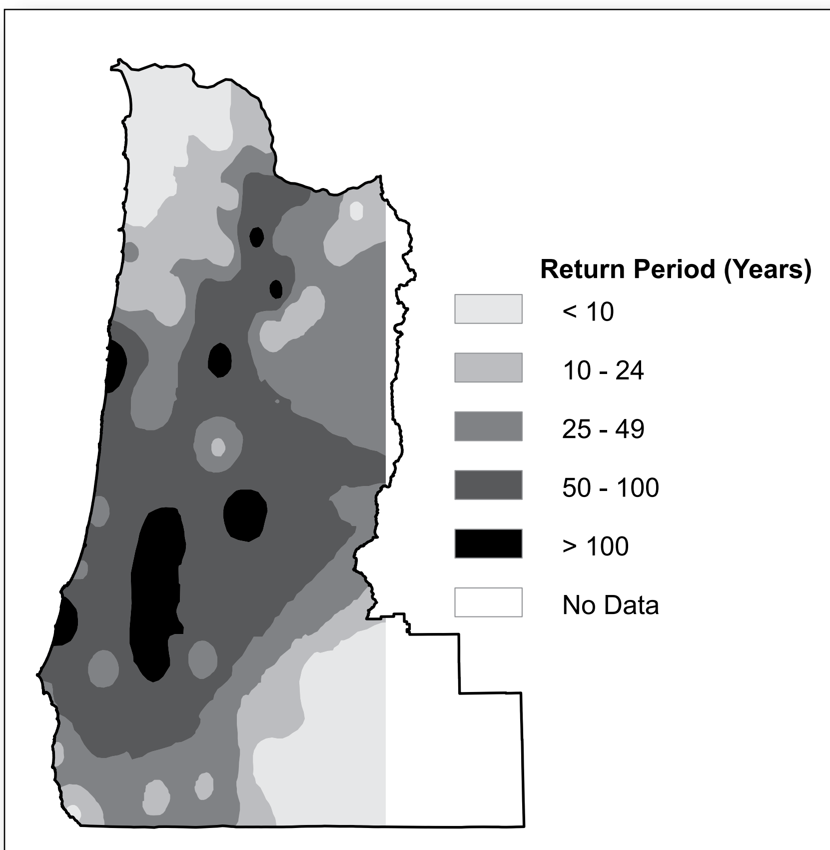


Figure 3-87. November 1996 Precipitation Return Period For Western Oregon

Currently, roads that are damaged from flooding and rebuilt are designed to higher standards than in the past. For example, the BLM abandoned sidecasting of waste material in the 1980s and planned lower fill heights over culverts at stream crossings. A road inventory in Washington state found that roads constructed in the last 15 years had minimal damage rates from large storms compared to roads constructed in earlier years (Toth 1991). Observations by the Oregon Department of Forestry for the 1996 storms show that road-related landslides were fewer and smaller than in previous studies and concluded that current improved road management practices were responsible (ODF 1999).

With development of road networks in the early 20th century, valley bottom roads along streams were constructed to salvage riparian timber and access upper watershed areas. There was often little regard for riparian areas. Streams were sometimes straightened and stream banks were lined with boulders to accommodate roads on floodplain terraces. Many of these arterial roads still remain and most are surfaced with few stream crossings. Road systems associated with forest management have been constructed on ridges and across middle slopes (between valley bottoms and ridge tops). There are many more road crossings in these upper watershed areas. There are minimal miles of roads within riparian areas along streams in these upper watershed areas.

Within the last decade, the BLM has decommissioned 588 miles (4%) of roads on BLM-administered lands within the planning area. These road closure segments were scattered with many being outside of the riparian reserves and not connected to stream channels. The Northwest Forest Plan 10-year monitoring effort regarding watershed condition found that the condition scores of watersheds, as influenced by roads, generally did not change significantly since the Northwest Forest Plan was implemented (Gallo et al. 2005). The amount of roads removed from any given watershed may have been relatively small and insufficient to change the watershed condition. There were 3,324 miles of roads decommissioned from 1995 to 2002 on U.S. Forest Service and BLM-administered lands, and there were an estimated 354 miles of new permanent roads constructed during the same period (Baker and Palmer *in press*).

Approximately 3,800 miles (25%) of the BLM road system are maintained in a given year. See *Table 3-60* (*Miles of BLM road decommissioning, improvement and maintenance in the past 10 years).* Maintenance reduces sediment delivery through road surface grading and replacement, pavement maintenance and replacement, and slough and slide removal. Culvert clearing and replacement can increase sediment delivery in the short term (1-2 years), but is necessary to prevent failure of the road drainage system.

Stormproofing and road improvements are used to maintain roads that receive infrequent road maintenance. Stormproofing puts the road into more of a self-maintaining condition, and projects are completed as funds allow. Road renovation and improvements are normally completed with timber sale contracts.

Heavy Metals

Heavy metals in streams and rivers in the forested and rangeland areas are normally associated with natural sources, agricultural runoff, and mine drainage. Natural sources may be increased by land erosion rates. Urban and industrial point sources (such as manufacturing, storm water runoff, and landfills) provide additional inputs. Heavy metals may assimilate near the point source or in large rivers outside the majority of BLM ownership. Mercury is the most common heavy metal of concern.

Water Quantity

The timing, magnitude, duration, and spatial distribution of peak flows must be sufficient to create and sustain riparian and aquatic system habitat, and to retain the patterns of sediment, nutrient, and wood routing (FEMAT 1993, V-19). Aquatic organisms require adequate flows during migration, spawning, and rearing to satisfy the requirements of various life stages (FEMAT 1993, V-19).

Table 3-60. Miles Of BLM Road Decommissioning, Improvement, And Maintenance In The Past 10 Years

Activity	10-Year Total (miles)
Road decommission (non-continuous use)	588
Road maintenance	38,115
Road improvement (renovation and improvement)	2,184

Timber harvesting and associated activities in maritime mountainous watersheds alter the amount and timing of peak flows by changing site-level hydrologic processes (Keppeler and Ziemer 1990, LaMarche and Lettenmaier 1998, Wemple and Jones 2003, Wright et al. 1990). These hydrologic processes include changes in evapotranspiration of forest trees, forest canopy interception of water, snow and snowmelt rates, roads intercepting surface and subsurface flow, and changes in soils infiltration rates and soil structure.

Changes in hydrologic processes affecting peak flows can be grouped by the following primary forest management actions:

- reduction in forest vegetation through harvesting
- construction of forest access roads and skid-roads

Reduction of forest vegetation through harvesting can affect processes that control snow accumulation in tree canopies and on the ground. Snowmelt can be accelerated where wind with warm air temperatures cross forest openings.

Low intensity winter precipitation of various durations is common within the planning area. Some of this precipitation falls as rain or snow, depending on the prevailing storm air temperature and watershed elevation. Snow acts as stored water within the mountainous watersheds. Lower valleys are below the snow line, except for extreme cold fronts. Snow comes and goes within the intermediate elevations, whereas the higher elevations have a winter permanent snowpack. These precipitation zones are displayed as hydroregions. See *Figure 3-88* (*Precipitation hydroregions within the planning area*). The use of hydroregions helps to distinguish how peak flows would be affected by different-sized openings in areas that mimic regeneration harvested and stand establishment conditions.

A spatial analysis to determine susceptibility to peak flow increase from vegetative management was developed for the planning area for both rain-dominated and rain-on-snow-dominated areas. The analysis uses sixth-field subwatersheds (a U.S.Geological Survey hydrologic unit), because they are small enough areas to capture the patterns of BLM forest lands and because tributary streams are more sensitive to vegetation and runoff-related changes. Subwatersheds are generally 10,000 to 40,000 acres in size and have a single outlet. There are 1,191 subwatersheds within the planning area. When separated by hydroregion, 634 subwatersheds are rain-dominated, 471 subwatersheds are rain-on-snow-dominated, and 86 watersheds are snow-dominated. Snow-dominated watersheds involve higher elevation (important for sustaining spring flows), but have minor contributions to the elevation of winter peak flows (Grant et al.2008).

Cutting of forest trees stops transpiration of water from the soil up into leaves, lowering evapotranspiration rates in the forest area. This results in variable but higher moisture content in soils during the summer months in regeneration harvest units. When precipitation occurs in the fall, the soils pore spaces are filled sooner, resulting in subsurface downslope movement of water. Where the subsurface flow meets a channel, it appears as streamflow. In a general forest environment, with a mosaic of forest age classes and treatments, low flows can increase up to 100% or more (Harr 1976, Ziemer 1981). This effect disappears after a few fall storms, because soils fill to capacity and behave similarly to uncut stands. These types of increases in low flows do not carry sediment nor affect channel form and are considered geomorphically insignificant (Grant et al. 2008).

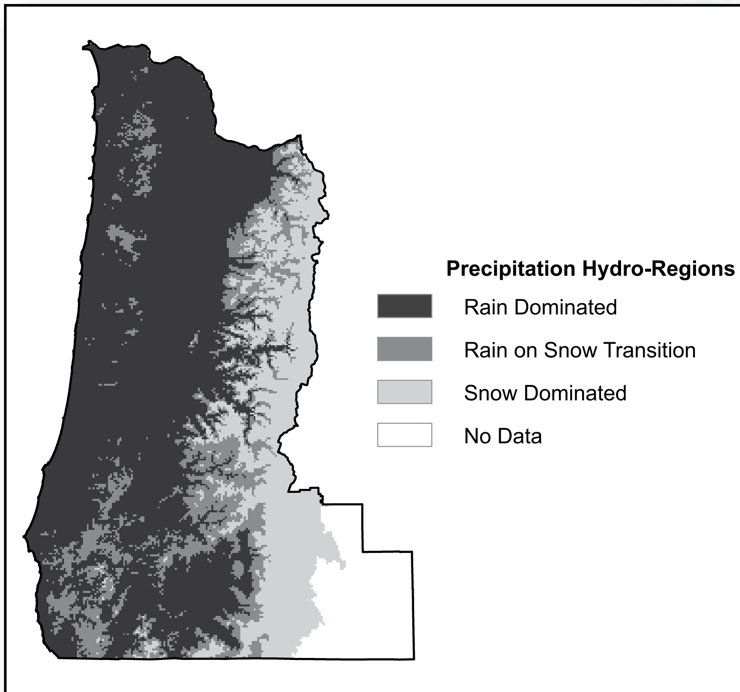
Hydroregion

Hydroregions are a means for classifying the dominant precipitation type of a region as either rain or snow. With regards to snow, hydroregions also distinguish the depth of winter snow and the longevity of accumulated snow.

Rain-Dominated Areas

Within the rain-dominated hydroregion, decreases in evapotranspiration are expected to correspond somewhat linearly with the amount of vegetation removed by forest harvest (Rothacher 1973, Harr 1976). Additional runoff from evapotranspiration losses is roughly proportional to the watershed area where forest basal area was removed. See *Figure 3-89 (Envelope curve of reported percent change in peak flow with percent area harvested in the rain hydroregion*).

Figure 3-88. Precipitation By Hdyroregions Within The Planning Area



- Based on a compilation of watershed studies in the Northwest, completed in small catchments, a peak flow response is only detected where at least 29% of the drainage area is harvested (Grant et al. 2008). As suggested by the upper line in *Figure 3-116*, there are no peak-flow experimental study results in the rain-dominated hydroregion showing a peak-flow increase where less than 29% of a drainage area is harvested. (This is understood by noting where the upper line crosses the 10% detection peak-flow response level).
- The mean of the data suggests that a peak-flow response only occurs where 45% of the area is harvested. This detectable range would be even higher for areas without roads or at watershed scales (Grant et al. 2008).

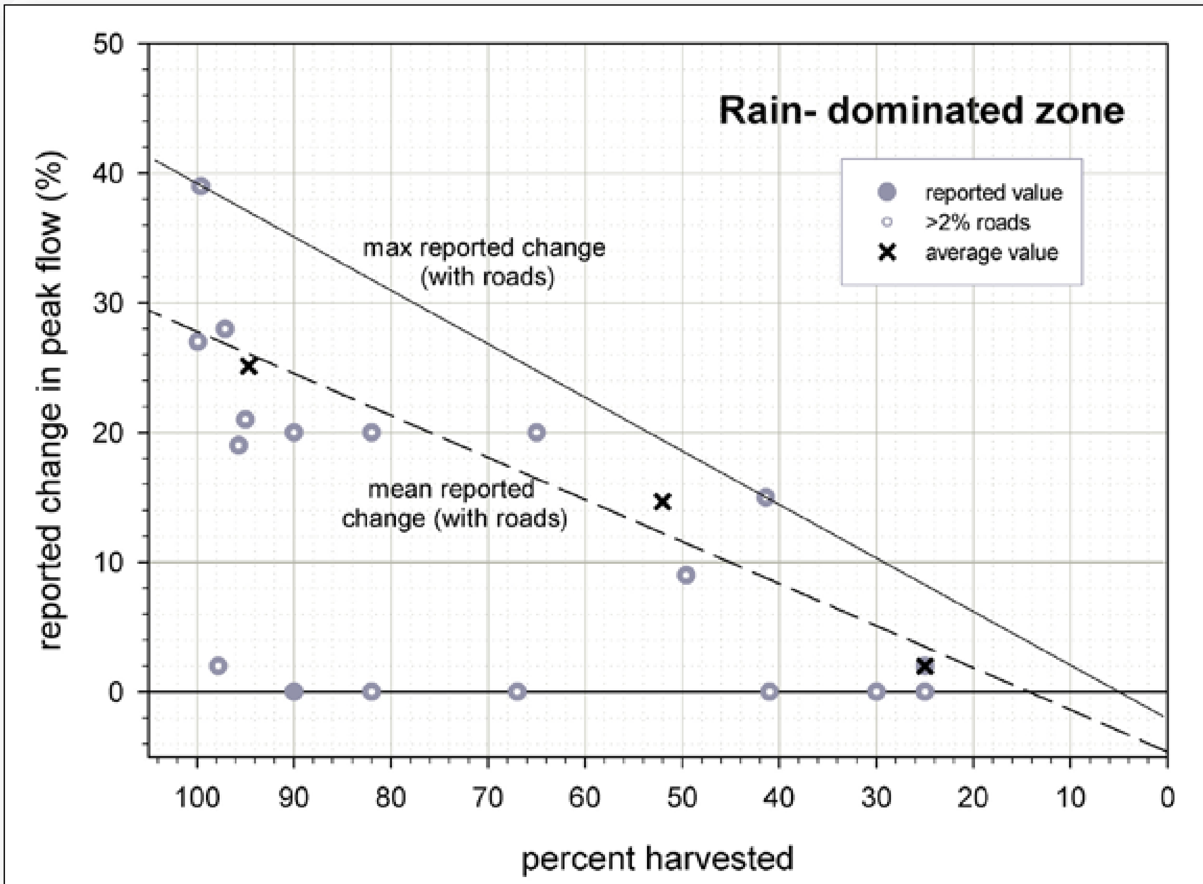
Ziemer (1981, 1995) found a nonstatistical (4%) increase in peak flow for 80-year-old conifer stands that were harvested where 50% of the basal area was retained. This study suggests that a totally cleared forest in a watershed is more important in demonstrating a detectable peak flow response in the rain-dominated hydroregion. It is presumed that hydrologic impacts (peak flow increase) decrease with the intensity of treatment from regeneration harvest (many acres), small patch cuts (<1 acre to several acres), and thinning in descending order, although past experimental studies in the Northwest did not fully examine the differences (Grant et al 2008). Compared to the rain-on-snow dominated hydroregion, for harvests greater than 1 acre, patch size or arrangement is not a primary factor in explaining greater flow volume or timing.

The analysis of the effects of the alternatives on peak flows within the rain-dominated hydroregion used the degree of forest vegetation harvested from all lands, also referred to as an equivalent clearcut area. On BLM-administered lands, the vegetation projections were derived from the OPTIONS modeling for the existing condition. The stand establishment structural stage was used as a surrogate for the removal of basal area or degree of equivalent clearcut area. On other lands, high quality vegetative crown closure datasets of satellite imagery were used from the 1996 Interagency Vegetation Mapping Project, with added "harvest history" change detection datasets through 2004. Forest acres of stand establishment on BLM-administered lands, and acres of less than 30% crown closure on other lands, were summed using GIS processes, by subwatersheds, as a surrogate for the removal of basal area. See *Appendix J - Fish*.

Of the 634 sixth-field subwatersheds in the planning area:

- Two currently include 14,035 acres of BLM-administered lands susceptible to peak flow increase where the equivalent clearcut area within the watersheds on all lands is greater than 40%, (see

Figure 3-89. Envelope Curve Of Reported Percent Change In Peak Flow With Percent Area Harvested In The Rain Hydroregion



From Grant et al 2008, used by permission

Note: Detection level set at 10% reported change in peak flow, due to measurement error in natural stream systems.

explanation of interpreting *Figure 3-89* described above), which is near a mean for reported change in peak flow in the rain-dominated hydroregion. These subwatersheds are Cooper Creek and Elk Creek-Flat Creek.

- An additional six currently have a total of 15,554 acres of BLM-administered lands above the maximum 29% equivalent clearcut area curve at the detection level for a reported change in peak flow.

See *Figure 3-90* (*Subwatersheds currently susceptible to peak flows in the rain-dominated hydroregion*). For the existing condition, the total BLM area in these eight subwatersheds is 29,589 acres, which is less than 2% of BLM-administered lands in the planning area. Within these subwatersheds susceptible to peak flow enhancement, the BLM susceptibility area varies from 0.2% to 18%, with a mean of 5%. Several of these subwatersheds have natural openings because of the existing vegetation community types and are not entirely attributable to forest harvest. This includes the susceptible Cooper Creek, which is predominantly oak savannah. Five additional sixth-field subwatersheds would be susceptible when examining those subwatersheds without any BLM ownership.

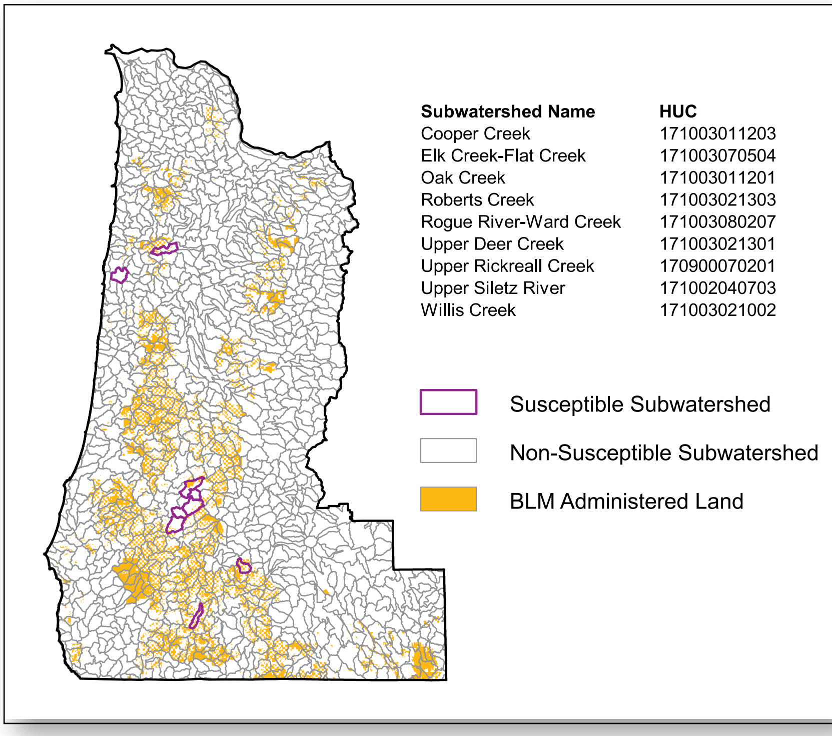


Figure 3-90. Subwatersheds Currently Susceptible To Peak Flows In The Rain-Dominated Hydroregion

Rain-on-Snow Areas

A rain-on-snow storm involves prolonged rainfall under warm and windy conditions. Rain-on-snow events are of particular interest because the melt of shallow snow packs can enhance storm runoff. Also, rain-on-snow events have been associated with landsliding and downstream flooding (Christner and Harr 1982, Harr 1986, Berris and Harr 1987, Jones and Grant 1996, Grant et al. 2008).

Large openings in a forest canopy (greater than two tree heights where wind can accelerate), which are commonly found in areas that have had regeneration harvests or forest stand conversions, affect precipitation and snow interception and melt. The melting or vaporization of snow in large openings may occur before rain-on-snow storms, in contrast to increased snow accumulation and melt during winter storms when the freezing levels are initially low but subsequently rise.

Snowmelt can provide extra water for runoff. Regeneration harvests or forest conversions with large open areas provide additional melt contributions under rain-on-snow conditions (Harr 1981, Storck 1997). This is primarily due to more snow accumulation in the openings and increased wind speeds. In contrast, research suggests that forest thinning treatments maintain patterns of snow accumulation that are similar to mature forests and reduce turbulent air near the ground. Furthermore, it is concluded that thinning treatments have little effect on snowmelt rates during rain-on-snow events (Poggi et al. 2004).

The largest floods in the world are caused by sustained rates of rainfall or dam-break floods (Naiman and Bilby 1998). Within the planning area, warm subtropical air from winter storms with sustained rates of rainfall and mild temperatures combine with snow on the ground to produce the largest floods. For example, the largest documented historic floods on record (during the years 1861, 1890, and 1964) were rain-on-snow events. Harr (1981) concluded that 23 of 25 of the largest annual peak flows of the Willamette River at Salem, Oregon between 1814 and 1977 were caused by rapid snowmelt during rainfall. Harr also concluded that the effect of these wet mantle floods overwhelmed the peak flow response to forest management. A severe rain-on-snow flood comparable with the 1964 flood occurred in February 1996 in northern Oregon where intense rain with warm temperatures combined with snow on the ground (Taylor and Hatton 1999). Again, the severity of these events diminishes the effects of vegetation management.

Forest roads, skid roads, and landings change the infiltration of soil and the flow of surface and subsurface water in watersheds. These compacted areas are relatively impermeable and are a source of overland flow. Increases in peak flow were found when roads and other impermeable areas occupied more than 12% of a catchment scale watershed (Harr et al. 1975, Harr 1976). The road and its cut slope can advance the timing of surface runoff, compared to slower subsurface flow routes (Harr et al. 1975, 1979; Megahan et al. 1981; 1992; Wemple et al. 1996). During large storm events, roads intercept larger contributions of subsurface flow and route it to drainage ditches. This additional runoff contributes to rising flows where drainage ditches connect to streams. (Megahan 1972, LaMarche and Lettenmaier 2001, Luce 2002, Wemple and Jones 2003).

There are approximately 14,000 miles of BLM roads within the planning area. Many of these roads are crowned or insloped with a drainage ditch between the road shoulder and the backslope. This drainage ditch and stream connectivity effectively extends the stream channel network at stream crossings. However, where road drainage intersects ditch relief culverts, stream extension is appreciably reduced. Any remaining extension is short and often terminated at the point of the first ditch relief culvert. Some surface runoff and interception of subsurface flow could enter stream channels below this juncture.

A rain-on-snow empirical analytical technique was used to identify susceptible subwatersheds to peak flow increase within the rain-on-snow hydroregion. The procedure was patterned after the Washington State Department of Natural Resources hydrologic change watershed analysis methodology (Washington State DNR 1997a). This screening technique (with modifications) was converted to GIS spatial analysis (See *Appendix J - Fish*).

An appropriate method of describing the peak flows of various exceedance probabilities for unregulated streams in ungauged watersheds is to use the basin characteristics regression analysis with gauged watersheds that have long-term records. The Harris et al (1979) flood frequency equations were chosen as reference points because they cover the various hydrologic regions within the planning area and have long-term records (10 to 70 years). The base period of streamflow data for use in the analysis was collected prior to the maximum forest conversion in many watersheds (with much of the streamflow data being gathered before 1960). The base period data set may include some chance rain-on-snow events, but with considerably fewer forest openings. Rain-on-snow occurrences of interest correspond to a streamflow return period of 2 to 8 years where research has shown that prelogging and postlogging regressions were significantly different (Harr and Coffin 1992). The 2-year, 24-hour and the 5-year, 24-hour stream flows were calculated for each sixth-field subwatershed with these equations and serve as reference points for a rain-on-snow watershed response level (See *Appendix J - Fish*).

Rain-on-snow areas, where shallow snow accumulations can come and go, have been reported by (Harr 1981, Harr and Coffin 1992) to be in the elevation range of 1,200 to 3,600 feet in western Oregon and from 2,500 to 5,000 feet in the southern Cascades (Lindell 2006). Forest openings commonly receive greater snow accumulation (two to three times more snow water equivalent) than adjacent forests (Harr 1992). These openings also receive greater wind speeds and twice the amount of heat during rain-on-snow events, which provides greater melt compared to a mature forest (Harr 1981, Harr and Coffin 1992, Storck 1997). For BLM-administered lands, acres of stand establishment were taken from the OPTIONS model vegetation modeling for each alternative. Satellite imagery from the 1996 Interagency Vegetation Mapping Project was used to determine the forest cover on other lands.

Published regression equations were used to generate a winter snowpack (Greenburg and Welch 1988) that relates to snow accumulation by elevation using the snow telemetry (SNOWTEL) data from the National Resources Conservation Service for January 1 snow accumulation. Large forest openings within the rain-on-snow hydroregion receive greater snow accumulation (two to three times more snow water equivalent) than adjacent forests (Harr 1992). Further adjustments for regeneration harvest areas (Brunengo, unpublished) were used to estimate snow cover in openings.

Snowmelt equations from the U.S. Army Corps of Engineers (USACE 1956, 1998) were used to melt snow in the rain-on-snow elevation to approximate a 2-year, 24-hour storm using average environmental conditions. The water from snowmelt for all vegetation cover types for each sixth-field subwatershed was averaged for the watershed and added to the precipitation for the 2-year, 24-hour storm. The water available for runoff (precipitation plus snowmelt) was rerun in the 2-year, 24-hour peak flow basin characteristics runoff equations. Water available for runoff was substituted as precipitation. The 2-year, 24-hour peak streamflow was then compared with a 5-year, 24-hour peak streamflow. Where it exceeded the 5-year, 24-hour peak streamflow, the watershed was considered susceptible to peak flow increase.

There are currently three sixth-field subwatersheds (out of 471) that are susceptible to peak flow increase in the rain-on-snow hydroregion on BLM-administered lands. See *Figure 3-91* (*Subwatersheds currently susceptible to peak flow in the rain-on-snow-dominated hydroregion*). No additional sixth-field subwatersheds would be susceptible when considering management activity across all land ownership for these 471 subwatersheds.

Peak Flow Research

There has long been debate regarding the magnitude of peak flows resulting from timber harvesting and road building. Much of the discussion has centered on the timing and scale at which peak flows are detected as well as the type, size, and intensity of management activities that result in channel changing peak flows. Many of the existing research studies have used very small scale watersheds. Following is a summary of recent research on peak flows that is relevant to this plan revision.

Research from primary hydrologic study sites in the Cascades, Coast Range, and in northern California since the late 1950s show that a peak flow change from regeneration harvesting is detectable at the catchment scale (small experimental watersheds, oftentimes <100 acres). The greatest response is from the first stream flow peaks in the fall that can be increased up to 100% or more after logging (Harr 1976, Ziemer 1981). These early fall storms produce small peaks, which had little, if any, consequence on channel form because stream flow is very low at this time (Grant et al. 2008). This effect of logging on peak flow through the winter storm season has shown to diminish with each subsequent storm by a variable representing the percentage of the area logged divided by the sequential storm number (Ziemer 1981). This trend appears to diminish exponentially with increasing storm size (Grant et al. 2008).

Combinations of roads and regeneration harvests interact differently at the catchment scale. Studies show that there was a statistical increase in peak flows for smaller

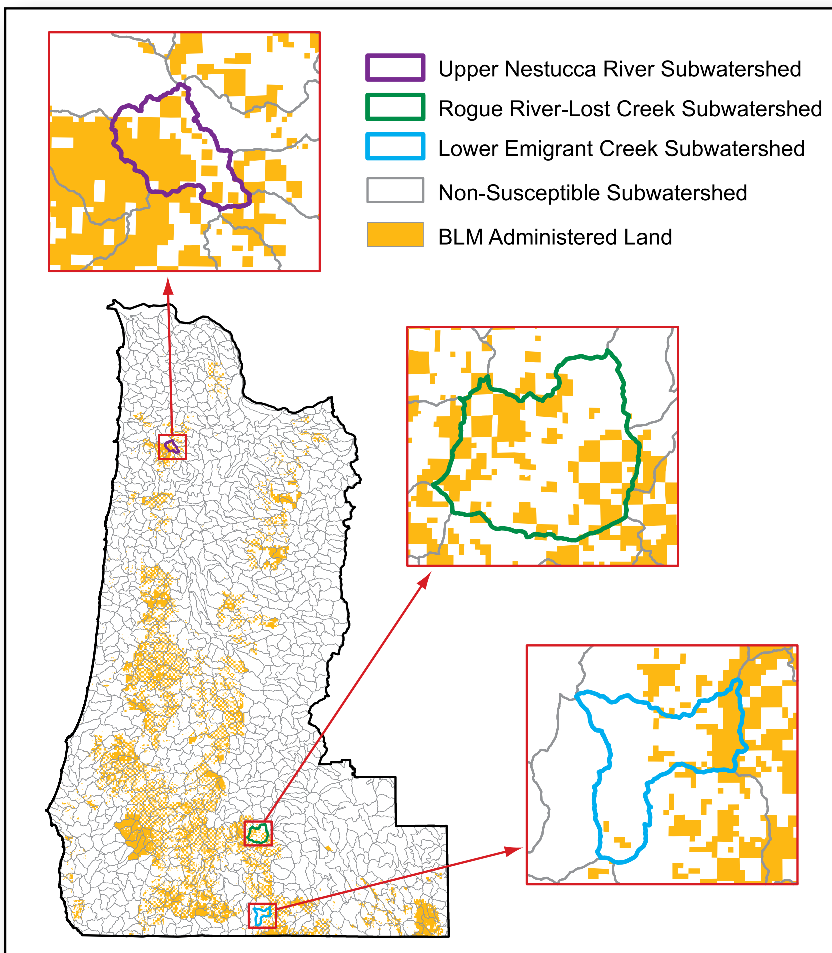


Figure 3-91. Subwatersheds Currently Susceptible To Peak Flow In The Rain-On-Snow-Dominated Hydroregion

Shown is the peak flow susceptibility for sixth-field watersheds where the 2-year, 24-hour bankfull channel forming peak flow is greater than the 5-year, 24-hour peak flow. Includes the current rate of harvest on private land from 1996 IVMP imagery.

peak flows (those with a return interval of less than 1 year) looking only at regeneration harvest (without considering roads). This effect diminished rapidly within 5 years (Jones and Grant 1996). Further, Jones and Grant (1996) found no statistical increase in peak flows when considering only roads (without regeneration harvest). When roads and regeneration harvest occurred together and covered more than 25% of the area, they observed that peak flows increased 50% for all event sizes.

A recent literature review by Grant et al. (2008) grouped most Pacific Northwest catchment-scale experimental watershed studies over the last 40 years by areas of similar hydrological processes called hydroregions. The effects on peak flow from forest harvest and roads were examined for the rain-dominated and rain-on-snow hydroregions. (The findings for the rain-dominated hydro-region are previously discussed in this section).

At the catchment scale, within the rain-on-snow hydroregion, the maximum response at the detection level for peak flow increases is 15% forest basal area removed (without considering roads), and the mean is 19% when including roads. See *Figure 3-92* (*Envelope curve of reported percent change in peak flow with percent area harvested in the rain-on-snow hydroregion*). For this hydroregion, the shape of the outermost line (curve) is shown to be linear for a change in detection of peak flows with percent harvested. This line may not always be linear. It may take more harvested area than shown for a peak flow change to become apparent. This is because there are very few studies in the data set with partial harvest, and the curve was anchored with total harvest and no harvest. However, peak flows in this hydroregion are very sensitive to forest patch size and density and the corresponding influence of wind speeds that are a primary driver of melt (Harr 1981, 1992). Therefore, it would be expected that the levels of forest harvest would be much higher than the reported 15% level before a peak flow response would be observed.

Further, the authors state that the data and curves used to derive these findings are at the maximum end of the range of effects. Grant et al. (2008) suggest using the mean values for larger watersheds along with the application of modifiers. These considerations include stream gradient and channel structure affecting the transport and deposition of fine sediment, the amount and distribution of roads in a watershed, drainage efficiency, forest patch size, and riparian leave areas.

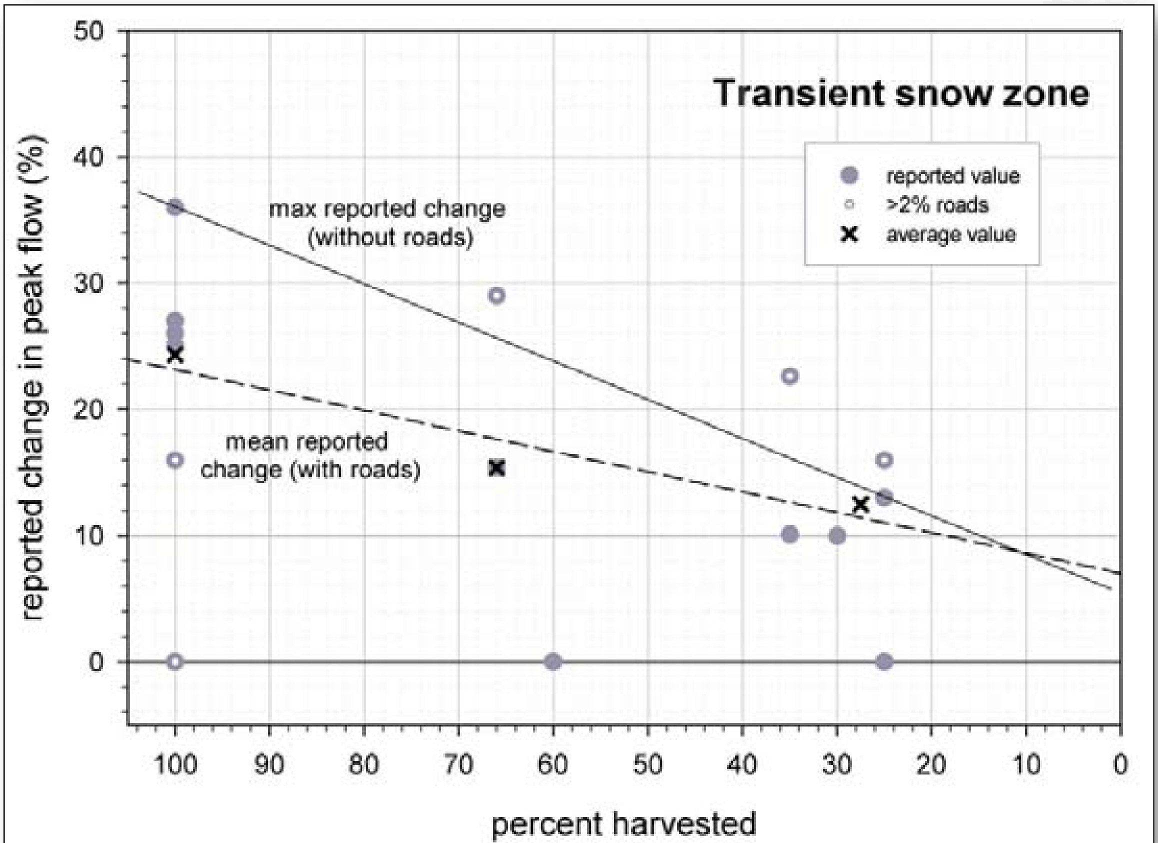
While this EIS was being prepared, the envelope curves were still under development and therefore were not used. Rather, the analysis of effects for the rain-on-snow hydroregion was based on an established empirical model used in Washington State (see *Appendix J - Fish*). This model (as described earlier) evaluates the processes of snow accumulation and melt, and also the snowmelt water additive effect to runoff, in subwatershed-sized basins during runoff events. See *Appendix J - Fish*.

Jones and Grant (1996) reported that smaller peak discharges (a return interval of less than one year) have increased by as much as 100% in the last 50 years. However, the data set was skewed toward smaller peak flows. Greater than 75% of the data set had a return period of less than one year, and gauged areas were small catchments that were not representative of the watershed-size basins (10,000 to 250,000 acres). Further analysis of the same data set by others (Beschta 1997, Thomas and Megahan 1988) either could not detect any changes for the fifth- or sixth-field watersheds or were inconclusive.

Grant et al. (2008) point out that the magnitude of peak flows from management practices diminishes with increasing watershed area (such as the sixth-field watershed size). This diminished magnitude of the peak flow is due to channel resistance, floodplain storage, transmission losses, storm size, and origin and timing of tributary inputs. Reductions in stream flows of 50% or greater have been observed due to stream tributary timing effects (Woltemade and Potter 1994). For these reasons, the authors conclude that streamflows diminish in a downstream direction as watershed size increases (measured as a percent change in unit area).

Large peak flows (those with return intervals of greater than 6 years) were not significantly affected by regeneration harvest logging or roads in the H. J. Andrews (Rothacher 1973) and Alsea (Harr 1976) studies,

Figure 3-92. Envelope Curve Of Reported Percent Change In Peak Flow With Percent Area Harvested In The Rain-On-Snow Hydroregion



From Grant et al 2008, used by permission_
Note: Detection level set at 10% change in peak flow.

or elsewhere in the region (Grant et al. 2008). The sheer amount of runoff from the maritime climate event overwhelms the difference in streamflow from management activity. These are the flows that can scour stream channels, modify floodplains, and carry tremendous quantities of sediment.

Some authors have reported that equivalent clearcut or aggregate recovery procedures (King 1989, Christner and Harr 1976) are an effective way to determine runoff effects in rain-on-snow areas for subwatersheds and watersheds. These procedures may be useful in the rain-dominated hydroregion, since response is roughly proportional to area harvested. However, merely tallying acres of harvest in a watershed does not address the underlying mechanisms of how snow accumulates and melts in the rain-on-snow hydroregion. The vertical and horizontal dimensions of forest openings and their size, as well as their distribution and juxtaposition at the stand level, are sensitive to snow accumulation and melt processes (Harr and Coffin 1992). In this hydroregion, melt is enhanced by energy released from condensation of moisture onto snowpacks during warm and windy weather. This relationship is scaled by size; there are greater wind speeds in larger openings that promote the process (Harr and McCorison 1979). Grant et al. (2008) recognize and expect this effect to be present in the rain-on-snow hydroregion, but they make no attempt to rectify these processes with their envelope curve (*Figure 3-119*), presumably because of insufficient experimental watershed information at larger watershed scales.

Source Water Protection

The 1996 Safe Water Drinking Act amendments require the identification and management of source water protection areas for public water systems. States are required to develop source water assessments for public drinking water supply systems that include surface water and groundwater sources. The assessments include mapping of the surface or groundwater area, an inventory of the potential sources of contamination, and an evaluation of watershed sensitivity. See *Table 3-61* (*Potential contaminant sources affecting waterbodies within source water watersheds*) for the activities on BLM-administered lands that could affect drinking water supplies.

See *Figure 3-93* (*Source water watersheds percentage on BLM-administered lands within the planning area*). These watersheds are primarily in rural settings and do not involve industrialized contaminant sources. See *Appendix J - Fish* for descriptions of specific community public water systems using surface water, population served, and land area affected for each district.

With settlement of the Pacific Northwest in the late-18th and early-19th centuries, along with increasing populations, concerns arose about the quality of drinking water. Early focus centered on the characterization of disease-causing microbes in public water supplies and methods to immobilize or remove them.

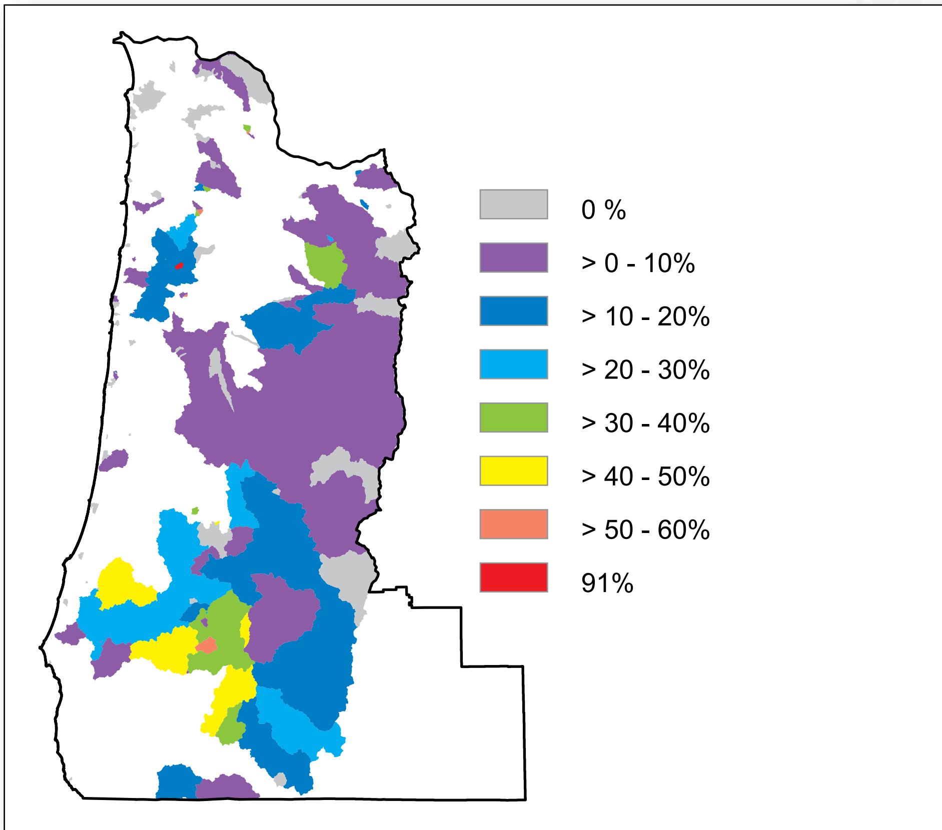
As a matter of necessity, small cities in rural areas set up points of diversion from surface waters from federal lands. They generally enjoyed excellent water quality during most of the year with minimal treatment. During the 1950s and 1960s, timber harvesting increased. A water system survey conducted by the Public Health Service in 1969 showed that only 60% of the public water systems surveyed delivered water that met Public Health Service standards (EPA 2000). Small systems, such as those found in rural communities, were most at risk. Deficiencies related more to water system equipment (including filtration, disinfection, and a safe distribution system), rather than to surface water quality.

The height of road construction and harvesting on BLM timber lands occurred in the 1950s through the 1980s. Watersheds have been generally on an improving trend during the last 15 years. On rangelands, from the late-1930s to date, there has been a declining trend of grazing use, with a reduction of 80% or more in the late-1930s and another 30-40% reduction in the late-1950s. The rangeland use diminished gradually due to re-surveys and rangeland monitoring studies.

Table 3-61. Potential Contaminant Sources Affecting Waterbodies Within Source Water Watersheds

Contaminant	Activity	Causal Mechanism
Temperature	• Harvesting within riparian zones on perennial streams	• Decrease in stream shade affected by canopy removal
Sediment	• Existing road network • New road construction	• Sediment delivery near stream crossings of roads
	• Harvest areas • Recent burns • Cattle grazing	• Landslides and debris torrents • Erosion and dry ravel • Concentrated animal grazing in riparian areas leading to erosion or streambank collapse
Bacteria	• Recreation at campgrounds • Dispersed sites	• Failing sewage systems • Improper waste disposal
	• Cattle grazing	• Cattle holding areas within riparian areas • On-stream watering
Nutrients	• Forest fertilization	• Fertilizer entering watercourses
	• Recent burns	• Mobilization from adjacent areas to streams
Pesticides	• Forest pesticide application	• Application to nontargeted areas by drift or runoff
Petroleum products	• Refueling of equipment • Transportation and fuel storage	• Spills

Figure 3-93. Source Water Watersheds Percentage On BLM-Administered Lands Within The Planning Area



Fish

Key Points

- There are eight anadromous fish populations and four resident fish population segments that occur on BLM-administered lands within the planning area that are listed as threatened or endangered under the Endangered Species Act. Habitat degradation is a factor of decline for most of these populations, and is a major risk factor that continues to threaten all of the population segments.
- Large wood, stream temperature, sediment, and water flow have the greatest influence on aquatic habitat and the ability of aquatic habitat to support fish populations.
- The abundance and survival of salmonids is often closely linked to the abundance of large woody debris in stream channels. The current amount of large woody debris in streams is low and hinders recovery of salmonid populations.
- Eighty-one percent of sampled stream channels on BLM-administered lands in the planning area had low levels (<22%) of fine sediment, and 19% of stream channels had higher levels (>22%).
- The past land use practices that most severely degraded fish habitat (stream cleaning and building of splash dams) no longer occur. Additionally, improvements in road construction and grazing practices have reduced or eliminated adverse effects to fish habitat on BLM-administered lands.

This section focuses on the current condition of fish habitat in the planning area and the ecosystem processes that can affect fish habitat.

Aquatic ecosystems within the planning area include (USDA USFS and USDI BLM 1994b):

- large river systems (e.g., the Rogue, Umpqua, Klamath and Columbia rivers)
- small headwater streams
- coastal rain-influenced streams
- lakes and ponds
- wetlands

Threatened/Endangered Fish

Within the planning area, there are eight anadromous fish population segments that are listed as threatened or endangered under the Endangered Species Act:

- *Lower Columbia River Chinook*
- *Lower Columbia River Coho*
- *Lower Columbia River Steelhead*
- *Columbia River Chum*
- *Upper Willamette River Chinook*
- *Upper Willamette River Steelhead*
- *Southern Oregon/Northern California Coho*
- *Oregon Coast Coho*

There are four resident fish populations that are listed as threatened or endangered under the Endangered Species Act within the planning area:

- *Columbia River and Klamath River bull trout*
- *Lost River sucker*
- *Shortnose sucker*
- *Oregon chub*

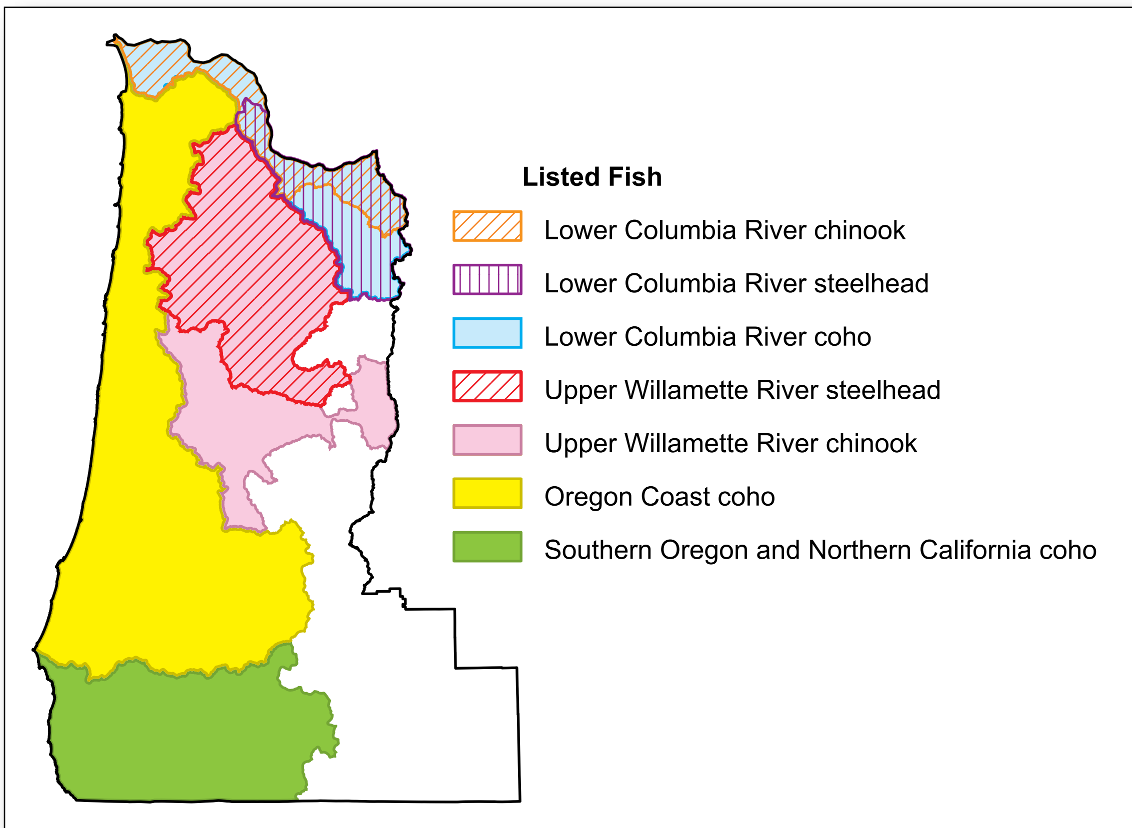
The Columbia River chum salmon and the Oregon chub do not occur on any BLM-administered lands in the planning area. The Columbia River and Klamath River bull trout occur on less than eight miles of BLM-administered lands.

See *Appendix I - Water* for a list of fish species and stream miles on all streams on BLM and non-BLM administered lands in the planning area.

See *Figure 3-94* (*Listed anadromous fish populations and evolutionary significant units within the planning area)* *Figure 3-95* (*Bull trout distribution in the planning area)* and *Figure 3-96 (Lost River and shortnose sucker distribution in the planning area*) for the evolutionary significant unit and distinct population segment boundaries within the planning area.

Evolutionary significant unit
A population of an organism that is considered distinct for the purposes of conservation under the Endangered Species Act. Such a distinct population can be a species, subspecies, variety, geographic race, or population.

Figure 3-94. Listed Anadromous Fish Evolutionary Significant Units And Distinct Population Segments In The Planning Area



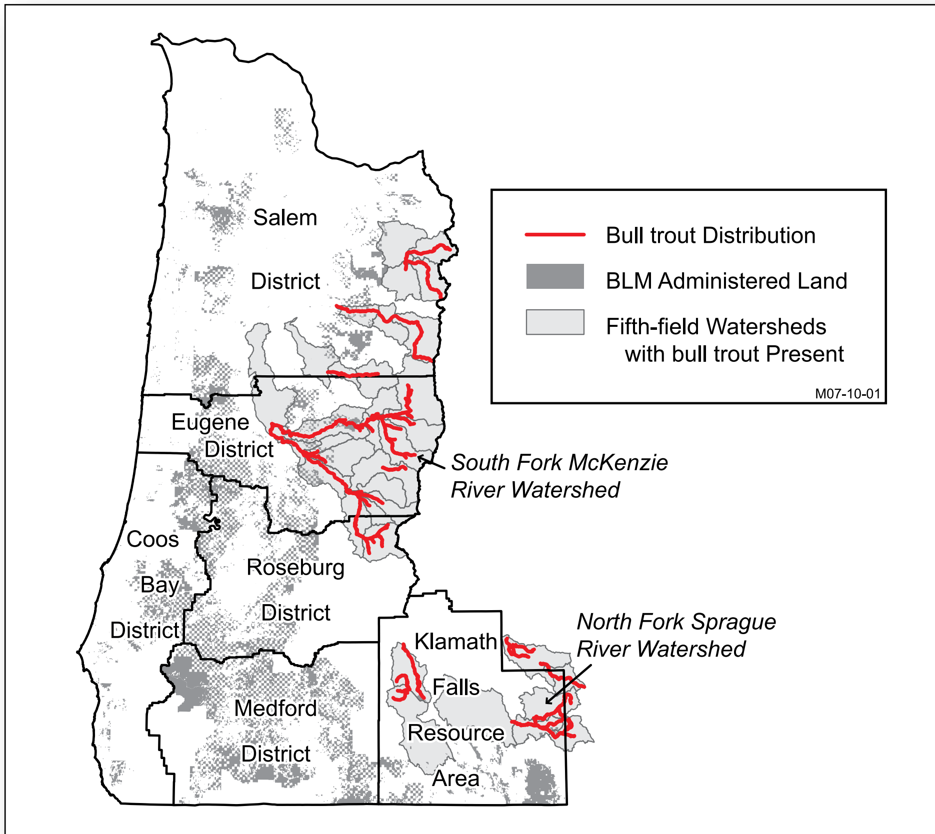


Figure 3-95. Bull Trout Distribution In The Planning Area

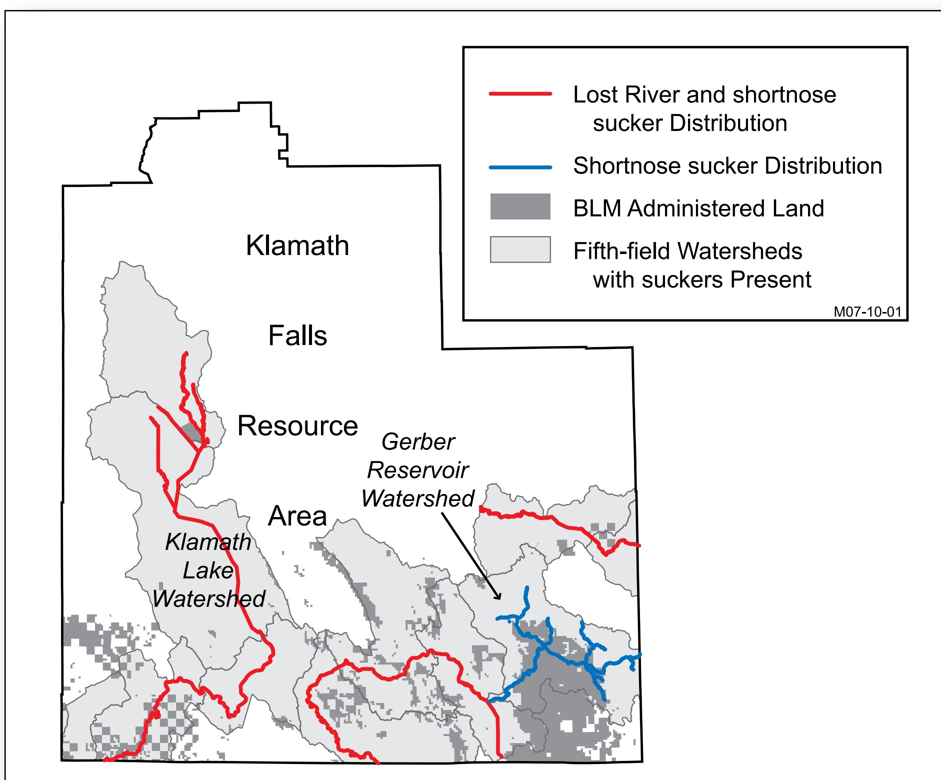


Figure 3-96. Lost River And Shortnose Sucker Distribution In The Planning Area

Fish Habitat

Critical habitat is designated for the following fish species within the planning area (Federal Register 2005d, Federal Register 2008):

- Lower Columbia River Chinook
- Lower Columbia River Steelhead
- Columbia River Chum
- Upper Willamette River Chinook
- Upper Willamette River Steelhead
- Southern Oregon/Northern California Coast Coho
- Oregon Coast Coho

Columbia River and Klamath River bull trout critical habitat is designated only on non-federal lands in the planning area. Critical habitat has not been designated for the Lower Columbia River Coho, Lost River sucker, or shortnose sucker.

The National Marine Fisheries Service Critical Habitat Analytical Review Team (CHART) rated fifth-field watersheds in Oregon and Washington as having a high, medium, or low conservation value for Endangered Species Act listed salmonids (USDC NOAA 2005). As described in the final rule, the Critical Habitat Analytical Review Team information was used to support the designation of critical habitat and for the development of recovery plans for Endangered Species Act listed salmonids (except Southern Oregon/Northern California Coast Coho). In general, watersheds with medium or high conservation values were designated as critical habitat. Out of 748 fifth-field watersheds containing anadromous fish habitat, 678 (90%) have a medium or high conservation value. Three figures on fifth-field watersheds and high intensity potential for coho, chinook and steelhead (a few pages later in this section) provide illustrations of Critical Habitat Analytical Review Team watersheds and their conservation rating for each evolutionary significant unit and distinct population segment.

This analysis (see the *Fish* section of *Chapter 4*) determines the effect of each alternative on fish habitat using current fish distribution data. Designated critical habitat for listed fish is encompassed within this analysis because the distribution data used for all fish species is greater than the extent of designated critical habitat.

Fish populations are cyclic by nature and trends can be driven by a variety of factors. Those fish species within the planning area that have been listed as threatened or endangered have been listed as a result of the following factors (Good et al. 2005):

- habitat degradation and loss
- hydropower development
- over-harvest
- hatchery propagation

A biological review team, consisting of scientists from the National Marine Fisheries Service and the Southwest Fisheries Science Centers, updated biological information for the listed salmon and steelhead evolutionary significant units and distinct population segments. This team made conclusions regarding the current and future major risk factors for each evolutionary significant unit (Good et al. 2005). See *Table 3-62 (Major risk factors by evolutionary significant units and distinct population segments)*.

Habitat degradation is a factor of decline for all the listed fish species and is a major risk factor that continues to threaten fish populations.

Currently, the Lost River and shortnose sucker occupy only a fraction of their historic range and are restricted to a few areas in the Upper Klamath Basin (i.e., the drainages of the Upper Klamath, Tule, and

Table 3-62. Major Risk Factors By Evolutionary Significant Unit And Distinct Population Segments

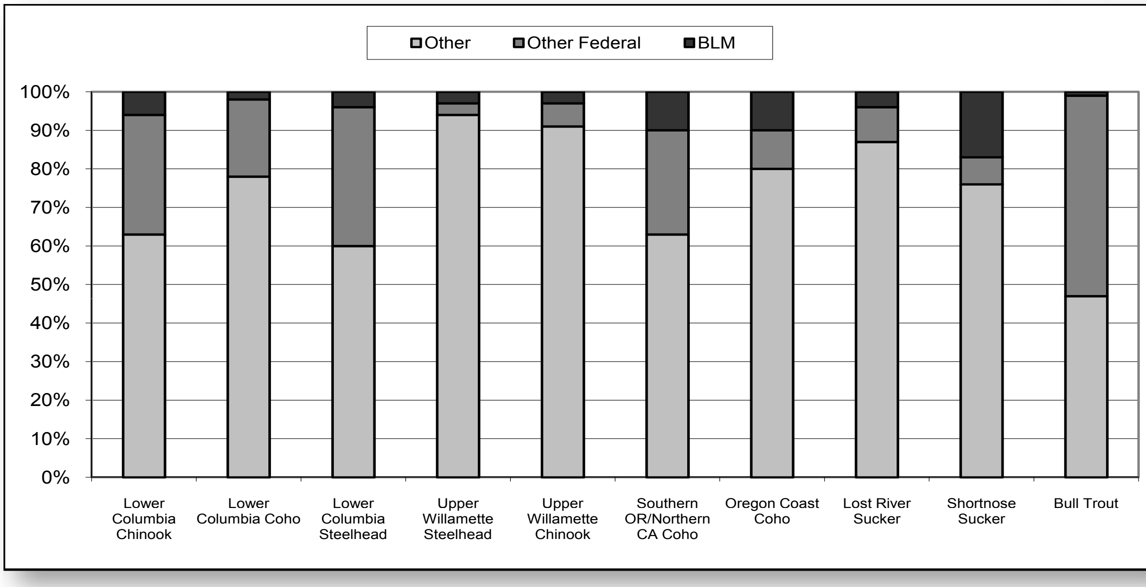
Evolutionary Significant Units and Distinct Population Segments	Major Risk Factors
Bull trout	• Barriers • Habitat degradation
Lower Columbia River chinook salmon	• Habitat degradation • High hatchery production
Lower Columbia River chum	• Unknown
Lower Columbia River coho	• Habitat degradation • High hatchery production
Lower Columbia River steelhead	• Dams • Habitat degradation • High hatchery production
Oregon Coast coho	• Habitat degradation • Over-utilization (fish harvest) • Disease or Predation
Shortnose and Lost River suckers	• Habitat degradation • Water quality
Southern Oregon and northern California coho	• Habitat degradation
Upper Willamette River chinook salmon	• Dams • Habitat degradation • High hatchery production
Upper Willamette River steelhead	• Dams • Habitat degradation

Clear lakes). Poor water quality, reduced suitable habitat for all sizes and ages, and the impacts of non-native fish continue to threaten remaining Lost River and shortnose sucker populations (USDI USFWS 2003d). Although numerous factors have contributed to the decline of these species, habitat degradation is considered the primary cause. Streams, rivers, and lakes have been modified by channelization and dams. Grazing in the riparian zone has eliminated streambank vegetation and has added nutrients and sediment to river systems (USDI USFWS 2003d).

Recovery plans have been established for populations of the bull trout (Federal Register 2005d), Lost River sucker, and the shortnose sucker (USDI USFWS 1993). Recovery plans are in progress for the other evolutionary significant unit and distinct population segments.

Past management activities have degraded aquatic and riparian conditions and contributed to declines in fish populations. Aquatic habitat improvement projects have been completed, but additional opportunities exist across the landscape to continue improving conditions and further contribute to restoring impaired ecological processes (see *Aquatic Restoration* later in this section). The BLM can contribute to improving fish habitat, but the BLM within the planning area is rarely the predominant landowner in a fifth-field watershed. See *Figure 3-97* (*Percentage of miles of fish-bearing streams by ownership and evolutionary significant unit/distinct population segment within the planning area.*). Limiting factors (habitat and non-habitat) for listed fish species may continue regardless of the BLM's contribution to improving habitat trends because of the other influences on the populations and their habitat.

Figure 3-97. Percentage of miles of fish-bearing streams by ownership and evolutionary significant unit and distinct population segments within the planning area



* Data not available for cutthroat trout and other fish species that would have a greater extent than anadromous fish on BLM-administered land because of their occupancy above barriers for anadromous fish.

Because of BLM's land ownership pattern, the BLM's ability to influence aquatic habitat depends not only on the overall amount of land ownership in a watershed, but also on the location of the ownership relative to areas such as high intrinsic potential streams. High intrinsic potential (HIP) streams are streams that have a greater potential to provide high-quality habitat for salmonids. High intrinsic potential is a topographical approach developed by Pacific Northwest Research Station scientists using empirical evidence and attributes of topography and flow to determine the potential of a stream to provide high-quality juvenile salmonid habitat. See *Appendix I - Water*.

The Pacific Northwest Research Station assisted the BLM with development of the Intrinsic Potential model for all chinook, coho, and steelhead streams on BLM-administered lands and non BLM-administered lands within the planning area. This coordination was done to provide comprehensive information on the location of stream reaches having the greatest potential to provide high-quality habitat for salmonids, which was generally missing within the planning area. The BLM is solely responsible for interpretation of the results. The high intrinsic potential model is used in the FEIS to evaluate the location of the high intrinsic streams relative to BLM land ownership patterns, the BLM's ability to influence high intrinsic potential stream channels that have a greater intrinsic potential to provide high-quality habitat for salmonids (Burnett et al. 2007), and the potential and feasibility of aquatic restoration relative to landscape characteristics. See *Figure 3-98 (Percent of high intrinsic potential stream miles by ownership)* and *Figure 3-99 (Percentage of miles of high intrinsic potential streams by ownership and evolutionary significant unit/distinct population segments)*. High intrinsic potential streams have not been determined for Bull trout, Lost River suckers, shortnose suckers, or other special status fish species.

High intrinsic potential reflects the potential of the stream channel to support fish, but is not an indicator of current fish presence or current fish productivity. Current fish distribution or productivity may not correlate with high intrinsic potential streams because of poor water quality, or the current stream condition may lack habitat complexity, or fish passage barriers may prevent fish from reaching high intrinsic potential stream reaches. Therefore, lower intrinsic potential reaches in some locations currently have greater fish densities and productivity than high intrinsic reaches.

Figure 3-98. Percent of High Intrinsic Potential Stream Miles By Ownership

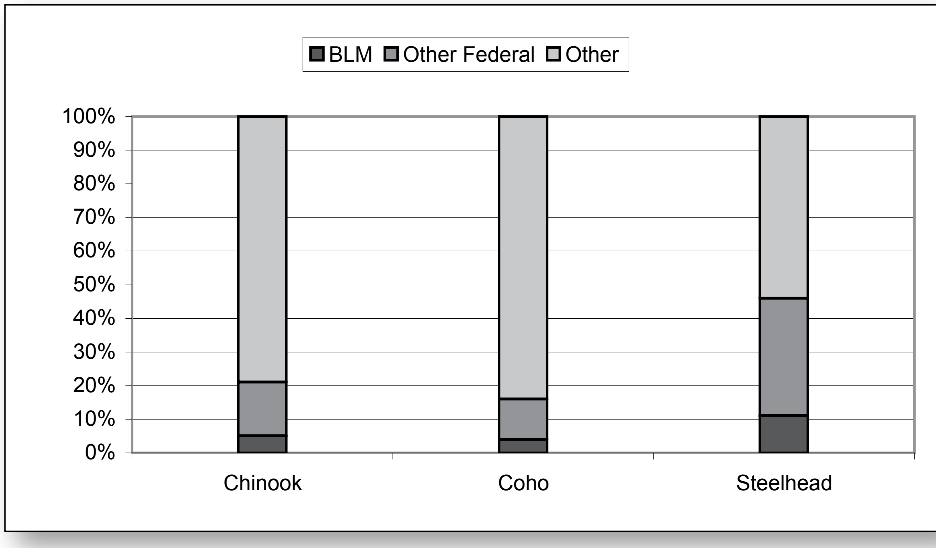
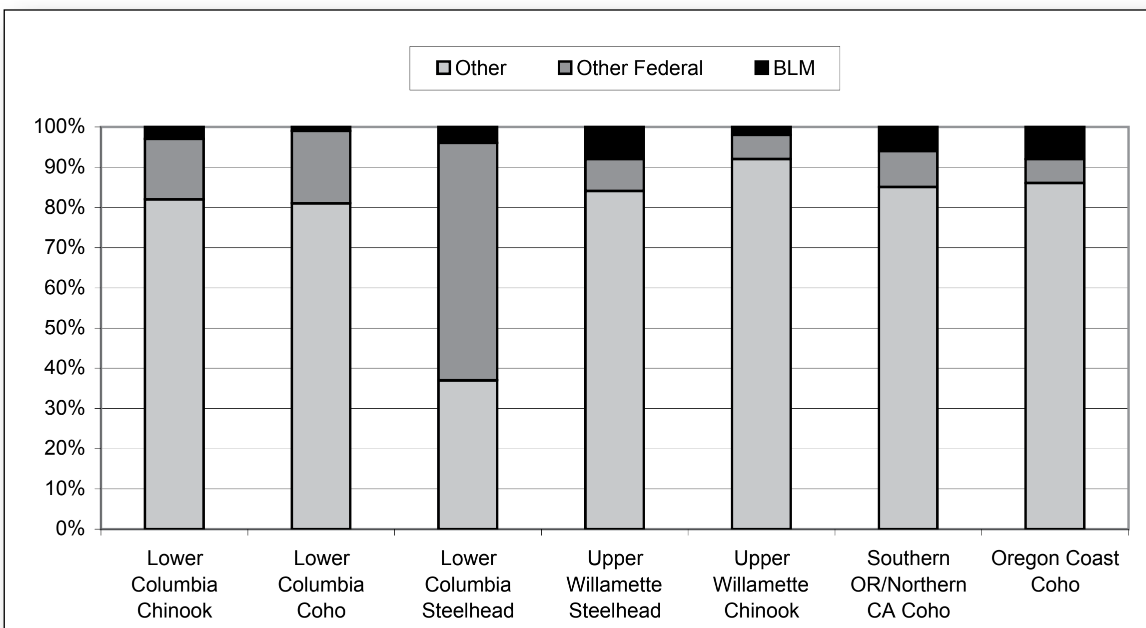


Figure 3-99. Percentage Of Miles Of High Intrinsic Potential Streams By Ownership And Evolutionary Significant Units/Distinct Population Segments Within The Planning Area

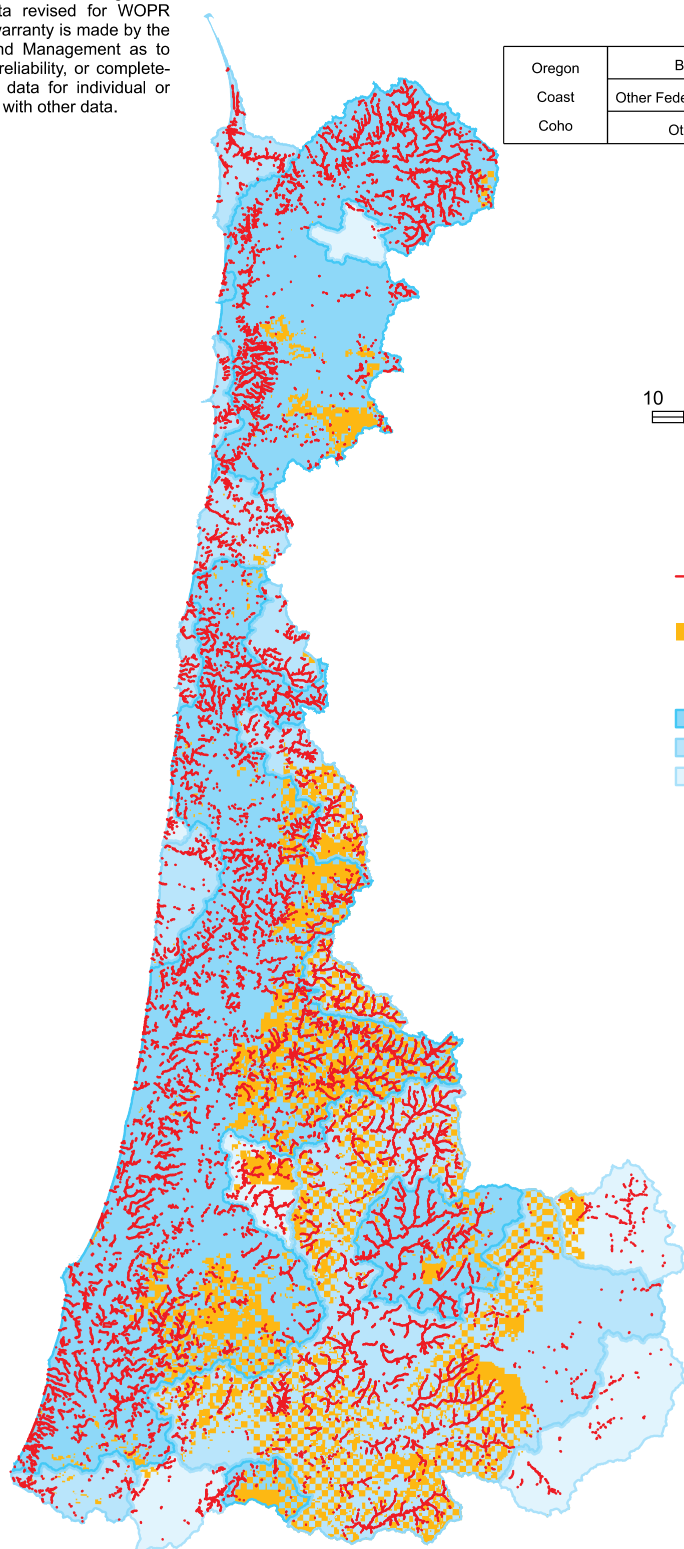


High intrinsic streams are not always the same as the fifth-field watersheds with high conservation value ratings that were identified by the National Marine Fisheries Service Critical Habitat Analytical Review Team (CHART). See *Figures 3-100, 3-101, and 3-102 (Comparisons of CHART-rated fifth-field watersheds and high intrinsic potential streams for coho, chinook and steelhead*). These figures show that on BLM-administered lands, the greatest percent of high intrinsic potential stream channels occurs in watersheds with a low or medium conservation value (or not rated), and the lowest amount of high intrinsic potential streams occurs in watersheds with a high conservation value.

Figure 3-100. Comparison Of CHART-Rated Fifth-Field Watersheds And High Intrinsic Potential Streams For Coho

Source: Bureau of Land Management Corporate Data revised for WOPR Analysis. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

		HIP / Total Stream Miles per CHART WA Value			
		Low	Medium	High	Not Rated
Oregon Coast Coho	BLM	165/453 (36%)	70/233 (30%)	3/7 (43%)	69
	Other Federal	101/412 (25%)	30/195 (15%)	6/64 (9%)	104
	Other	1811/3,824 (47%)	814/1,382 (59%)	20/88 (23%)	864



N
W E
S

10 0 10 20 30 40 50 Miles

Oregon Coast Coho High Intrinsic Potential Stream

BLM Administered Land

Fifth-Field Watershed CHART Rating

High

Medium

Low

Western Oregon Plan Revisions

Final Environmental Impact Statement

M07-10-01

Figure 3-101. Comparison Of CHART-Rated Fifth-Field Watersheds And High Intrinsic Potential Streams For Chinook

		HIP / Total Stream Miles per CHART WA Value			
		Low	Medium	High	Not Rated
Upper Willamette Chinook	BLM	4/11 (36%)	10/31 (32%)	1/1	6
	Other Federal	22/66 (33%)	3/4 (75%)	0/3	43
	Other	52/476 (11%)	166/355 (47%)	178/327 (54%)	684
Lower Columbia Chinook	BLM	4/10 (40%)	0/0	0/0	1
	Other Federal	11/49 (22%)	0/19	0/0	15
	Other	18/251 (7%)	37/74 (50%)	1/6 (16%)	88

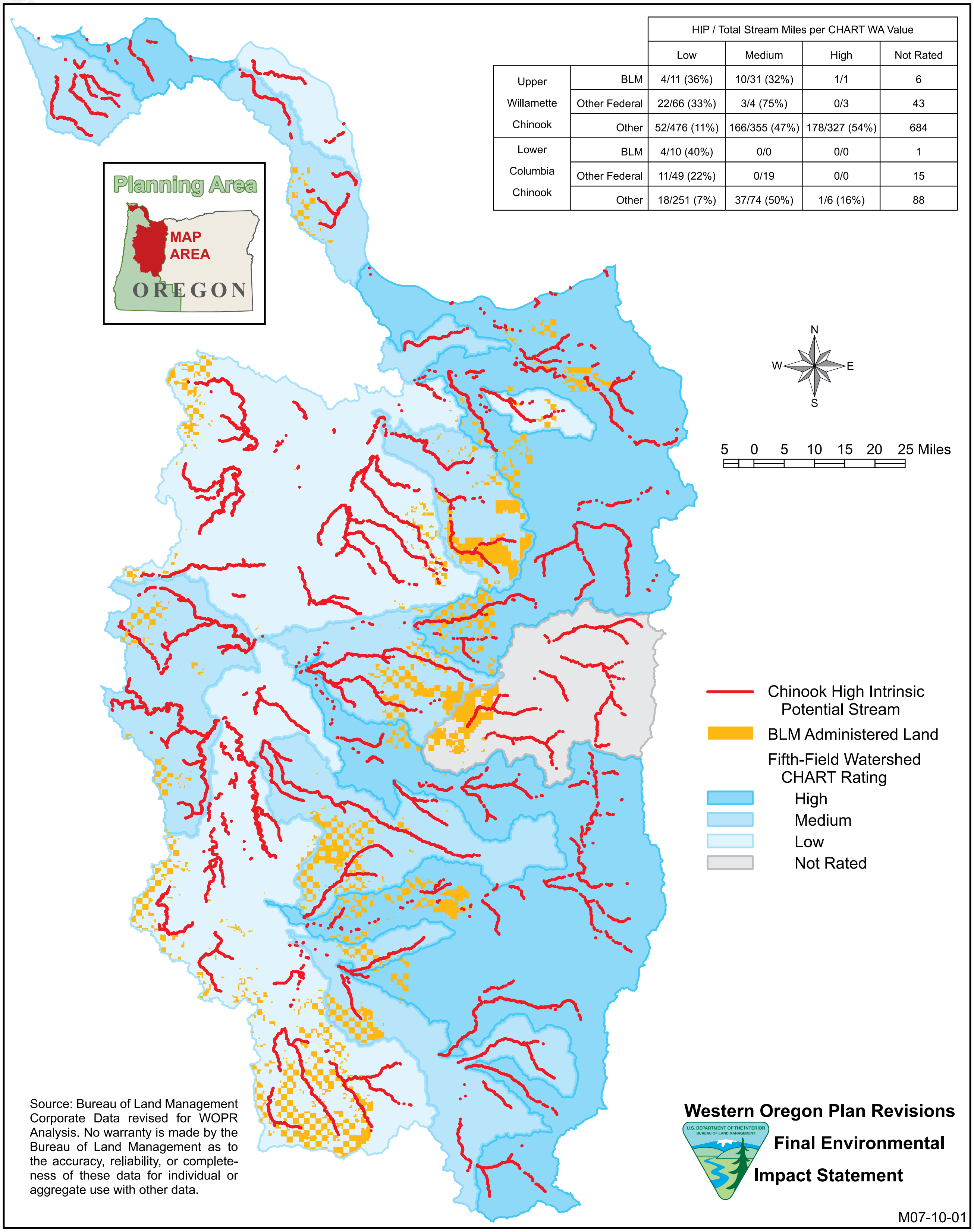
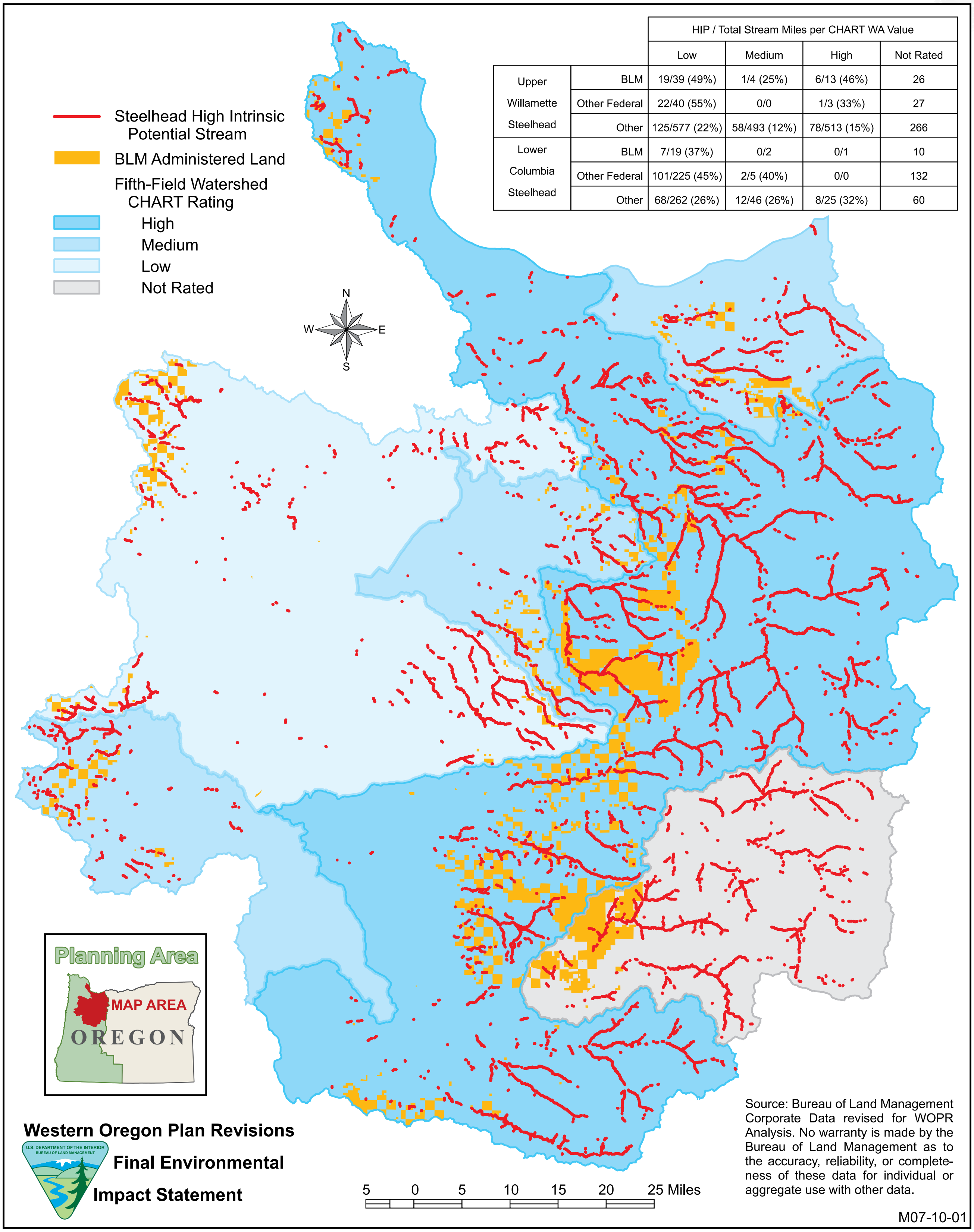


Figure 3-102. Comparison Of CHART-Rated Fifth-Field Watersheds And High Intrinsic Potential Steams For Steelhead



		HIP / Total Stream Miles per CHART WA Value			
		Low	Medium	High	Not Rated
Upper Willamette Steelhead	BLM	19/39 (49%)	1/4 (25%)	6/13 (46%)	26
	Other Federal	22/40 (55%)	0/0	1/3 (33%)	27
	Other	125/577 (22%)	58/493 (12%)	78/513 (15%)	266
Lower Columbia Steelhead	BLM	7/19 (37%)	0/2	0/1	10
	Other Federal	101/225 (45%)	2/5 (40%)	0/0	132
	Other	68/262 (26%)	12/46 (26%)	8/25 (32%)	60

For this analysis, high intrinsic potential is used to identify streams with the greatest potential to support salmonids, as well as areas where BLM-administered lands would have the greatest influence on fish habitat. High intrinsic potential is primarily used in the analysis because it is based on empirical evidence from published studies regarding relationships between stream attributes and juvenile fish. Conversely, the National Marine Fisheries Service CHART rated fifth-field watersheds using a delphi multi-factor scoring system approach, based on the presence of primary constituent elements in the watershed, information regarding fish populations in each watershed, and the "benefit of designation." The benefit of designation is determined on the likelihood that Section 7 consultations, which are required by the Endangered Species Act, occur in the watershed. The benefit of designation is based on a watershed's profile, which is used to determine if the watershed has "low leverage." Low leverage watersheds are those with less than 25% federal ownership, no hydropower dams, and no consultations likely to occur on instream work (USDC NOAA 2005). These attributes were chosen because "federal lands, dams and instream work all have a high likelihood of consultation, and activities undergoing consultation have a potential to significantly affect the physical and biological features of salmon and steelhead habitat" (USDC NOAA 2005). If watersheds were determined to have low leverage, the benefit of designation was lowered or watersheds were excluded from designation (USDC NOAA 2005).

Key Ecological Processes

Aquatic ecosystems are dynamic environments, changing over time due to natural disturbances. Recognizing that dynamic processes such as periodic large disturbances can have big impacts on aquatic ecosystems represents a relatively new perspective (Naiman et al. 1992). This perspective implies that aquatic ecosystems and their conditions vary because of such periodic events as wildfires and large storms, and the subsequent floods, hillslope failures, landslides, and debris flows (Haynes et al. 2006b). This analysis focuses on the key ecological processes that shape fish habitat over time, rather than static conditions at one point in time.

The following are examples of key ecological processes that shape aquatic and riparian habitat in the planning area:

- tree growth and mortality (which affect stream shade, nutrient input, and large wood delivery)
- hydrology (water flow and temperature)
- sediment routing

Large wood, stream temperature, sediment, and stream flow have the greatest influence on the ability of aquatic habitat to support fish populations (Meehan 1991, OWEB 1999). In forested landscapes, the important delivery mechanisms of large wood and sediment to stream channels are landslides, debris flows, and floods. In nonforested landscapes, the important processes are water flow, water temperature, and sediment routing.

Large Wood

Large woody debris (large wood) refers to coniferous or deciduous logs, limbs, or root wads that intrude into a stream channel. This analysis included both the large wood (greater than 20 inches in diameter) and small wood (trees less than 20 inches in diameter) contribution to stream channels. In addition to large wood, small wood (trees less than 20 inches in diameter) can also be functional in stream systems, depending on stream size. Small wood is considered functional if it is "pool-forming" (Beechie et al. 2000). The correlation factors shown on *Table 3-63 (Functional piece size and stream channel width)* are used to determine small functional wood by stream size for the wood delivery model.

However, because decay rate and probability of displacement are a function of size, the larger diameter trees have a greater influence on fish habitat and physical processes in fish-bearing stream channels than smaller

Table 3-63. Functional Piece Size And Stream Channel Width

Stream Width (feet)	**Functional Wood Diameter** (inches)
15	4.5
20	6.0
30	9.0
40	12.0
50	15.0
>50	>20.0 (referenced as large wood or "key piece")

Source: Beechie et al. 2000

pieces (Dolloff and Warren 2003). Additionally, larger pieces are necessary in larger fish-bearing stream channels to trap and store smaller pieces of wood. In general, trees greater than 24 inches in diameter and 50 feet in length are considered large wood west of the Cascade Mountains, and trees greater than 12 inches in diameter and 35 feet in length are considered key pieces east of the Cascade Mountains (Foster et al. 2001, USDC NOAA and NMFS 1996). For this analysis, trees greater than 20 inches in diameter are considered to be large wood for larger, fish-bearing streams to maintain consistency with the structural stage classification of forests. That classification uses the density of trees greater than 20 inches in diameter as a threshold for the definition of mature & structurally complex forests (see the *Forest Structure and Spatial Pattern* section of *Chapter 3*).

Large wood is an important component of aquatic habitats, from headwater channels to estuaries in forested ecosystems (Dolloff and Warren 2003). Large wood accumulation within stream channels is necessary for many functions including:

- providing cover for fish
- sediment storage for food supply and spawning grounds
- nutrient retention
- pool formation
- formation of off-channel habitat

For many aquatic organisms, particularly fish, large wood is an important factor in creating and maintaining deep water or pool habitat. See *Figure 3-103* (*Example of deep pool and habitat diversity caused by large wood)* and *Figure 3-104* (*Example of a stream with high wood volume*). Salmonids inhabit pools as refuges from high water velocities. Juvenile salmonids use pools and side channels created by wood as overwintering habitat. Large wood can capture and store sediment, which provides spawning habitat (Dolloff and Warren 2003). Large wood is also an important source of cover that makes fish more difficult for predators to see. Stream complexity is important for many fish, particularly aggressive species such as salmonids, which do not tolerate close proximity to each other. Wood partitions the habitat and visually isolates fish, allowing more fish per unit of available space (Dolloff 1986).

In forested ecosystems, the abundance and survival of salmonids is often closely linked to the abundance of large woody debris, particularly during winter (Meehan 1991). In general, streams with high amounts of large wood and complex habitats tend to have more fish species and higher populations than those lacking complexity (Dolloff and Warren 2003). Many studies have established that improved habitat complexity correlates to improved fish survival and production (Hartman et al. 1996, 237, 243, 248; Reeves et al. 1993, 314; Bustard and Narver 1975; Tschaplinski and Hartman 1983, 452; Murphy et al. 1986, 1526; Hartman and Brown 1987, 262). Researchers have documented an increase in the density of salmon following the addition of wood to stream reaches. Roni (2001) reported a 180% increase during summer and 332% increase during winter in the density of juvenile coho following the addition of wood to 30 streams in Washington and Oregon. Similarly, Cederholm et al. (1997) showed a 20-fold increase in juvenile coho during winter in

Figure 3-103. Example Of Deep Pool And Habitat Diversity Caused By Large Wood

Figure 3-104. Example Of A Stream With High Wood Volume

response to the addition of wood. Reeves et al. (1997) found that the number of steelhead did not increase in response to wood additions, but that smolts were significantly larger.

Past management practices throughout the Pacific Northwest have reduced the abundance of large woody debris in channels throughout the region. Historically, large wood source areas did not produce large wood all the time, but rather fluctuated both spatially and temporally. Natural disturbances such as fires, wind, and floods do not affect all of the landscape equally. Because of the dynamic spatial effects of natural disturbance regimes, large wood loading and stream habitat features across natural landscapes vary greatly. At any one time, some stream channels may have large amounts of large wood and highly complex habitats, but other channels, even in the same watershed, may lack wood and have simplified habitats (Reeves et al. 1995). Prior to the 20th century, large channels and large rivers such as the Willamette River as described by Sedell and Froggatt (1984) were full of wood or blocked by wood jams and accumulations.

Wood loading in large Pacific Northwest rivers has generally declined to 1/100th of historical amounts (Sedell and Froggatt 1984). Rivers were cleared of large wood and boulders during settlement to improve access for transportation. Large wood was later removed from rivers and streams as a stream-cleaning regime, because log jams were believed to obstruct fish migration. Smaller streams were cleared through a splash-damming process in which a dam-break flood was induced to transport trees. These torrents scoured sediment and wood from streambeds and banks and left many channels scoured to bedrock (Sedell and Luchessa 1982, Montgomery et al. 2003).

The decline in beaver populations from trapping also reduced the large wood found in streams and consequently reduced the complexity of aquatic habitats. Dam building by beavers provides accumulations of large wood and pools, which are an important component of high-quality habitat for fish species (ODFW 2005b, Pollock et al. 2003, Nickelson et al. 1992). By 1900, trapping had nearly extirpated beaver in the Pacific Northwest (Naiman et al. 1998). The decline in beaver populations resulted in incised channels and also loss of riparian and wetland areas and loss of channel complexity, which are important to fish and invertebrate production. For example, the greatest reduction in the productive capacity of coho smolt has been associated with the extensive loss of beaver ponds (ODFW 2005b). A 94% reduction in smolt production potential in a western Washington basin is attributed to the loss of beaver pond habitat (ODFW 2005b).

The mining, urbanization, agriculture, and logging activities of the 20th century began to change physical and biological characteristics of streams by removing trees from upland and streamside areas. The ground disturbances and road construction associated with these activities caused increased sedimentation into streams, which directly altered stream channels. Large fires and the subsequent salvage logging such as the Tillamook Burn removed both upland and riparian forests, reducing stream shading and future sources of large wood and increasing sedimentation.

In the past, roads were often constructed along stream channels. Roads constructed along and across stream valley bottoms altered channel morphology, modified natural drainage networks, and limited large wood from migrating downstream from headwater sources to fish-bearing stream reaches (Everest and Reeves 2007). See *Figure 3-105 (Road and stream crossings in the Evans Creek Watershed).*

Although there is high variability in the natural levels of large wood in streams, the amount of large wood in rivers and streams within the planning area is currently far outside the historic range and is hindering the recovery of wild salmonids (IMST 1999). Watershed monitoring completed within 55 watersheds in the area of the Northwest Forest Plan in 2004 concluded that large wood levels are below benchmark values in nearly 70% of the sample (Gallo et al. 2005).

The current amount of large wood in stream channels is a reflection of past management and the availability of trees on the landscape for delivery to stream channels. Most riparian areas have been harvested at least once over the last 150 years (Dolloff and Warren 2003), and the trees in the resultant second-growth forests are generally too small to provide large wood (greater than 20 inches in diameter) to streams. See *Figure 3-106 (Current riparian conditions by BLM district)* for the current riparian condition on BLM-administered lands within the planning area. Stand establishment and young forests generally have few trees greater than 20 inches in diameter. Trees in mature & structurally complex forests contain trees large enough to provide large wood. Within riparian forests, 47% are currently in stand establishment and young forest, and 53% are in mature & structurally complex forest.

In the Coast Range Province, riparian red alder stands have increased in abundance, and large conifer stands have decreased in abundance since the 1930s (see the *Forest Structure and Spatial Pattern* section in *Chapter 3*). See *Figure 3-107 (Changes in western Oregon vegetation types).* A lack of conifers along streams

Figure 3-105. Road And Stream Crossings In The Evans Creek Watershed

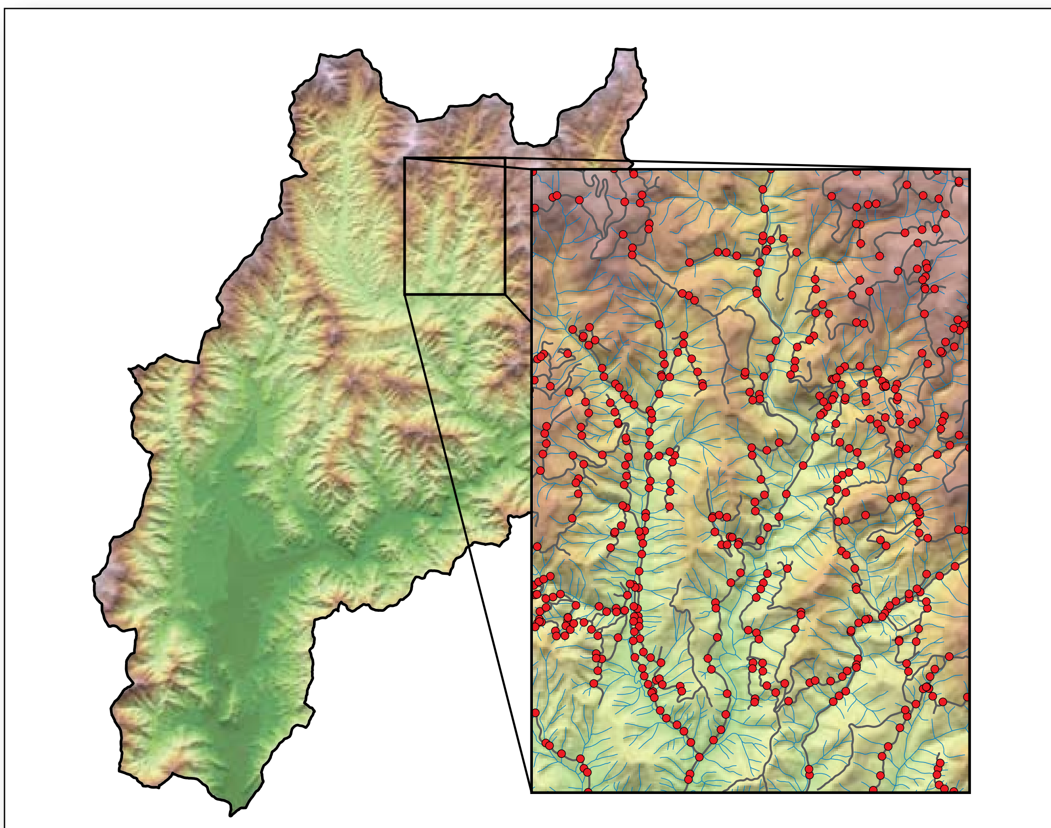
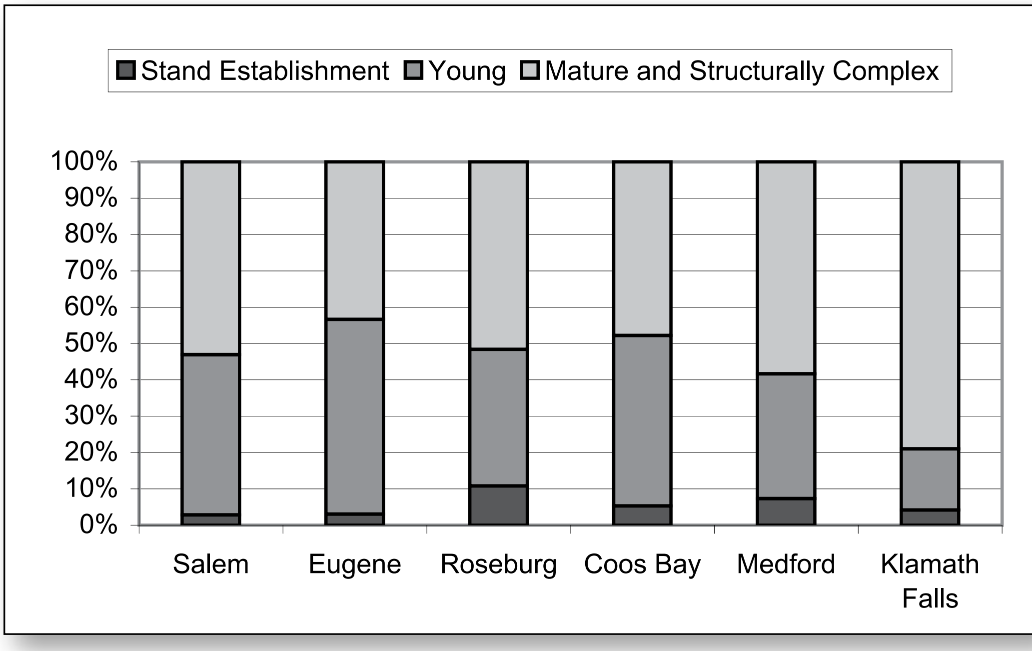


Figure 3-106. Current Riparian Conditions By BLM District



can contribute to simplified aquatic habitat structure, which is a limiting factor for many listed salmonids. Although red alder trees may provide for stream structure in the short term, they cannot provide the larger-diameter, persistent stream structure that conifers can. Red alder trees that fall into streams are more likely to be broken down and transported out of the streams than are conifers (Hyatt and Naiman 2001). Red alder is an important source of nutrients for macro-invertebrates and, subsequently, for fish (Romero et al. 2005). However, key pieces from conifer trees must be available in the stream channel to trap and store smaller trees, such as alder, and the nutrients from the alder input (Findlay et al. 1977).

Large wood is delivered from forests to stream channels from both chronic and episodic events (Naiman et al. 2000). The amount of large wood in stream channels depends on the amount of trees available on the landscape that can be delivered to a stream channel. Not all areas across the landscape have the potential to deliver trees to stream channels. Wood is typically delivered to stream channels from:

Chronic events (events that occur frequently, such as tree mortality along streambanks):

- riparian tree-fall (typically one site-potential tree height from the stream channel)
- valley floors and floodplains (channel migration zones)

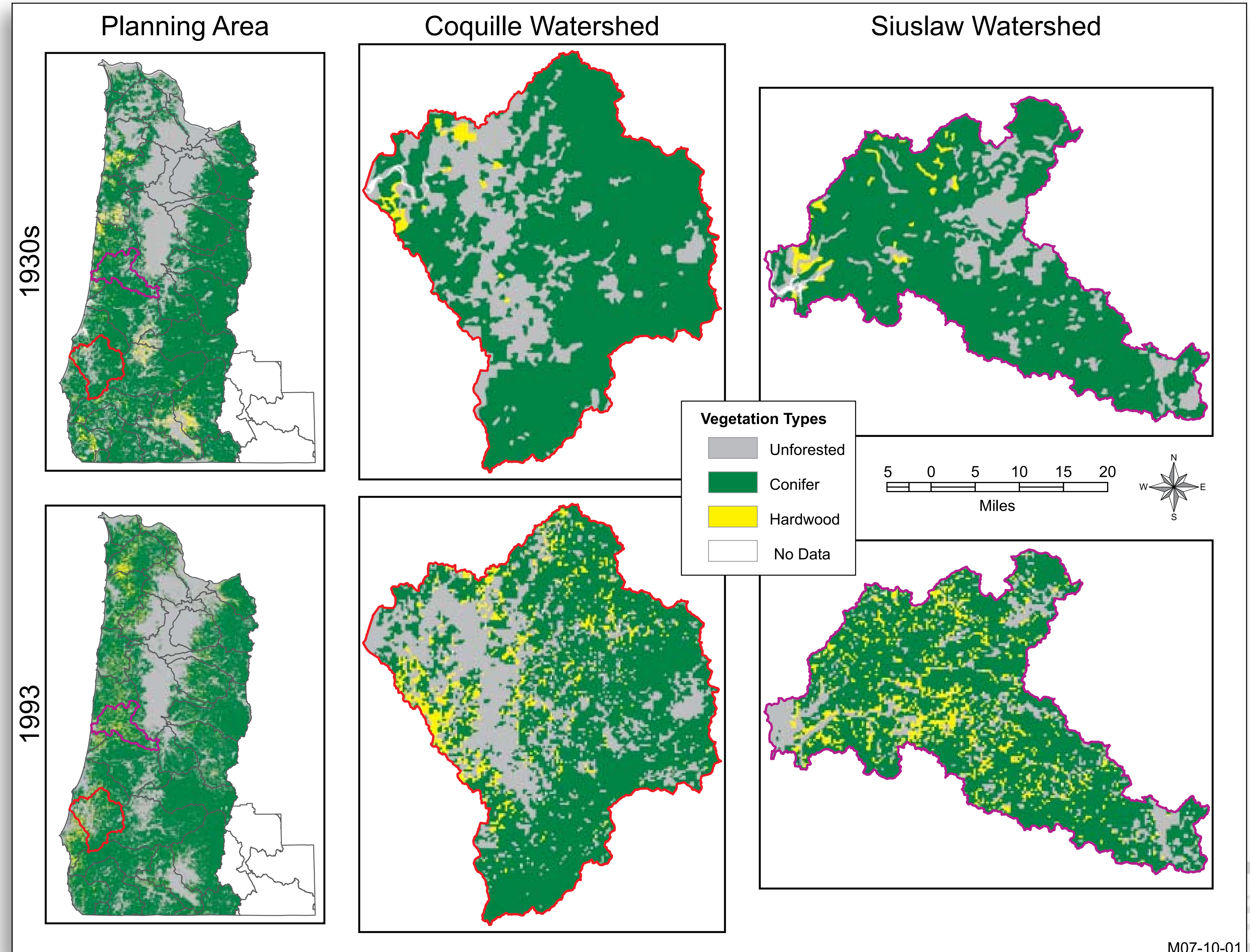
Episodic events (events that typically occur sporadically and infrequently and can deliver large amounts of wood to stream channels (Bilby and Bisson 1998, Benda et al. 2003a and 2003b, Naiman et al. 2000):

- landslides and debris flows

Riparian Tree Fall

Large wood enters stream channels from the adjacent streambank as trees eventually fall over, and, if they are close enough to a stream channel, land in the channel (McDade et al. 1990). Trees along stream edges are also undercut as a result of bank erosion and eventually fall into the stream. The majority of wood that falls into stream channels from adjacent forests occurs within a distance of one tree height away from the channel (FEMAT 1993, p. V-27).

Figure 3-107. Changes In Western Oregon Vegetation Types



For forest lands on the east side of the Klamath Falls Resource Area, large wood enters stream channels primarily from riparian tree fall as a result of windthrow, tree mortality, or bank erosion. The rate at which large wood is supplied to streams depends on the character of adjacent landforms and vegetation patches. In forested canyon settings, large wood recruitment is relatively high, whereas large wood input to streams that flow through meadows and rangelands occurs at lower rates. Instream large wood surveys in east side streams indicate that large wood amounts are higher in constrained reaches than in unconstrained reaches (USDA USFS and USDI BLM 2003).

Landslide and Debris Flows

In forested areas of the Pacific Northwest, shallow landslides (including debris flows) are important mechanisms for delivering sediment and large wood from hillslopes and headwater channels to downstream fish-bearing stream reaches (Keller and Swanson 1979). A ***debris flow*** is a rapidly moving slurry of rock, soil, wood, and water that can travel hundreds to thousands of feet on steep slopes or in steep channels (ODF 2003). Debris flows commonly start as rainfall-initiated translational landslides of shallow soils (Iverson et al. 1997) and are a primary process by which headwater channels are connected to and influence larger streams (Benda and Cundy 1990, Gomi et al. 2002).

Debris flows are natural disturbances in the Pacific Northwest, but can have both short-term negative and long-term constructive effects on aquatic habitat (Reeves 2005). Over short periods, debris flow deposits can have destructive effects, including burial of existing aquatic habitat and direct mortality of aquatic biota, increased fine sediment deposition that can suffocate fish eggs in gravel, increased bed load transport and lateral channel movement due to increased sediment supply that scours fish eggs, loss of aquatic insects, and the dewatering of pools due to channel aggradation (Miller et al. 2003, Benda et al. 2005).

Over longer periods, constructive effects of debris flows on aquatic systems include the creation of gravel deposits and large pools; deposition of woody debris and of boulders that trap sediments and create complex habitats; formation of wider valley floors that contain larger floodplains; and increased biological productivity (Benda et al. 2005, Benda et al. 2003a and 2003b). For many streams, landslides and debris flows provide a large portion of the instream wood (Reeves et al. 2003) and other materials that contribute to the habitat heterogeneity in fish-bearing streams (Miller and Burnett 2007) and that create complex, productive stream habitats (Reeves et al. 1995, Bilby and Bisson 1998.) For macro-invertebrates and fish, increasing the heterogeneity of habitat conditions including channel width and depth, bed substrate, wood storage, and water velocity, can increase total species richness (Allan 1995). This has been documented in the Oregon Coast Range, where increased wood storage and pool formation at low-order confluences resulted in increased salmonid rearing (Benda et al. 2004).

The frequency, magnitude, and spatial extent of debris flows can vary within and among watersheds (Miller et al. 2003). Headwater streams differ in their susceptibility to landslides and debris flows and the subsequent delivery of large wood to downstream reaches. Research from the Coastal Landscape Analysis and Modeling Study indicates that a small percentage of headwater stream networks encompass the majority of wood contribution to stream channels (Miller and Burnett 2007). *Figure 3-108 (Relationship between intermittent streams and wood contribution to streams)* illustrates the general relationship that the majority of wood contributed to streams from debris flows comes from a relatively small percentage of the headwater channels in a watershed.

Watersheds differ in the frequency and magnitude of debris flows as a result of differences in topography and climate. For example, in the Siuslaw River basin in coastal Oregon, topographic differences between Knowles Creek and Sweet Creek result in large differences in the predicted probability of debris-flow delivery between these two channel systems (Miller et al. 2003). See *Figure 3-109 (Within and among watershed heterogeneity of debris flow probability for the Knowles Creek and Sweet Creek watersheds, Coast Range, Oregon*).

Figure 3-108. Relationship Between Intermittent Streams And Wood Contribution To Streams

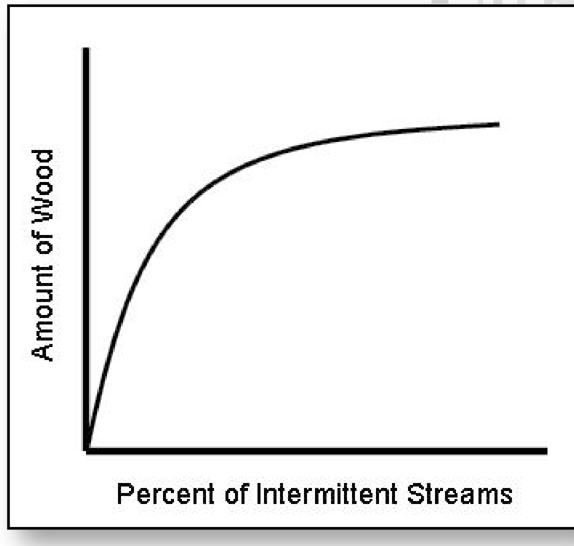
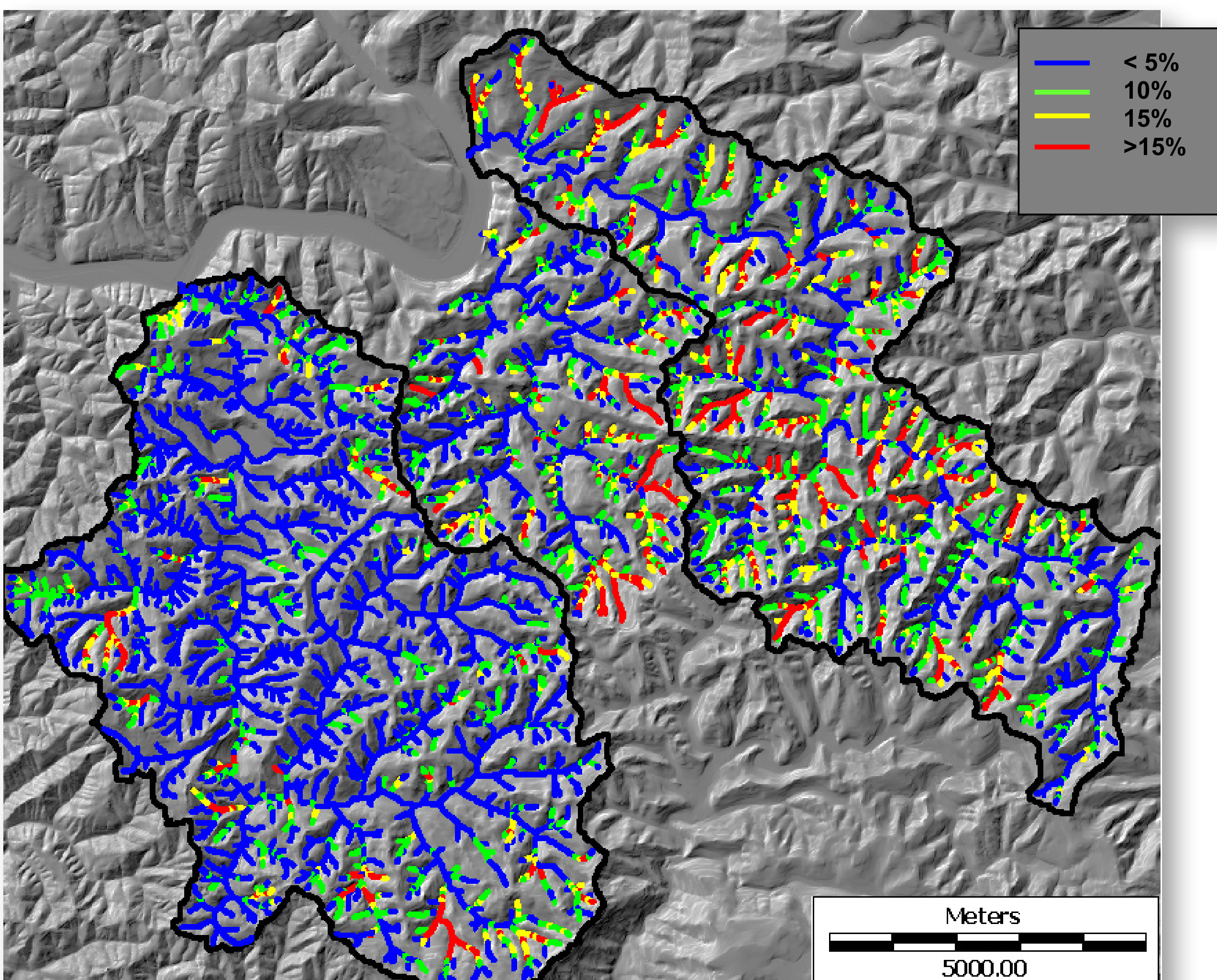


Figure 3-109. Within And Among Watershed Heterogentiy Of Debris Flow Probability For The Knowles Creek And Sweet Creek Watersheds, Coast Range, Oregon

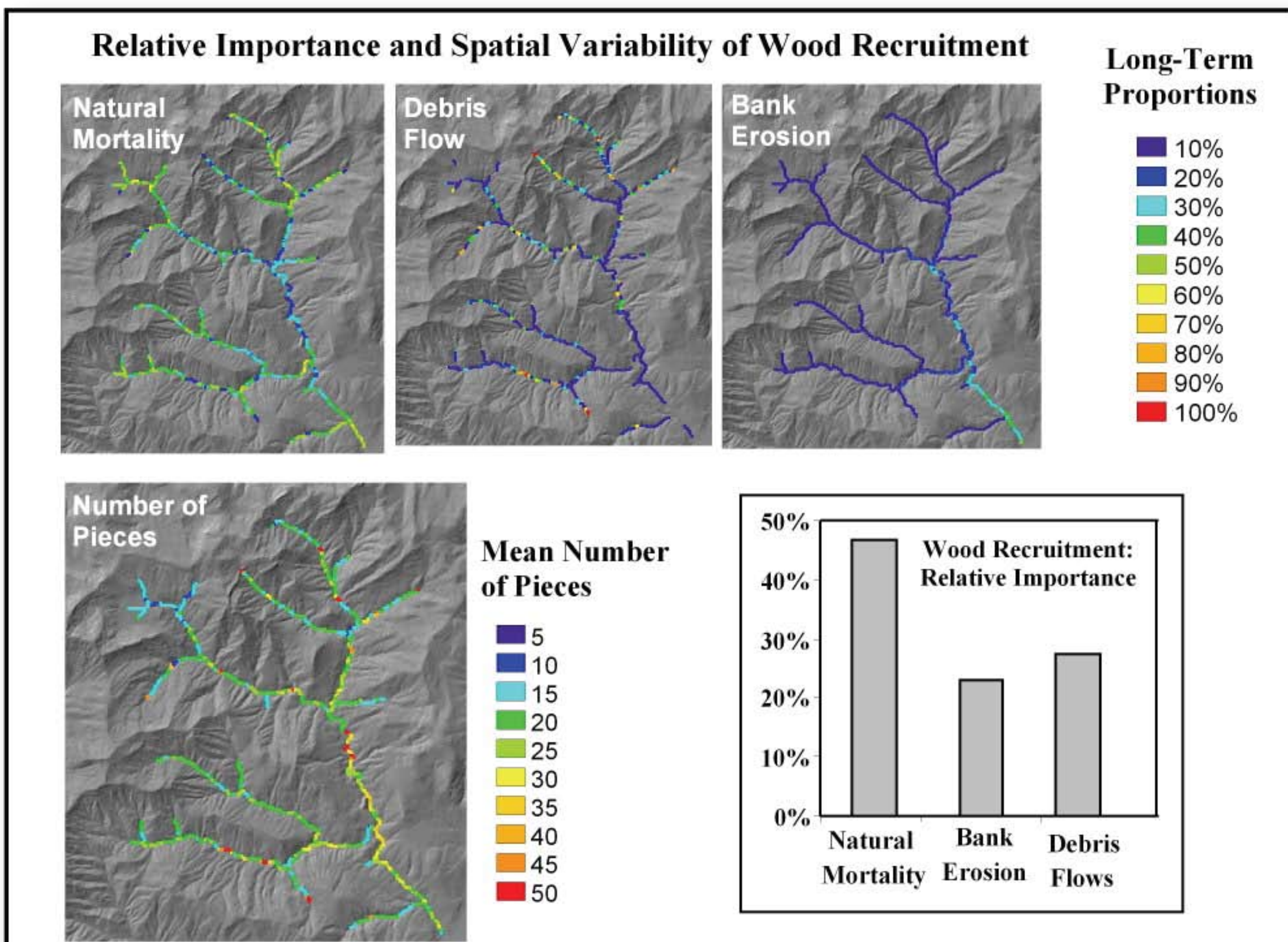


Channel Migration

The channels of some streams, particularly larger streams and rivers in broad alluvial valleys, may migrate across the valley as a result of natural erosional and depositional processes. The channel migration zone is the area where the active channel of a stream is prone to movement over time. In meandering or incising streams, bank erosion can account for a substantial portion of wood input to streams (Martin and Benda 2001, Murphy and Koski 1989). However, large wood contribution from this source is relatively small from BLM-administered lands in the planning area since channel migration in larger rivers comprises a small percentage of the entire stream network.

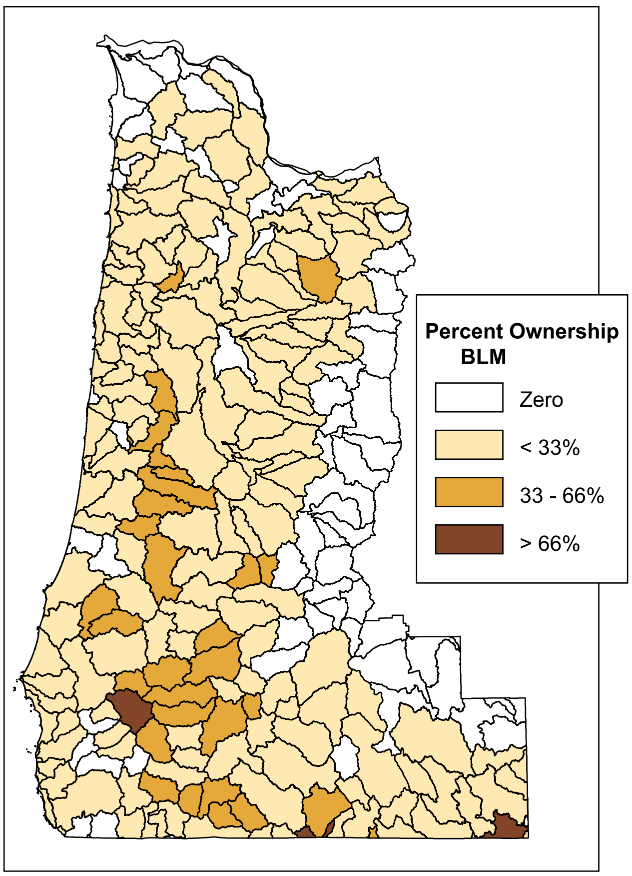
The relative importance of each delivery process varies by province, stream channel, riparian vegetation, position in the landscape, and time (Bilby and Ward 1989). Episodic processes deliver large amounts of wood during infrequent events (windstorms or mass movements), whereas chronic processes (suppression mortality and bank erosion) consistently provide small amounts of wood over extended time periods. Windthrow, debris flows, landslides, and avalanches are the primary delivery mechanisms in steep headwater channels (Bilby and Bisson 1998). Bank erosion and delivery from upstream sources contribute the majority of large woody debris in larger unconfined channels (Murphy and Koski 1989). See *Figure 3-110 (Example of relative importance and spatial variability of wood recruitment processes in the Coast Range)* for the relative rates of wood recruitment from each process in the Coast Range province (USDA USFS 2002 in Benda et al. 2003a and 2003b).

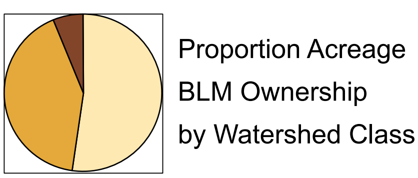
Figure 3-110. Example Of Relative Importance And Spatial Variability Of Wood Recruitment Processes In The Coast Range



The Pacific Northwest Research Station assisted Earth Systems Institute in the development and application of the wood delivery model. The wood delivery model is based on research by Pacific Northwest Research and Earth Systems Institute scientists in the analysis of effects on the aquatic ecosystems. The BLM was responsible for model inputs, quality control, and interpretation of the modeling results. The wood delivery model was developed to compare the potential wood contribution to both fish-bearing and non-fish-bearing stream channels over time between alternatives on BLM-administered lands and non-BLM-administered lands.

Figure 3-111. BLM ownership patterns in the planning area





Other existing wood models and studies focus primarily on riparian sources of wood (Lienkaemper and Swanson 1987, Murphy and Koski 1989, McDade et al. 1990, Robison and Beschta 1990, Van Sickle and Gregory 1990). See Reeves (2005) at http://www.blm.gov/or/plans/wopr/science/scienceforum.php. However, landslides and debris flows can provide a large portion of instream wood in the planning area (Bigelow et al. 2007, Reeves et al. 2003). Therefore, the wood delivery model used for this analysis provides a more comprehensive analysis of wood delivery for the planning area than the other existing wood models. This analysis uses a spatially explicit, topographically based large wood model to estimate potential wood recruitment to streams over entire stream networks. The model incorporates all large wood delivery processes including riparian tree fall, landslide and debris flows, and channel migration tree recruitment. Topographic characteristics from a 10-meter digital elevation model are used to identify all large wood sources across the landscape (Clark et al. 2008, Miller and Burnett 2007). Probabilities of delivery are assigned to every 10-meter digital elevation model pixel across the landscape. For debris flow sources, all initiation points are ranked by their probability of initiating and transporting a debris flow to a fish-bearing channel. See *Appendix I - Water* for a complete description of the large wood model.

Since the BLM is rarely the predominant landowner within a fifth-field watershed in the planning area, the potential large wood contribution from BLM-administered lands is generally less than from other landowners. See *Table 3-64 (BLM land ownership patterns in the planning area)* and *Figure 3-111 (BLM ownership patterns in the planning area)* for the range of BLM ownership watersheds with BLM-administered land.

Highly detailed forest stand data for BLM-administered lands was used for the wood delivery model to determine the potential wood delivery from BLM-administered lands and

Table 3-64. BLM Land Ownership Patterns In The Planning Area

BLM Ownership	Number of Watersheds
Less than 1/3	138
1/3 to 2/3	30
Greater than 2/3	3

for comparison with the No Harvesting reference analysis. However, the highly detailed forest stand data is not available for non-BLM-administered lands. Therefore, in order to show the relative potential large wood contribution from both BLM and non-BLM-administered lands, the wood delivery model used IVMP data for non-BLM-administered lands, as described in *Chapter 3* (*Forest Structure and Spatial Pattern* section). This relative large wood contribution was compared against a maximum potential large wood contribution to show the general relative contribution between ownerships.

The maximum potential large wood contribution is one point of comparison used for determining the biological potential of a watershed to provide large wood to streams. It is calculated as the number of pieces of large wood per year that could be delivered to a fish-bearing stream in a fifth-field watershed if all forested acres in the watershed were in a mature & structurally complex forest. The maximum potential large wood contribution does not account for large disturbance events (fires, floods, etc.) and is not used in the analysis as a benchmark or target condition. It is only used in the analysis to show the relative wood contribution between ownerships over time.

The maximum potential large wood contribution reflects a maximum biological potential and does not necessarily reflect average historic conditions. The average historic conditions at the province scale ranged from 79% in mature & structurally complex forest in the Coast Range and West Cascades provinces, to 45% in a mature & structurally complex forest in the Eastern Cascades province (see *Forest Structure and Spatial Pattern in Chapter 3*).

However, at the scale of an individual fifth-field watershed, the variability in historic amounts of mature & structurally complex forest would have been extremely high, and likely with long periods of time in which the watershed was nearly all in mature & structurally complex forest (Wimberly et al. 2000). These periods of time in which a fifth-field watershed would be nearly all in mature & structurally complex forest, which would correspond to the maximum large wood contribution calculated in the model, would represent the maximum potential for large wood delivery.

Periodic large disturbance events (such as wildfires, large storms, and the subsequent floods, hillslope failures, landslides, and debris flows) would deliver large wood to stream channels and alter the structural stage abundance of the forest. Delivery from disturbance events when the watershed would be nearly all in mature & structurally complex forest would provide accumulations of large wood in streams that would last longer than it would take the watershed to return to mature & structurally complex forest after the disturbance.

The calculated potential large wood contribution for this analysis is not a prediction of actual instream conditions at a specific point in time. The potential large wood contribution is not compared to large wood benchmarks developed by the Oregon Department of Fish and Wildlife, because the potential large wood contribution represents a potential contribution to instream wood based on forest conditions over time, whereas the large wood benchmarks are based on actual reference instream conditions. The model cannot predict actual instream conditions, because large wood input is episodic (delivery events are stochastic and unpredictable) and cumulative (large wood accrues over time). Therefore, this analysis summarizes wood contribution in terms of the proportion wood contribution compared to the No Harvesting reference analysis for BLM-administered lands, and to a maximum potential large wood contribution reference analysis for the relative comparison between ownerships, instead of a comparison with large wood benchmarks. See *Figure 3-112* (*Current potential wood contribution from BLM-administered lands compared to the potential large wood contribution under the No Harvesting reference analysis at year 2106*) and *Figure 3-113 (Current and maximum large wood contribution by ownership)* for the current potential large wood contribution.

Figure 3-112. Current Potential Large Wood Contribution From BLM-Administered Lands Compared To The Potential Large Wood Contribution Under No Harvesting Reference Analysis At Year 2106.

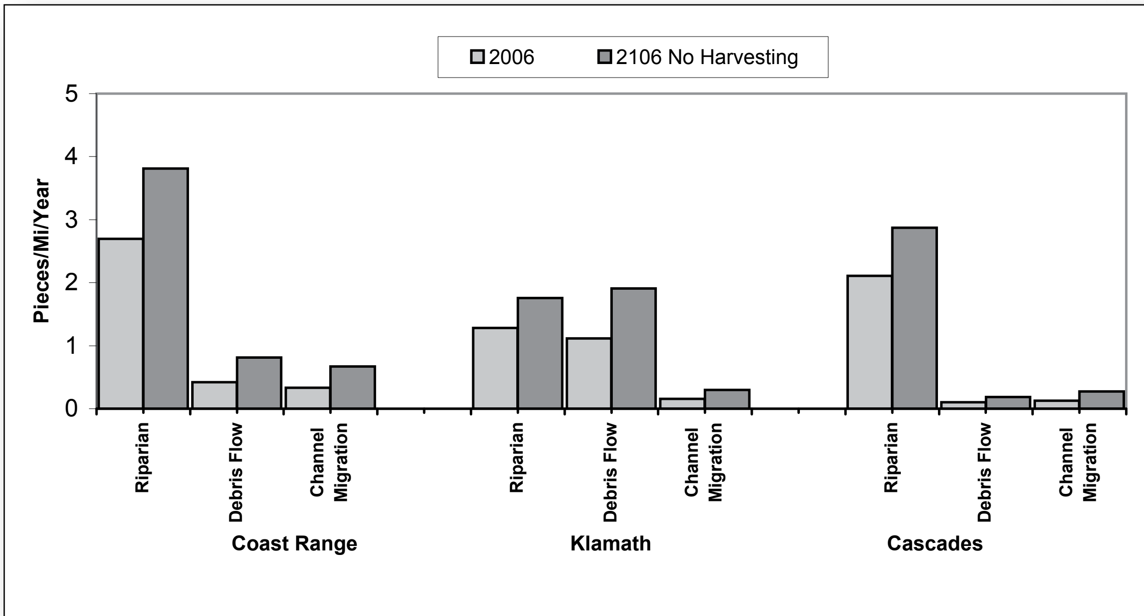
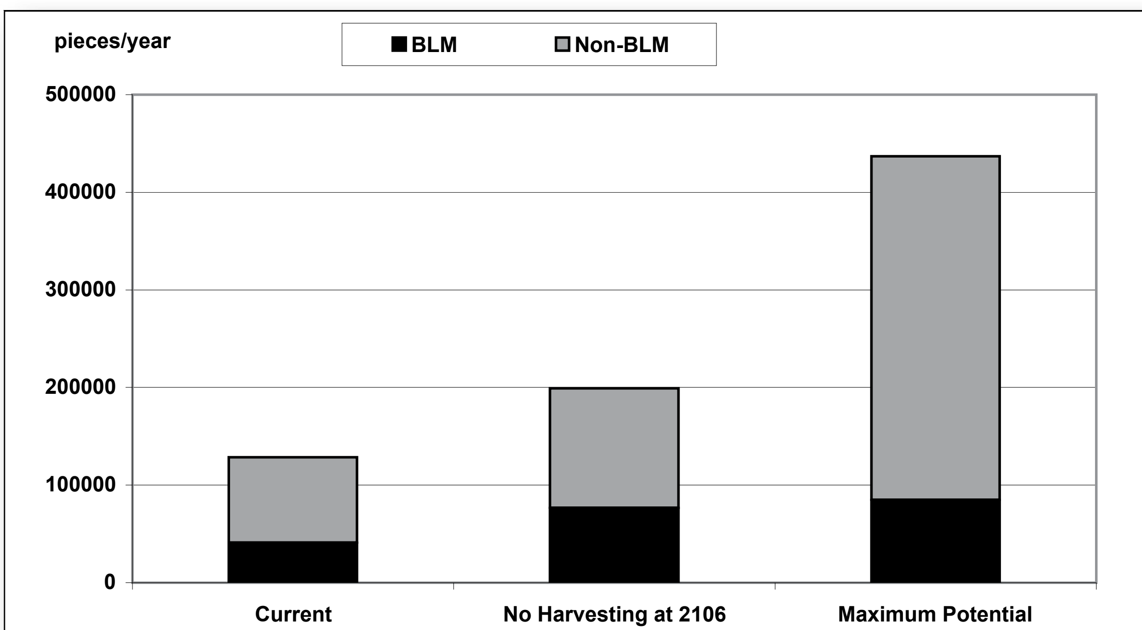


Figure 3-113. Current And Maximum Large Wood Contribution By Ownership



In all watersheds, the current large wood contribution is lower than the maximum potential, because not all forests that are capable of delivery to streams are currently in mature & structurally complex forest, particularly riparian areas. Refer to *Figure 3-106 (Current riparian conditions by district).*

Nutrient Input

Energy becomes available to the stream community from two main sources: photosynthesis by aquatic plants in the stream, and decomposition of organic matter imported from outside the stream (Murphy and Meehan 1991). Riparian vegetation (particularly size, abundance, and overall stand composition) governs the input of light and nutrients to stream channels (Murphy and Meehan 1991).

Riparian vegetation provides organic matter to stream channels from litterfall when leaves, needles, woody debris and insects fall into the stream channel. The supply of organic material contributes to the amount of food produced for fish species in forested ecosystems. The effectiveness of riparian forests to deliver leaf and other particulate organic matter declines at distances that are greater than approximately one-half a tree height (59 to 112 feet) away from the stream channel (FEMAT 1993, p. V-27).

The amount and composition of litterfall is strongly influenced by the forest type, successional stage, and site productivity of forests (O'Keefe and Naiman 2006). The composition and quantity of litterfall change as riparian forests proceed on a successional trajectory driven by changes in the composition, structure, and overall productivity of riparian forests (O'Keefe and Naiman 2006). The rate of input increases with increasing forest basal area during early successional forest growth (O'Keefe and Naiman 2006). O'Keefe and Naiman observed an initial 100-year linear increase in litter production with early forest succession. After the first century, total litter declined approximately 40% as forests shifted to structurally complex forest and were dominated by conifers (O'Keefe and Naiman 2006). See *Figure 3-114 (Total annual litterfall as a function of forest age*).

In general, litterfall composition can also change through the forest succession as litterfall from deciduous trees dominates during the first century and dominates from conifers thereafter. Fish-bearing streams receive food supplies from both nearby (riparian) and distant (headwater) habitats (Wipfli et al. 2007). The relative importance of each delivery process varies. Headwater streams are important sources of nutrients for invertebrate production (Wallace et al. 1997, Stone and Wallace 1998). Headwater streams on BLM-administered lands in the planning area comprise 67% of the stream network; and because of their abundance they may be substantial contributors of invertebrates and organic input to downstream fish-bearing waters. However, to what extent they subsidize food production in downstream fish communities is unclear (Wipfli et al. 2007). Additionally, relative to other sources such as instream production and riparian input directly to fish-bearing streams, the input from headwater streams to fish-bearing streams also may be only a small fraction of the contribution (Wipfli et al. 2007).

Overall, the input and processing of organic material is better served by a heterogeneous landscape with varying amounts of forest cover, species composition, and age classes than by the creation of a single

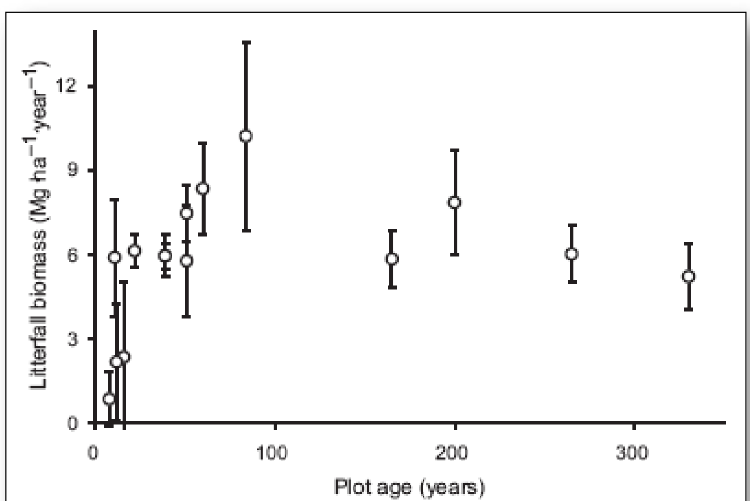


Figure 3-114. Total Annual Litterfall As A Function Of Forest Age (O'keefe And Naimain 2006).

forest type across the landscape (IMST 1999). However, there are no studies that establish a threshold as to what degree shifts in forest cover affect nutrient input, production, and fish productivity.

The amount of light reaching the stream channel also influences nutrient production within stream channels. Partial or complete riparian forest removal increases macro-invertebrate densities and biomass due to increased solar radiation on the stream channel (Chan et al. 2004, Jackson et al. 2001, and Wipfli et al. 2007). Danehy et al. (2007) found a higher abundance and more biomass of macro-invertebrate assemblages in streams within regeneration harvest units than in mature stands.

Many riparian areas have been harvested at least once over the last 150 years (Dolloff and Warren 2003). Within riparian forests, 47% are currently in stand establishment and young forest, and 53% are in mature & structurally complex forest. See *Figure 3-106 (Current riparian conditions by BLM district)* for the current riparian condition on BLM-administered lands within the planning area. The average historic conditions at the province scale ranged from 79% in mature & structurally complex forest in the Coast Range and West Cascades provinces, to 45% in mature & structurally complex forest in the Eastern Cascades province (see the *Forest Structure and Spatial Pattern* section in *Chapter 3*). Therefore, based on correlations identified in O'Keefe and Naiman (2006), current stream productivity from nutrient input is estimated to be less than average historic conditions from litterfall sources from mature & structurally complex forest, and higher than average historic conditions from increased solar radiation in stand establishment and young forest.

Fine Sediment

Fine sediments (sand, silt, and clay at less than 2 millimeters) enter and leave river channels naturally, but increased suspended sediment (turbidity) and sedimentation (embeddedness) can adversely affect fish (Anderson et al. 1996).

Fish species have the ability to cope with some level of sediment at various life stages (Everest et al. 1987). The effects of fine sediment on fish habitat are generally expressed as the percent of embeddedness at reach scales. Embeddedness is defined as the degree to which larger particles (such as boulders, cobble, and gravel) are surrounded and/or covered by smaller particles (silt, sand). Increases in sedimentation or embeddedness can reduce fish-spawning and rearing habitat, fish egg and fry survival, and food availability (Chamberlin et al. 1991, Hicks et al. 1991).

Thresholds beyond general levels at which these effects occur vary, despite scientific efforts to quantify the relationship between fine sediment and fish species. For example, Suttle et al (2004) suggest there is no threshold below which fine sediment is harmless to fish, and that the deposition of fine sediment in the stream channel, even at low concentrations, can decrease the growth of salmonids. When embeddedness exceeded 35%, survival from egg to emergence of chum salmon was reduced (Koski 1975 in Everest et al. 1987). Studies by Murphy and Hall (1981) in the Oregon Cascades found that juvenile salmonids were tolerant of fine sediment when embeddedness ranged from 26-52%.

Cederholm (1981) found that the survival of salmonid eggs to emergence was inversely correlated with the amount of fine sediment when the percentage of fine sediment exceeded natural levels in the watershed. Cederholm concluded that there was a 2% decrease of egg to emergence survival of salmonids, for each 1% increase in fine sediment over natural levels (Cederholm 1981) at the watershed scale. In the Cederholm study, natural levels of fine sediment were considered to be below 10% embeddedness. The Oregon Department of Fish and Wildlife considers the percent of fine sediment "undesirable" above 15% in streams with volcanic parent material, above 20% in streams with sedimentary parent material, and above 25% in low gradient streams (less than 1.5% gradient) (Foster et al. 2001). The National Marine Fisheries Service considers a stream "not properly functioning" when embeddness levels exceed 30% (USDC NOAA 1996). In other studies, levels that exceed 20% of the streambed are generally considered detrimental to most fish species in the planning area (Everest et al. 1987).

In 1998, the Oregon Department of Environmental Quality reported the results of the Oregon statewide assessment of non-point sources of water pollution. Of Oregon streams considered "impaired" for sedimentation, there were 1,500 stream miles on BLM-administered lands; 2,000 stream miles on Forest Service administered lands; and 7,400 stream miles on non-federal lands (ODEQ 1998).

In 2004, the Oregon Department of Environmental Quality reported the results of stream conditions in western Oregon for all ownerships, as part of Section 305(b) of the federal Clean Water Act (CWA). Fine sediment levels were in four ecoregions in the planning area and rated as good (<22% embeddness), fair (22-35% embeddness), or poor (>35% embeddness). The rating was based on the 10^{th} and 25^{th} percentile of western Oregon reference site scores (ODEQ 2004a and 2004b).

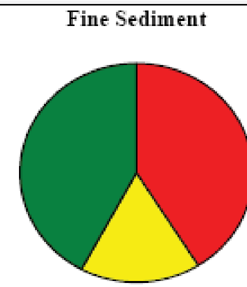
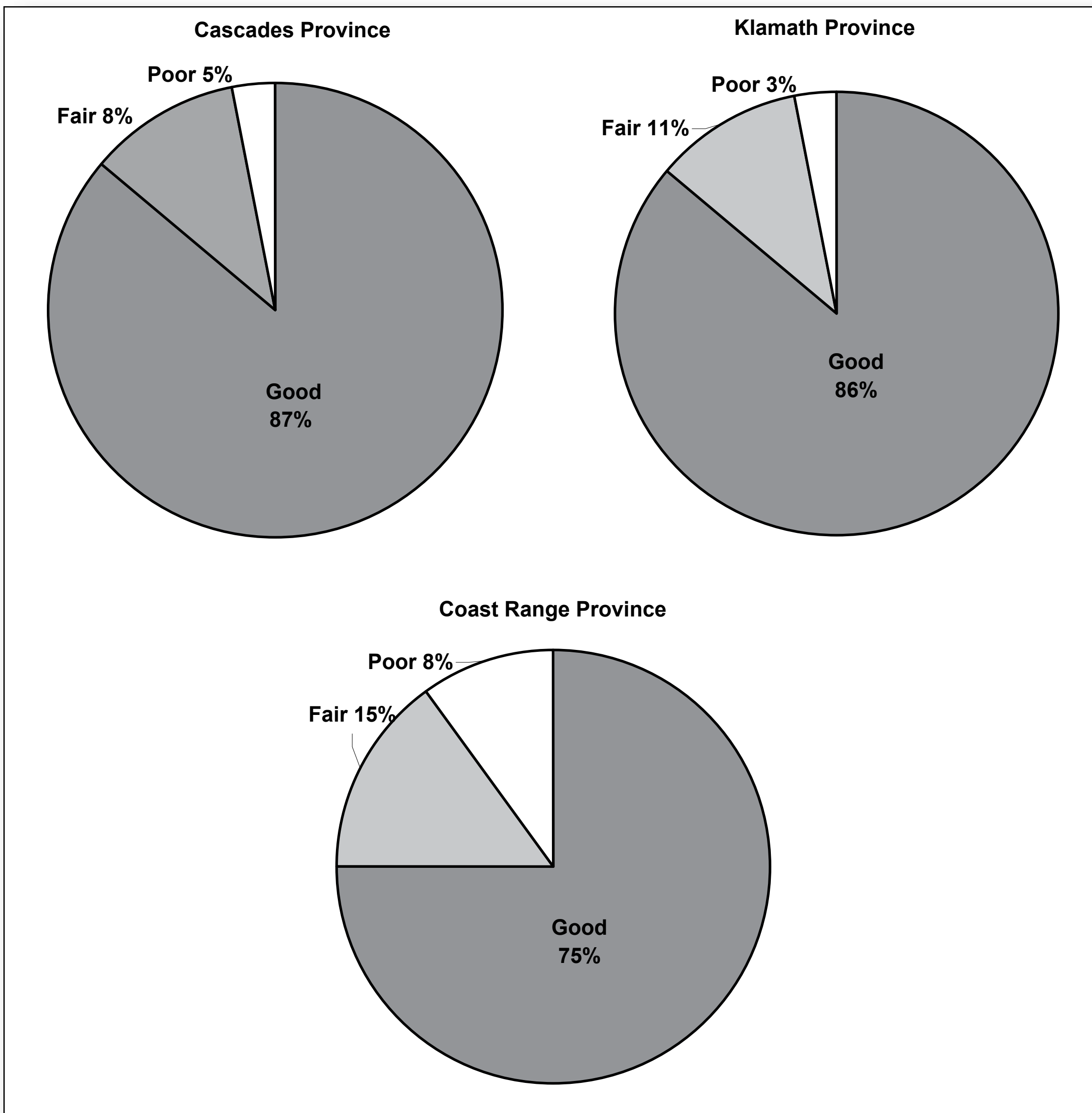
Ecoregion	Good	Fair	Poor	
Coast Range	42%	17%	41%	
Willamette Valley	7%	3%	90%	
Klamath Mountains	65%	14%	22%	
Cascades	71%	17%	11%	

Figure 3-115. Fine Sediment Levels In Western Oregon Streams, By Ecoregion (ODEQ Data 1994-2001)

The Willamette ecoregion had the lowest number of stream miles (7% rated "good" with fine sediment levels less than 22%). In the other ecoregions, 42% of stream miles in the Coast Range ecoregion, 65% percent of stream miles in the Klamath Mountains ecoregion, and 71% of stream miles in the Cascades ecoregion had fine sediment levels less than 22%. See *Figure 3-115* (*Fine sediment levels in western Oregon streams, by ecoregion [from ODEQ Probabilistic Stream Surveys 1994-2001]*).

However, these results do not represent the current conditions on BLM-administered lands since the data is for all ownerships combined. From 2001 to 2007, watershed monitoring was completed as part of the Northwest Forest Plan 10-year review on BLM-administered lands. Fine sediment was measured in 177 stream reaches in Western Oregon as part of the watershed monitoring. Overall, using Oregon Department of Environmental Quality survey thresholds, 81% of stream reaches on BLM-administered land would be considered "good," having fine sediment levels less than 22%. Average fine sediment levels varied by

Figure 3-116. Fine Sediment Levels In Western Oregon Streams On BLM-Administered Lands, By Province On 177 Stream Reaches.



province, with 75% of stream reaches in the Coast Range; 87% in the Cascades; and 86% in the Klamath having fine sediment levels less than 22%. See *Figure 3-116* (*Fine sediment levels in western Oregon streams on BLM-administered lands, by province [data from NWFP 10-year review]*). Fine sediment data was not collected in the Willamette Valley Province since BLM-administered land comprises a small percentage of land ownership within the province.

For this analysis, sediment yields are calculated at a fifth-field scale and expressed as tons per year (See the *Water* section in *Chapter 3*). Since this output (tons/year) cannot directly be equated to a percent embeddness, using the assumption from Cederholm et al.(1981) provides the ability to utilize a relative increase (>1% above natural levels) to evaluate the effects of fine sediment delivery on fish species at the watershed scale for each alternative. The Cederholm study is also used since it evaluated the effects on salmonids in the Pacific Northwest. Although the assumptions from Cederholm are used, they may over-estimate the actual effects to fish species in some areas, because:

- Fine sediment can be cleaned from the stream bottom gravel by scouring during storm events. High velocity flows tend to carry sediment rapidly out of the drainages, particularly in the Coast Range province. Within the planning area, the amount of fine sediment stored and routed through stream channels is highly variable, and some aquatic systems may function with high background levels of fine sediment.
- Spawning salmonids can improve their chances of reproductive success through behavioral adaptations (Everest et al. 1987). During redd construction (e.g., digging nests in the stream bottom) fish can remove large amounts of fine sediments from the gravel (Everest et al. 1987). For example, in Evans Creek, chinook salmon reduced fine sediments from 30% prior to spawning, to 7.2% after spawning (Everest et al. 1987). Secondly, when a female salmonid has completed spawning and burying eggs, the redd is left with a large pit on its upstream perimeter and a mounded tailspill downstream that contains the eggs. The pit acts as a natural settling basin for fine sediments and may capture up to 0.25 cubic meters of sediment before they reach the tailspill where the eggs are buried (Everest et al. 1987).

Increased concentrations of suspended sediment (turbidity) can also have direct effects on fish behavior, physiology, and growth (Anderson et al. 1996). Sigler et al. (1984) found that turbidities of 25 nephelometric turbidity units caused a reduction in juvenile steelhead and coho growth. Fish may avoid high concentrations of suspended sediment and at lower concentrations cease feeding (Hicks et al. 1991). Bisson and Bilby (1982) found that juvenile coho salmon avoided water with turbidities that exceeded 70 nephelometric turbidity units. The timing of the sediment inputs relative to the biological vulnerability of each fish species is often more important than the absolute quantity of sediment. In most streams, there are periods when the water is relatively turbid, and this sediment is generally mobilized during large storms (Everest et al. 1987). Larger juvenile and adult salmonids and trout species appear to be little affected by ephemerally high concentrations of suspended sediments that occur during most storms (Cordone and Kelley 1961, Sorenson et al. 1977). If sediment is introduced to streams in the absence of a runoff event, then sediment deposition may create localized adverse impacts (Everest et al. 1987). The tolerances of fish species to sediment vary seasonally. For example, Noggle (1978) demonstrated that the tolerance of juvenile coho salmon to suspended sediment was highest in the fall when increased suspended sediment normally occurs in streams.

Currently, there are no stream miles listed by the Oregon Department of Environmental Quality as turbidity impaired that occur on BLM-administered lands (see the *Water* section in *Chapter 3*).

Temperature

The water temperature in streams can affect the biological cycles of fish. The Oregon Department of Environmental Quality has established water temperature standards to protect the beneficial uses of the waters of the state. The beneficial uses most sensitive to water temperature are fish and aquatic life and,

Table 3-65. Temperature Standards For Fish Species

Species	7-Day Average Maximum Temperature Standard (degrees Fahrenheit)
Bull trout, spawning and juvenile rearing	53.5
Salmon and steelhead, spawning	55.4
Salmon and trout, rearing and migration	64.4
Shortnose and Lost River suckers	64.4
Cold core-water habitat	60.8

therefore, the temperature standard is based on protecting these uses (Boyd and Sturdevant 1997). See *Table 3-65 (Temperature standards for fish species)* for the temperature standards for several species within the planning area (ODEQ 2004).

The stream temperature standard is 64°F for salmon- and trout-rearing and migration, and sucker species; 55.4°F for salmon and steelhead spawning; and 53.6°F for bull trout. These criteria were established to protect fish use during the warm summer months. The unit for all the criteria in the standard is the 7-day moving average of the daily maximum temperatures. This means that the average of the daily maximum stream temperatures for the seven warmest consecutive days during a year, and any other seven-day period, is calculated and compared to the applicable criterion.

The Oregon Department of Environmental Quality "Core Cold-Water Habitat" designations identify and ensure the protection of colder water habitats that provide more optimal conditions for salmon and steelhead juvenile rearing and that protect summer bull trout sub-adult and adult foraging and migration. In addition, these areas would provide colder holding waters for pre-spawning adults (from Oregon Administrative Rules 340-041-0001 Water pollution division 41). Locations of "Core Cold-Water Habitat" in the planning area can be found at the Oregon Department of Environmental Quality website at: http://www.deq.state.or.us/wq/standards/standards.htm.

The standards are not based on temperature that have lethal effects to fish (usually above 70°F**),** but on sub-lethal effects (Boyd and Sturdevant 1997). Sub-lethal effects can lead to death indirectly, or they may reduce the ability of the fish to successfully reproduce and for offspring to survive and grow. Sub-lethal effects include an increase in the incidence of disease, a reduced survival rate of eggs, a reduced growth and survival rate of juveniles, increased competition for limited habitat and food, reduced ability to compete with other species that are better adapted to higher temperatures, and other adverse effects (Boyd and Sturdevant 1997).

Sub-lethal effects of temperature on salmonids occur gradually as stream temperatures increase. For example, for salmonids, some these effects begin when stream temperatures are below 64°F, such as increased incidence of disease and a reduction in juvenile growth rates for chinook. Optimal juvenile growth rates for chinook and coho occur at temperature below 58°F to 60°F. At 64°F, temperatures are less than optimal but not yet at levels where growth ceases or direct mortality occurs. In selecting the criteria, this information was balanced with the fact that the unit is a maximum temperature and that if the criteria is met, the fish will be exposed to temperatures above 60°F for only part of the day during a few of the warmest weeks of the summer (Boyd and Sturdevant 1997). The intent is that while this criterion does not eliminate any risk to the fish whatsoever, it keeps the risk to a minimal level (Boyd and Sturdevant 1997). There are currently 569 stream miles on BLM-administered lands (4% of all listed stream miles in Oregon) that are listed by the Oregon Department of Environmental Quality for temperature (see the *Water* section in *Chapter 3*).

Stream Flow

Stream flow is an important element of fish habitat. Stream flow is highly variable in mountainous areas within the planning area and is strongly influenced by the form of precipitation (e.g., rain, snowmelt, or rain on snow) (Naiman and Bilby 1998). For fish species, flow can affect:

- migration
- spawning and emergence
- rearing
- fish habitat (e.g. sediment routing and deposition)

The stream flow regime at the time of spawning is an important factor that determines the ability of migratory salmonids and other fish species to reach spawning areas (Titus and Mosegaard 1992), the amount of submerged gravel (Everest et al. 1987), and the water depth and velocity over gravel beds (Newcombe 1981, Bjornn and Reiser 1991). As stream flows increase, gravel is covered and becomes suitable for spawning (Hooper 1973 in Meehan 1991). However, if flows continue to increase, velocities can become too high for spawning to occur; this would cancel the benefit of increases in useable spawning areas near stream edges (Hooper 1973 in Meehan 1991).

Stream flow also has a major influence on the transport, routing, deposition, and size of gravel available in the stream channel available for spawning fish (Collins 1995, Montgomery et al. 1996).

Salmonid eggs are deposited in gravel beds within the stream channel and generally spend several months in the gravel until emerging. During this time the eggs are relatively immobile, which makes them vulnerable to disturbance of the stream bed. During peak flows, gravel beds can be scoured and transported out of channels (Kondolf et al. 1991). Scour from peak flows is an annual natural process. However, changes in the frequency or magnitude of peak flows can result in stream instability and increased scour. Scour and entrainment of eggs in gravel has frequently been documented (Schuett-Hames et al. 1996, McNeil 1966 in Schuett-Hames et al. 1996, Duncan and Ward 1985, Tripp and Poulin 1986, Lisle 1989, Nawa et al. 1993, Kondolf et al. 1991, and Schuett-Hames et al. 2000). Loss of eggs due to gravel movement occurred frequently in southeast Alaska pink and chum salmon spawning streams. Mortality often exceeded 50% and ranged as high as 90% (McNeil 1966). In the Queen Charlotte Islands of British Columbia, estimated mortality of chum and coho salmon eggs from scour was 80-90% (Tripp and Poulin 1986). Disturbance of more than 75% of the chinook redds was estimated in a southwest Oregon stream due to scour (Nawa et al. 1990).

As a storm event progresses, more water is added to the stream system, increasing stream flow, flow quantity, depth, and erosion power. If stream flow volumes and velocities become large enough, and if sediment and large wood is mobilized, shifts in channel structure and gravel distribution can occur (Swantson 1991). In the planning area, these channel-forming flows typically occur during a 2-year, 24-hour peak flow event (Lisle 1981). When the frequency and magnitude of the flow increases, stream channels can become unstable and streambank erosion increases. These changes typically occur when 5-year flows begin to occur at the 2-year, 24-hour flow interval (Harr 1992). See the *Water* section in *Chapter 3* for fifth-field watersheds in the plan area that currently have peak flows that exceed this threshold.

Aquatic Restoration

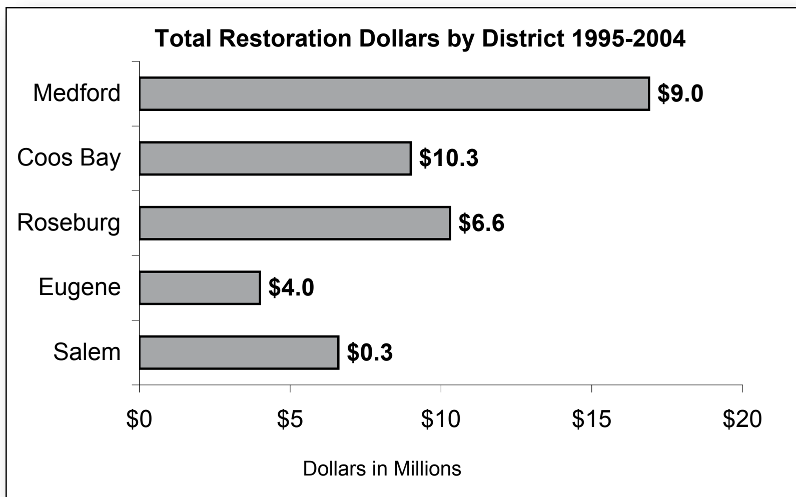
From 1995 to 2004, BLM spent 30.2 million dollars on restoration projects that affect fish habitat on BLM-administered lands in Western Oregon. See *Figure 3-117* (*Restoration funding in planning area 1995-2004*). The BLM has spent approximately 35% of this funding on road projects (mostly rock surfacing) and 49% on fish-passage barriers.

The BLM controls approximately 14,000 miles of roads in the planning area. Approximately 588 miles of BLM-controlled roads were decommissioned from 1995 to 2004. Although there are over 14,000 miles of roads on BLM-administered lands, most cannot be closed or decommissioned because of road right-of-way agreements. See *Figure 3-118* (*BLM road control as a proportion of all roads in two representative watersheds*). The checkerboard pattern of BLM ownership generates the need to cross public lands in order to provide access to intermingled private lands and reduces the ability of roads to be decommissioned on BLM-administered lands. *Figure 3-118* shows the amount of BLM road control as a proportion of all roads in two example watersheds.

As a result of these legal road right-of-way requirements and the amount of roads that have previously been decommissioned, opportunities on BLM-administered land to decommission roads has decreased over the last five years (2000-2005) as projects have been completed.

From 1995 to 2004, BLM replaced 380 fish-passage barriers on BLM-administered lands in the planning area that were fish-passage barriers for anadromous and/or listed fish. As a result, 465 miles of stream became accessible to adult and juvenile fish. See *Figure 3-119* (*Culvert replacements and miles of habitat opened by district, 1995-2004*).

Figure 3-117. Restoration Funding In Planning Area 1995-2004



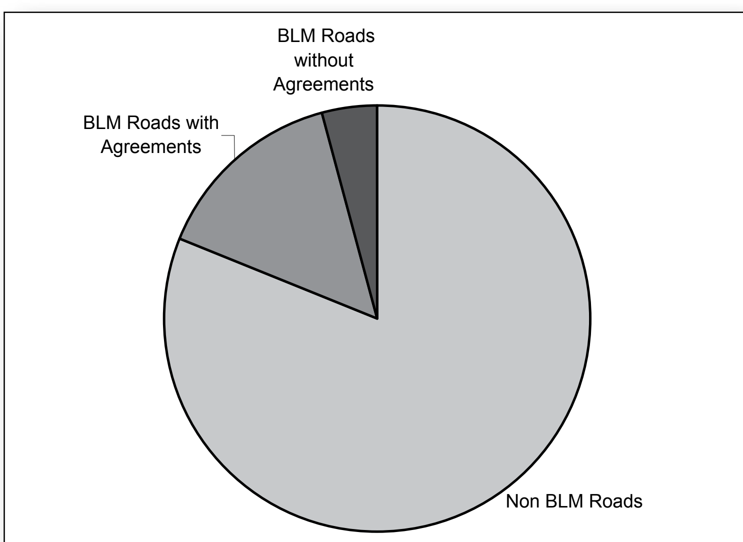


Figure 3-118. BLM Road Control As A Proportion Of All Roads In Two Representative Watersheds

Removing fish-passage barriers increases access for adults to reach spawning habitat and increases the ability for juveniles to move within the stream channel during winter high flows and to access cooler stream reaches during summer months. Although many fish-passage barriers on BLM-administered lands have been corrected, many barriers still exist on non BLM-administered lands. See *Map 3-8* (*Fish passage barriers in Oregon*). Therefore, working with watershed partnerships is critical in order to effectively improve fish passage in these watersheds.

From 1995 to 2004, the BLM implemented instream habitat projects on 110 miles of streams with anadromous and listed fish within the planning area to improve stream complexity. Opportunity for more instream habitat projects exists. See *Figure 3-120 (Miles of treated anadromous or listed fish streams by the BLM districts within the planning area 1995-2004)* for the total stream miles that have been treated by the BLM districts within the planning area and the percent treated of the total miles of anadromous or listed fish-bearing streams.

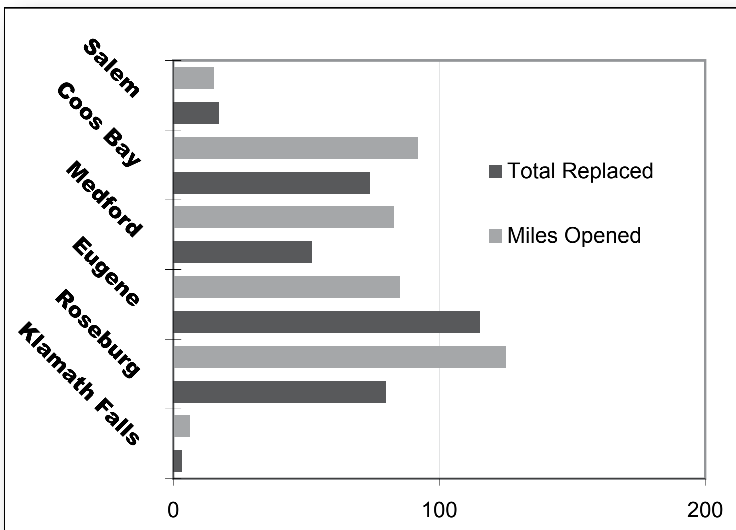
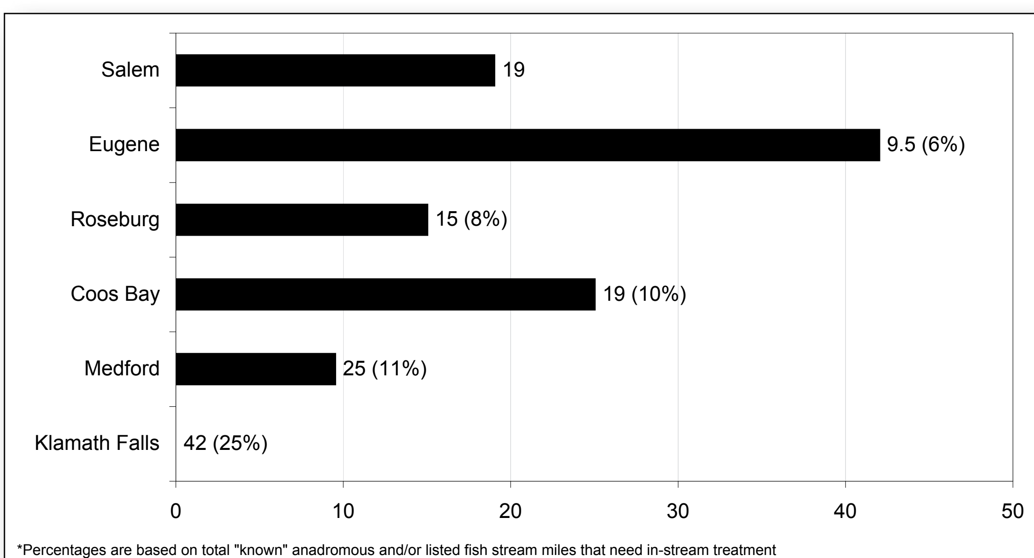
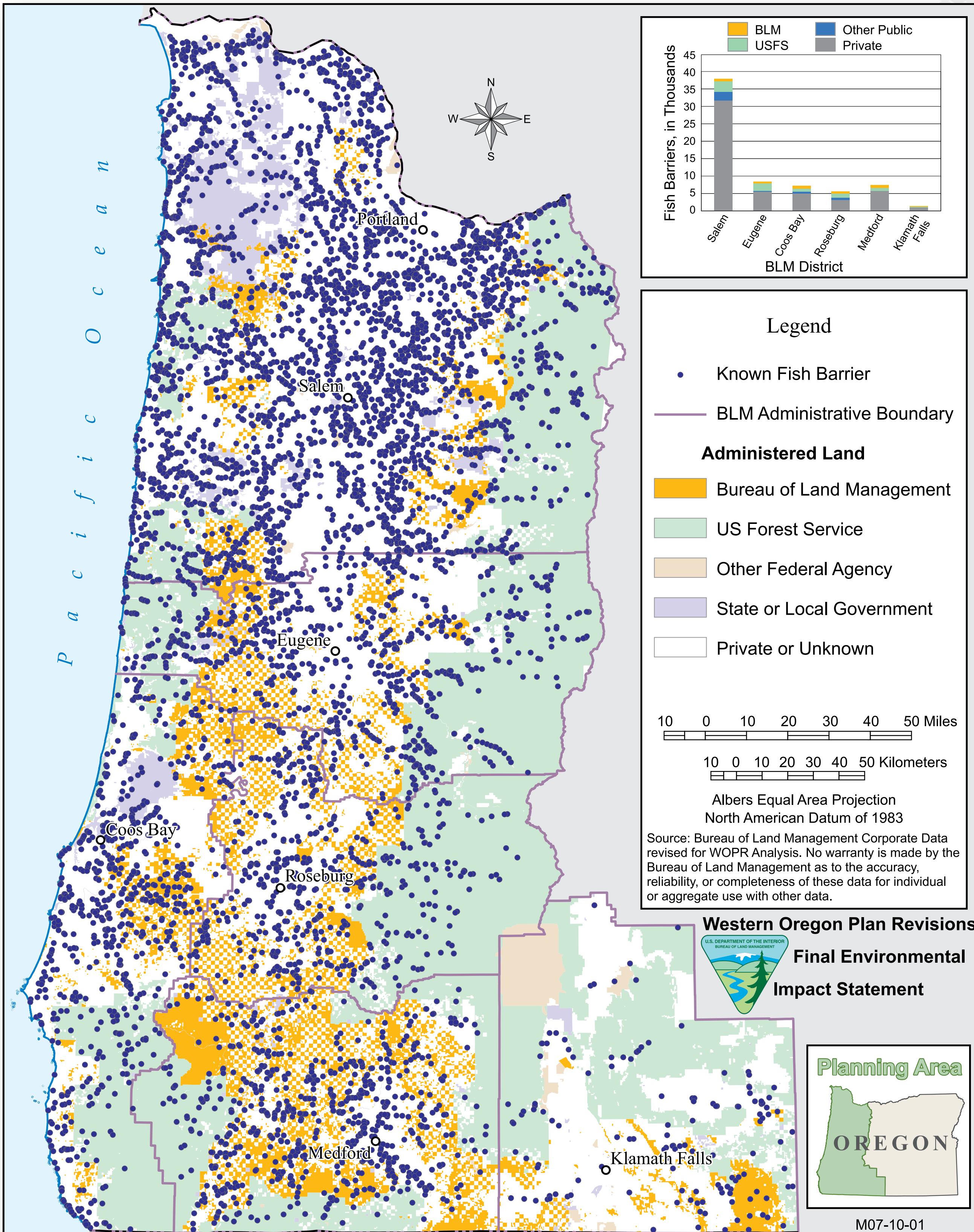


Figure 3-119. Culvert Replacements And Miles Of Habitat Opened By District, 1995-2004

Figure 3-120. Miles Of Treated Anadromous Or Listed Fish Streams By The BLM Districts Within The Planning Area 1995-2004



Map 3-8. Fish Passage Barriers In Oregon



Fire and Fuels

Key Points
• Fire, as a natural disturbance agent, differs in severity and frequency between the northern and southern BLM districts.
• Fire exclusion has increased the risk of high severity fires in the Medford District and Klamath Falls Resource Area.
• High-frequency, low severity fires historically created fire-resilient stands in the Medford District and Klamath Falls Resource Area. Fire exclusion and vegetative growth has reduced fire resiliency of current stands.
• Current vegetation in all districts shows a high percentage of departure from historical reference conditions across all fire regimes.

Fire Regimes

Fire is a natural disturbance agent that has played a major role in shaping the forests within the planning area. A natural fire regime is a general classification of how fire would behave in the absence of human intervention.

This analysis uses LANDFIRE data (current as of 1/30/2008) to describe fire regimes and fire regime condition class at a stand-level scale for all ownerships within the planning area. LANDFIRE, also known as the Landscape Fire and Resource Management Planning Tools Project, is a shared project between the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior. The LANDFIRE project produces consistent and comprehensive maps and data that describe vegetation, wildland fuel, and fire regimes across the United States. LANDFIRE data products include layers of vegetation composition and structure, surface and canopy fuel characteristics, and historical fire regimes. LANDFIRE data products are designed to facilitate national- and regional-level strategic planning and reporting of wildland fire management activities. Additional information about LANDFIRE can be found at the LANDFIRE website (http://www.landfire.gov/index.php)

For a description of the five fire regime groups, as defined by LANDFIRE, and also the frequencies and severities of natural fire by fire regime group, see *Table 3-66 (Frequencies and severities of the natural fire regimes)*. Group I includes ponderosa pine, other long-needle pine species, and dry-site Douglas fir. Group II includes the drier grassland types, tall grass prairie, and some chaparral ecosystems. Group V is the long-interval (infrequent), stand-replacement fire regime.

The first two fire regime groups (Groups I and II) occupy nearly all of the lower elevation zones across the United States. These two groups have been most affected by the presence of human intervention, and

Table 3-66. Frequencies And Severities Of The Natural Fire Regimes

The Five Historic Natural Fire Regime Groups		
Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0 to 35 years	low severity
II	0 to 35 years	stand replacement severity
III	35 to 100+ years	mixed severity
IV	35 to 100+ years	stand replacement severity
V	>200 years	stand replacement severity

analysis shows that these types demonstrate the most significant departure from historical levels. The departures are affected largely by housing development, agriculture, grazing, and logging. These areas are at greatest risk to loss of highly valued resources, commodity interests, and human health and safety. It is expected that these areas will receive primary focus of wildland management agencies in the future. (http://www.nifc.gov/preved/comm_guide/wildfire/fire_5.html)

Figure 3-121 shows fire regimes by BLM district within the planning area.

The Salem, Eugene, and Coos Bay Districts have high components of fire regime V. The Roseburg District is primarily fire regime III with mesic conditions. Klamath Falls is primarily fire regime III with xeric conditions. Because LANDFIRE does not distinguish between different conditions within a fire regime, Klamath Falls and Roseburg both contain large portions of fire regime III although they have dissimilar plant communities. Medford is primarily fire regime I. The Medford District and the Klamath Falls Resource Area have had less severe, but more frequent, fire regimes than the northern districts. These frequent low-severity fire events have historically contributed to the fire resiliency of the forests of southern Oregon by removing understory vegetation, reducing ground and surface fuels, and reducing tree density.

Fire Regime Condition Class

The fire regime condition class is a measure of departure of current vegetation from the historic fire regime, as determined by the number of missed fire return intervals with respect to: (1) the historic fire return interval, and (2) the current structure and composition of the system resulting from alterations to the disturbance regime. The departures may result in changes to key ecosystem components, such as vegetation characteristics (species composition, structural stage, stand age, canopy closure and mosaic pattern.); fuel composition; fire frequency, severity, and pattern; and other associated disturbances such as drought, grazing, and mortalities from insect and disease infestations.

Possible causes of departure include but are not limited to: fire suppression, timber harvesting, livestock grazing, introduction and establishment of non-native vegetative species, and introduced insects and disease. Additional information about fire regime condition class can be found on the LANDFIRE website (http://www.landfire.gov/NationalProductDescriptions10.php).

There are three levels of departure under the Fire Regime Condition Class System (FRCC) that describe departure from the central tendency of reference conditions:

- FRCC 1 has little or no departure.
- FRCC 2 has moderate departure.
- FRCC 3 has high departure.

This central tendency is a composite estimate of reference characteristics which include: fuel composition, fire frequency, fire severity and pattern; and other associated natural disturbances. To determine departure and assign fire regime condition class, LANDFIRE identifies reference condition characteristics for each biophysical setting. Descriptions of LANDFIRE biophysical settings can be found at LANDFIRE National Vegetation Dynamics Models website (http://www.landfire.gov/national_veg_models_op1.php)

See *Figures 3-122 through 3-127* for fire regime condition class acres by BLM district within the planning area.

All districts show a high percentage of Fire Regime Condition Class 3 across all fire regimes, with few exceptions. *Figures 3-122 through 3-127* show departure from reference conditions by district across all ownerships within the district boundaries.

Figure 3-121. Fire Regimes By BLM District Within The Planning Area.

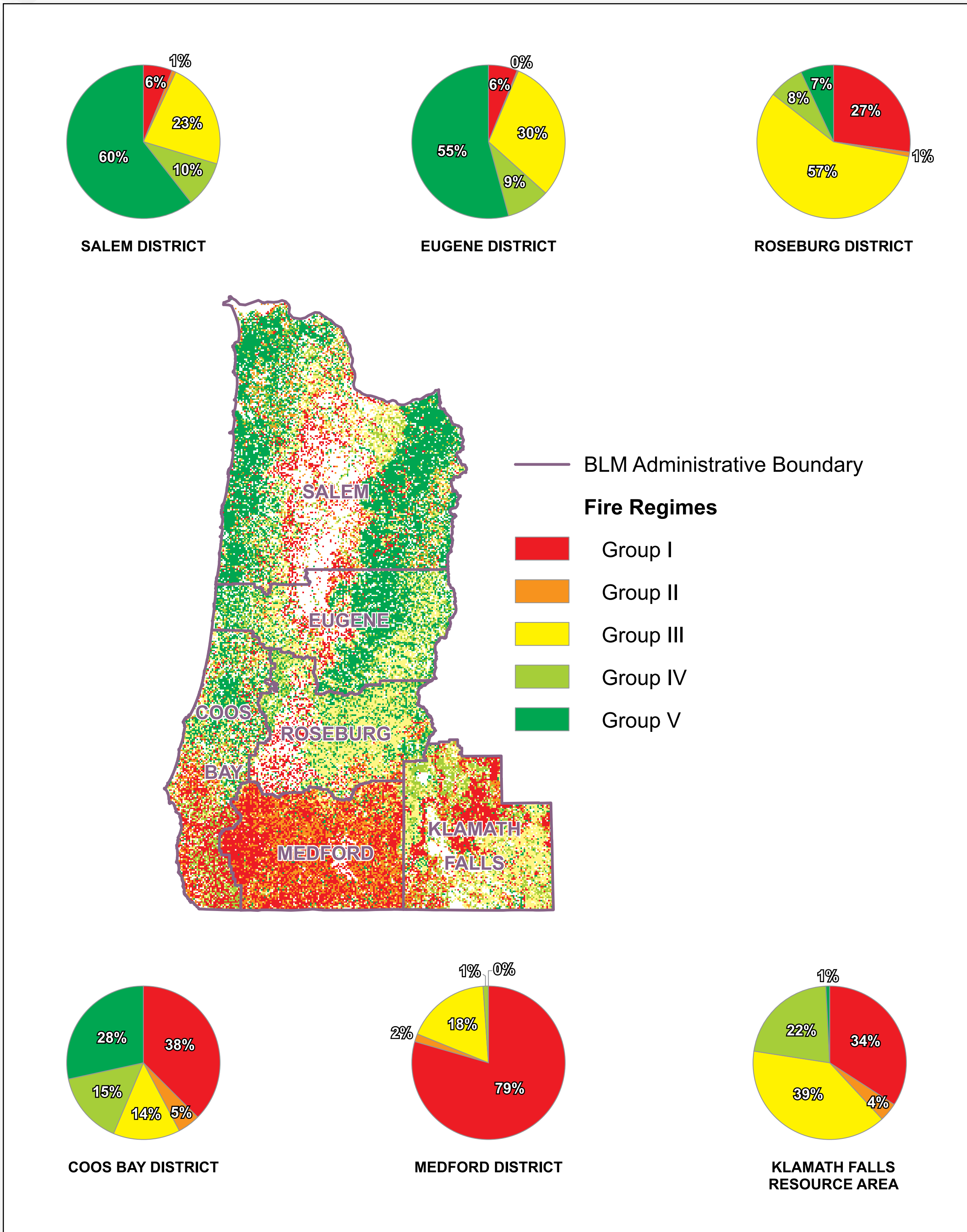


Figure 3-122. Fire Regime Condition Class Acres By Fire Regime, Salem District

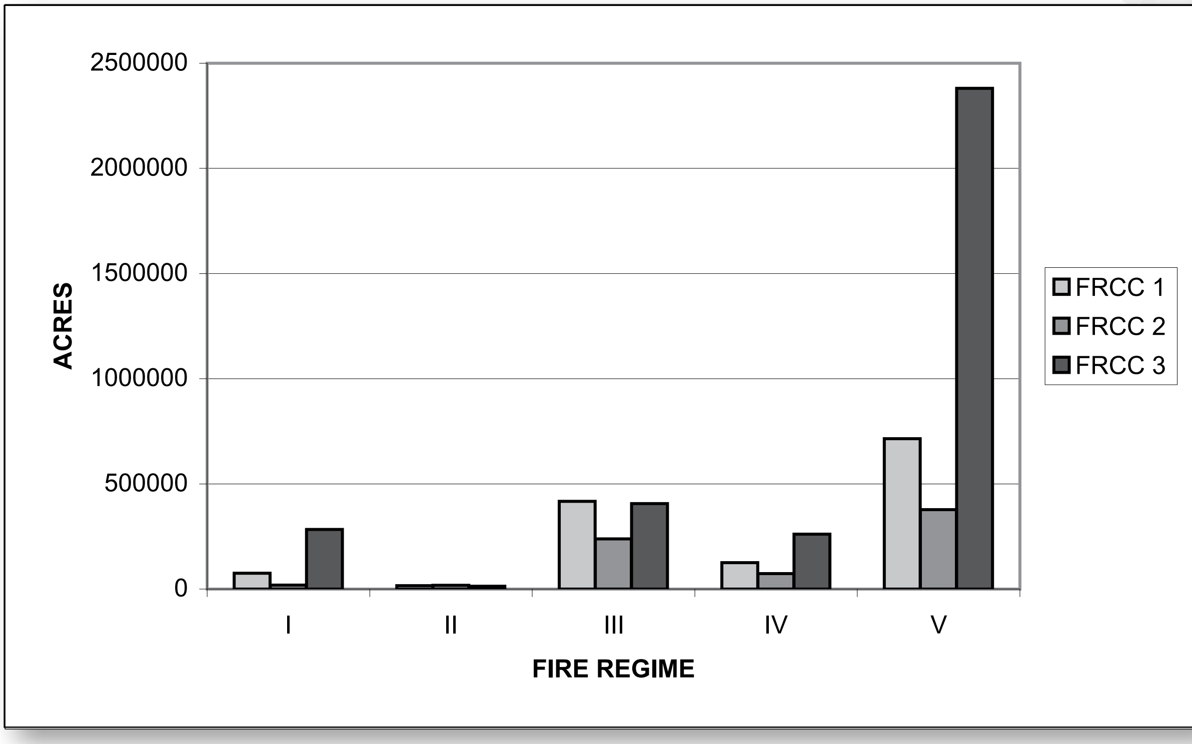


Figure 3-123. Fire Regime Condition Class Acres By Fire Regime, Eugene District

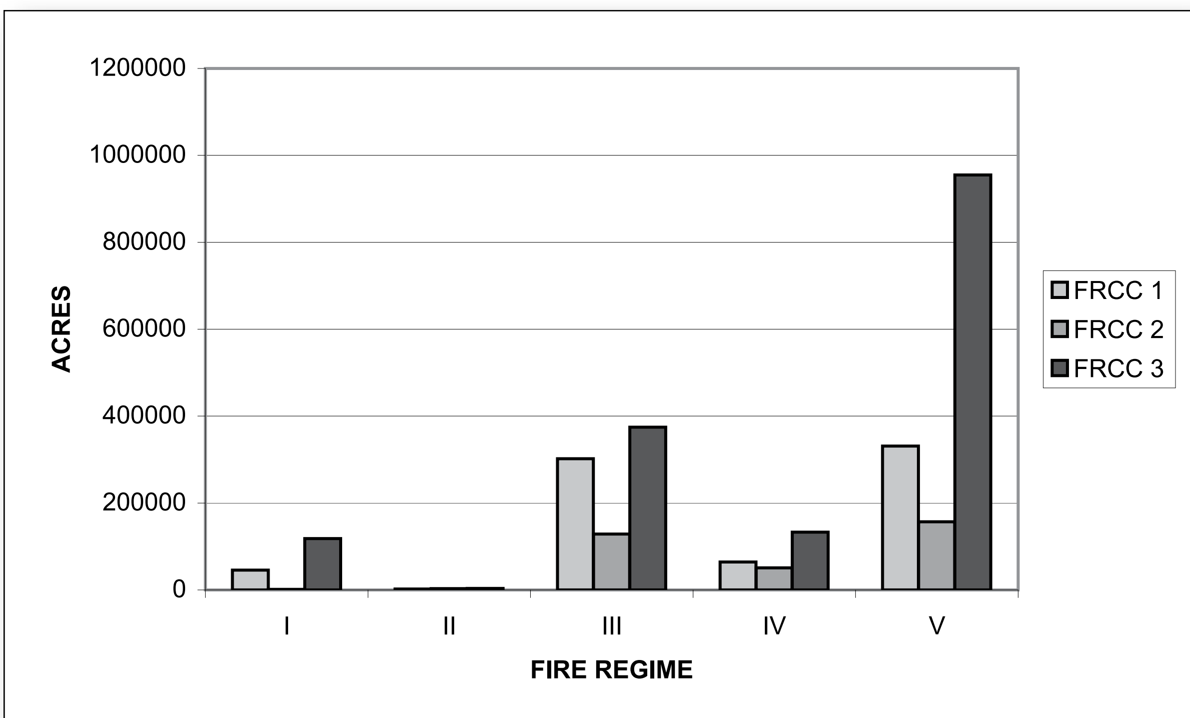


Figure 3-124. Fire Regime Condition Class Acres By Fire Regime, Coos Bay District

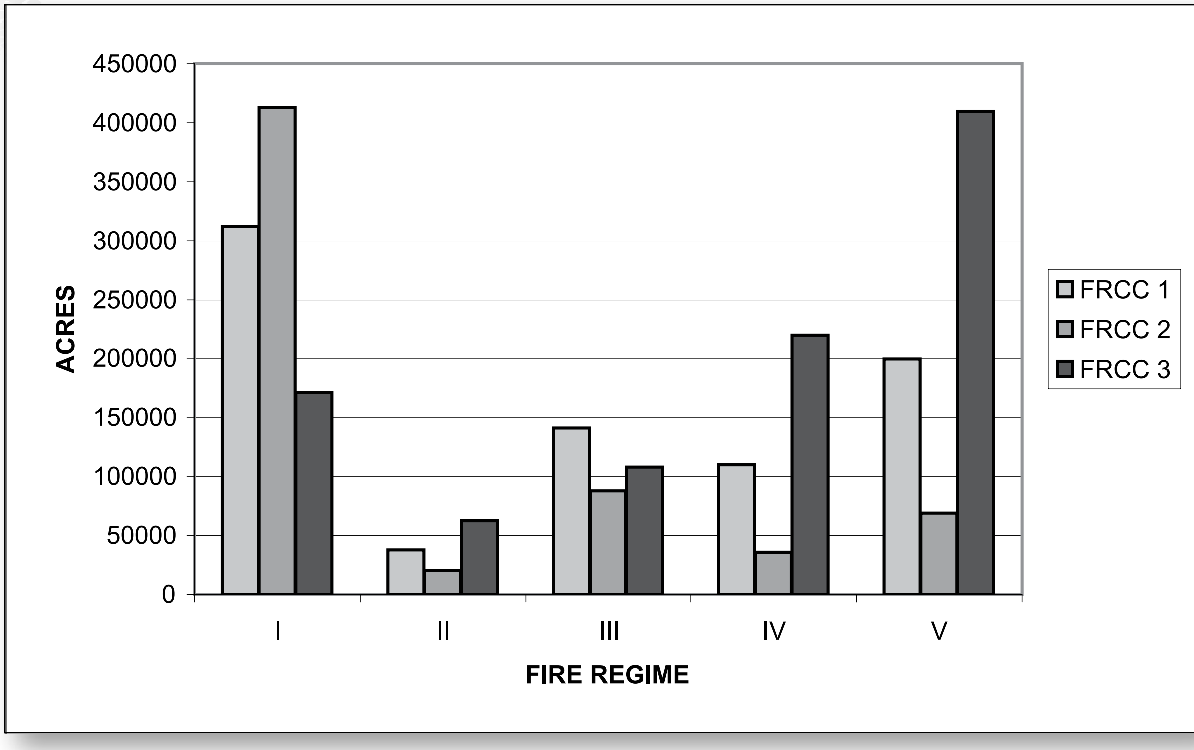


Figure 3-125. Fire Regime Condition Class Acres By Fire Regime, Roseburg District

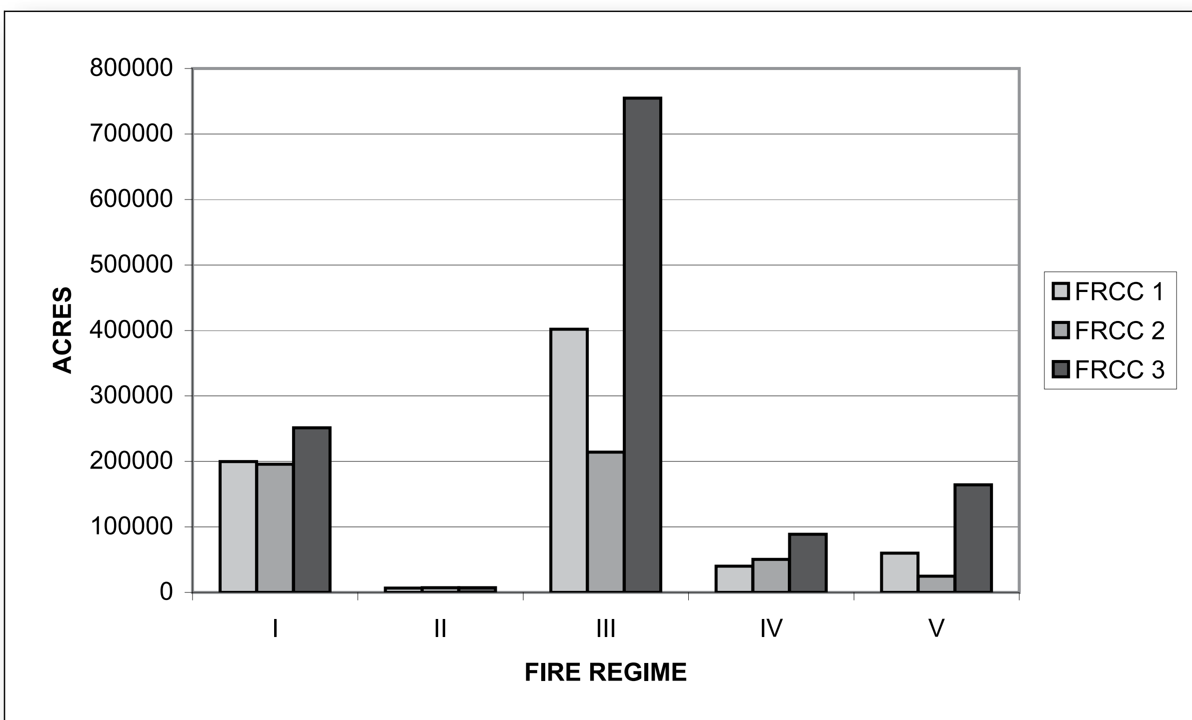


Figure 3-126. Fire Regime Condition Class Acres By Fire Regime, Medford District

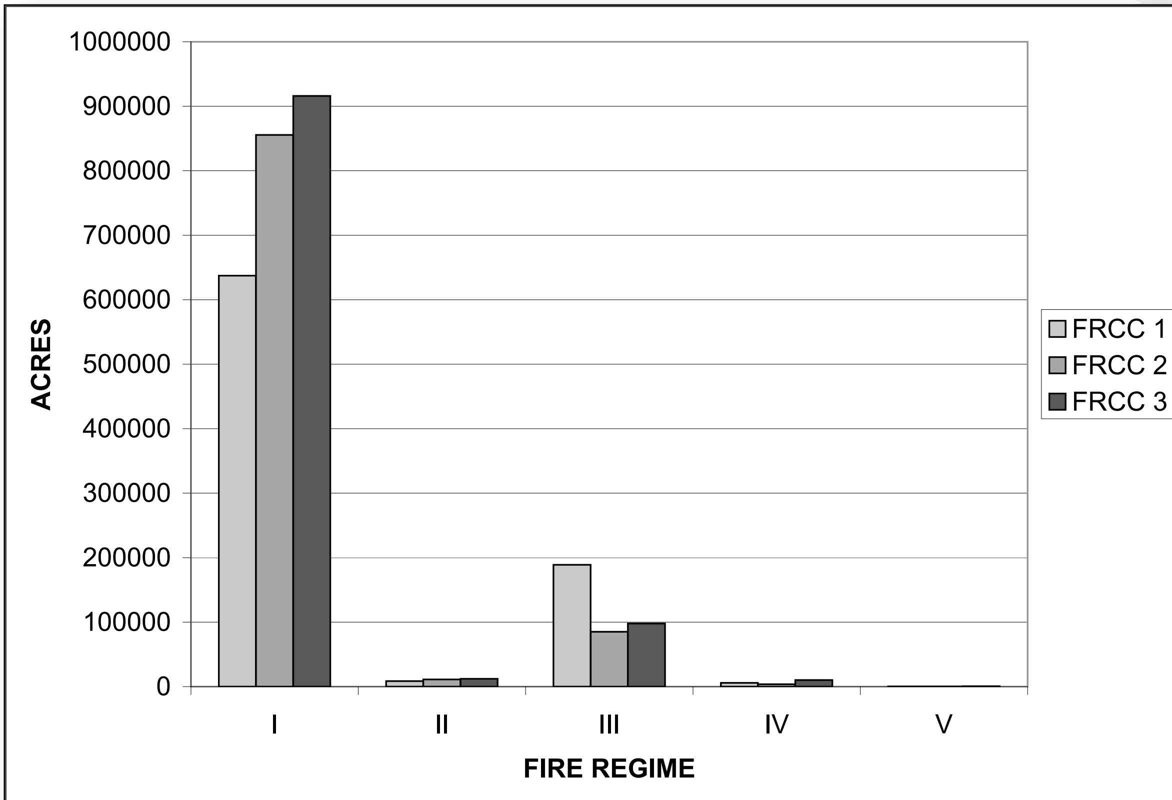
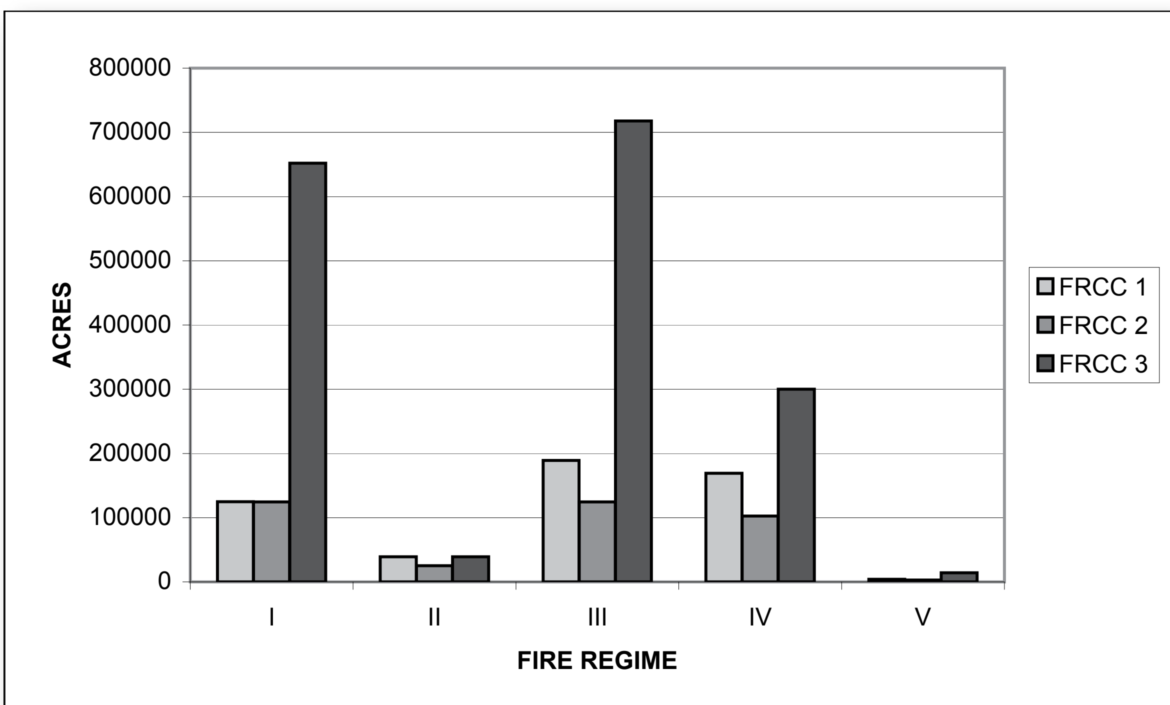


Figure 3-127. Fire Regime Condition Class Acres By Fire Regime, Klamath Falls Resource Area Of The Lakeview District



There appears to be an emerging trend toward higher severity fires in the southern portion of the planning area (USDA USFS and USDI BLM 2004d). In the dry Douglas fir forests of southern Oregon, forests that currently would burn at a high severity level compose 50% of the landscape compared to 20% historically. This increased fire potential is a result of fire exclusion and harvesting practices that have fundamentally changed current fuel conditions from historic fuel conditions (Peterson et al. 2005). These changes from historic fuel conditions include:

- an increase in shade-tolerant species (such as true firs), which are less fire resistant. Frequent, low-intensity fires control the establishment of fire-intolerant species, which are more susceptible to mortality from bowl scorch and have increased the risk of crown fires due to lower canopy base heights.)
- a lower height to live crown ratio of shade-tolerant species, which increases ladder fuels.
- increased tree stocking levels. Frequent, low-intensity fires maintained a higher proportion of low-density stands. Surface fuels accumulate over time as smaller trees crowd out and die.
- a decrease in canopy base height. Frequent, low-intensity fires pruned the lower limbs of the trees that survived and reduced the threat of crown fires.
- an increase in ground fuels as duff and large woody material accumulate and decompose. This build-up of ground fuels is a long-term process that occurs over decades. These fuels do not influence the rate at which fires spread, but do contribute heavily to fire severity.

Ground fuels that consume large amounts of woody fuels and organic soil horizons produce disproportionately large amounts of smoke compared to fires generated from other types of fuels. Ground fires reduce the accumulation of organic material and carbon storage, and contribute to smoke production long after the flaming front of a fire has passed (Graham et al. 2004). Under drought conditions, these fires also damage and kill large trees by killing or damaging their roots and lower stem cambium (Graham et al. 2004). The long duration of ground fires may result in greater soil heating than surface and crown fires, which could potentially reduce organic material, volatize nutrients, and create a hydrophobic layer that contributes to soil erosion (Graham et al. 2004). Crown fires have the largest immediate and long-term ecological effects and the greatest potential to threaten wildland urban interfaces (Graham et al. 2004).

The following management practices have increased the potential for uncharacteristic wildfires:

- Fire exclusion has created thickets of ladder fuels and increased fuel loadings (USDA USFS 2005).
- A lack of thinning and slash treatments has created higher density stands, understory vegetation, and fuels that favor large, high-severity fires (USDA USFS 2005).
- Harvesting practices have removed the more fire-resilient larger trees (Brown et al. 2004a, Peterson et al. 2005, Noss et al. 2006).
- Excluding areas (such as reserved areas) from the practices of thinning, prescribed burns, or fuel reduction activities makes them susceptible to wildfires of uncharacteristically high intensity and severity. This exclusion also makes them less fire resilient. The more frequent the fire regime, the more pronounced the effect of exclusion (Brown et al. 2004a, USDA USFS 2005).

Most of the northern area is characterized by a low fire return interval with high severity fires. However, under current fuel conditions, fires in the northern portion of the planning area are typically small and scattered. In the northern portion of the planning area, fire exclusion is not a significant factor in future fire severity as it is in the south. Additionally, weather conditions that are conducive to large fires and multiple ignitions are rarer in the northern portion than in the southern portion of the planning area. Historically, lightning has been the primary cause of large wildfire ignitions within the southern portion of the planning area. The area in western Oregon south of the Rogue-Umpqua divide generally has more severe and frequent thunderstorms with little precipitation. Storms tend to track up the crest and east side of the Cascade Range (Agee 1996).

Weather factors that influence fire behavior are temperature, relative humidity, and wind speed. On a 10-year average, extreme fire weather conditions (based on the Burning Index [see glossary]) occur:

- 37 days a year in coastal areas
- 51 days in the Willamette Valley and the Central Cascades
- 69 days in Roseburg, Medford and Klamath Falls (ODF Hazard and Risk Assessment 2005)

Fire Resiliency

In the southern portion of the planning area, high-frequency, low severity fires historically created more open forest stands with light surface and ladder fuels. These fuels presented low to moderate probabilities of crown and stand replacement type fires. The type of fire activity created fire-resilient stands. However, fire exclusion and harvesting practices have reduced fire resiliency (USDA USFS 2005).

Fire-resilient stands have the following characteristics:

- reduced surface fuel loading (Cram et al. 2006, Brown et al. 2004a, Peterson et al. 2005)
- lower density and basal area (Cram et al. 2006, Brown et al. 2004a)
- large-diameter trees of fire-resistant species (Brown et al. 2004a, Cram et al. 2006, Noss et al. 2006)
- increased height to live crown (Brown et al. 2004a, Peterson et al. 2005).

Fire resilient forest

A forest having characteristics that limit fire severity and increase the resistance of the forest to mortality (Brown et al. 2004a).

Legacy trees (large trees remaining from a previous stand) increase fire resiliency within a forest. Currently, 27% of the stand establishment and young stands in the Medford District contain legacy trees, and 19% of the stand establishment and young stands in the Klamath Falls Resource Area contain legacy trees.

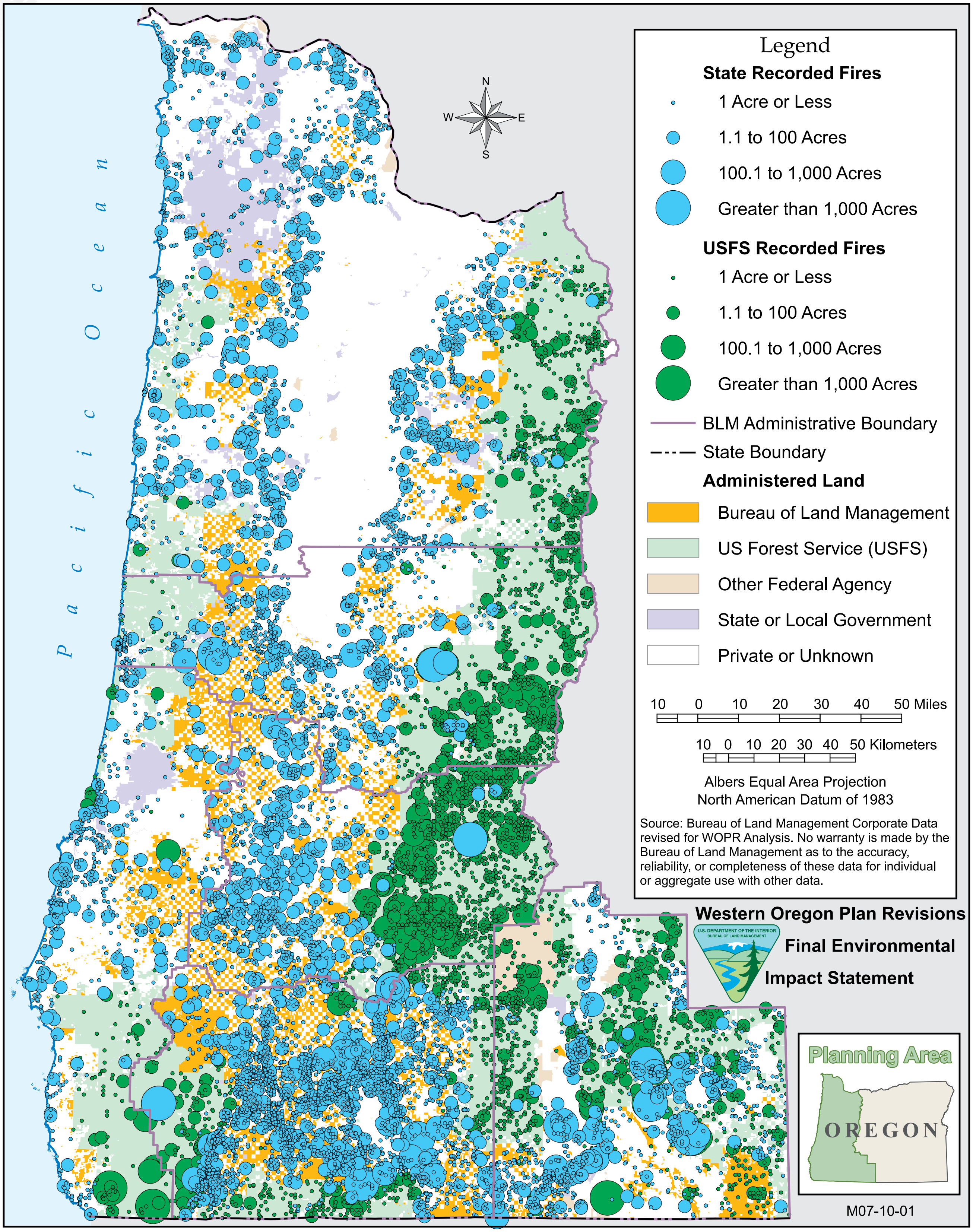
The Klamath Province and the southern portion of the West Cascades Province (which includes Medford and Klamath Falls have a greater abundance of fires than the northern portion of the planning area. There are more large fires in those provinces than in the northern portion of the planning area. See *Map 3-9 (Incidence of forest fires within the planning area between 1994 and 2004).*

Fire Hazard

The complexities and difficulties of fire management are increased by the checkerboard land ownership pattern of the BLM-administered lands within the planning area. The BLM-administered lands are interspersed with a variety of other lands (including intensively managed private, industrial forests and residential areas where residents may not want active forest management). Although the goal of rapid fire suppression may be common to all landowners, it is often difficult to treat fuel loadings in mixed ownership situations. This situation of mixed land ownership often reduces the effectiveness of fuels treatments. Treatment of broader landscape patterns may improve the effectiveness of fuel treatments. (USDA USFS 2005)

The wildland urban interface encompasses a large portion of BLM-administered lands within the planning area. The wildland urban interface is an area where structures and other human development meet or intermingle with undeveloped wildland. Under the National Fire Plan (available online at http://www.forestsandrangelands.gov), the wildland urban interface is being refined under Community Wildfire Protection Plans (CWPP). An increasing population in the wildland urban interface is increasing the incidences of human-caused fires. Currently in southwest Oregon, the primary source of ignitions is shifting from lightning to human-caused fires (Thorpe, pers. comm. 2007).

Map 3-9. Incidence Of Forest Fires Within The Planning Area Between 1994 And 2004



Fire hazard ratings consider slope, aspect, climate, elevation, fuel type, and crown fire characteristics. A fire hazard and risk assessment was completed in 2006 by the Oregon Department of Forestry. See *Figure 3-128 (Ratings of fire hazards within the planning area).*

As detailed below, fire hazard ratings are generally lower in the northern portion of the planning area and higher in the southern portion of the planning area:

- About 92% of the lands in the northern districts (Salem, Eugene, and Coos Bay) have a moderate fire hazard rating.
- The Roseburg District and Klamath Falls Resource Area have roughly equal amounts of moderate hazard acres (56%). Both locations have a high percentage of Fire Regime III lands that are also Fire Regime Condition Class 3, even though vegetation and climate are very different. However, a large portion of the Klamath Resource Area has relatively low slope gradients, which contributes to a reduced fire hazard rating.
- About 48% of the lands in the Medford District have a high fire hazard rating, and 25% falls into the very high hazard category.

See *Table 3-67 (Current fire hazard ratings by percent of land within the districts of the planning area*) and *Figure 3-129 (Current fire hazard ratings by percent of land within the Salem District*) through *Figure 3-135 (Current fire hazard ratings by percent of land within the Klamath Falls Resource Area of the Lakeview District)* for an illustration of these trends across the districts within the planning area.

Figure 3-128. Ratings Of Fire Hazards Within The Planning Area

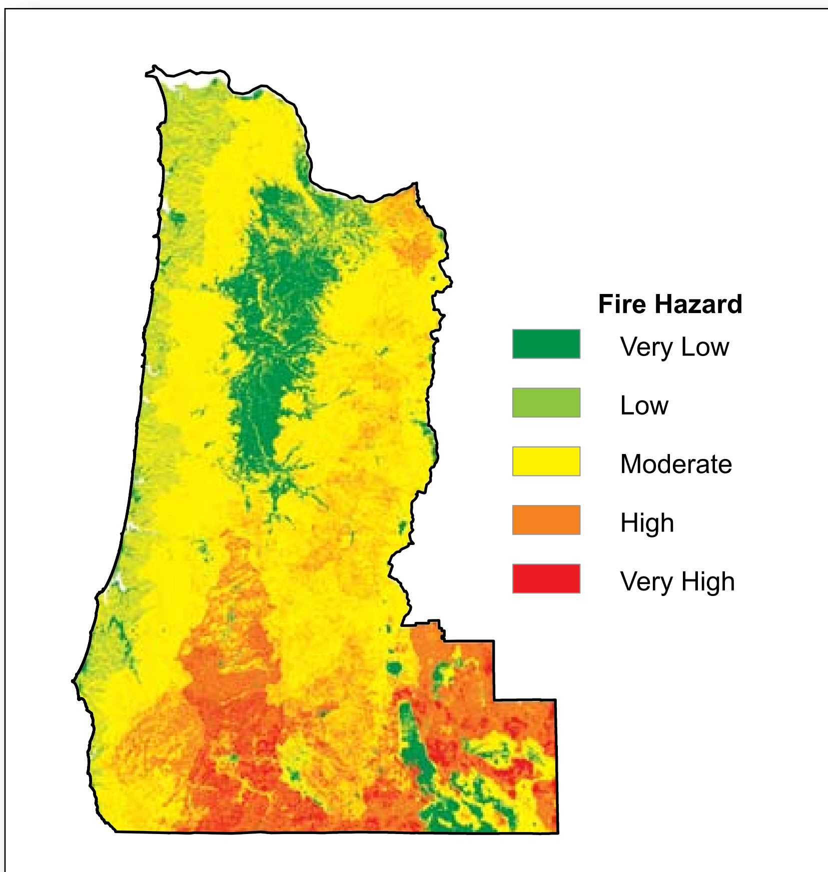


Table 3-67. Current Fire Hazard Ratings By Percent Of Land Within The Districts Of The Planning Area

BLM Districts	Fire Hazard Ratings (by % of land)			
	Very Low/Low	Moderate	High	Very High
Salem	2.4	92.9	4.6	0.1
Eugene	0.9	91.5	7.4	0.1
Roseburg	0.1	55.6	35.4	8.8
Coos Bay	5.8	91.0	3.1	0.1
Medford (northern portion)	0.2	35.9	47.1	16.9
Medford (southern portion)	0.2	18.6	48.6	32.6
Klamath Falls Resource Area (Lakeview District)	2.0	73.0	13.0	12.0

Figure 3-129. Current Fire Hazard Ratings By Percent Of Land Within The Salem District

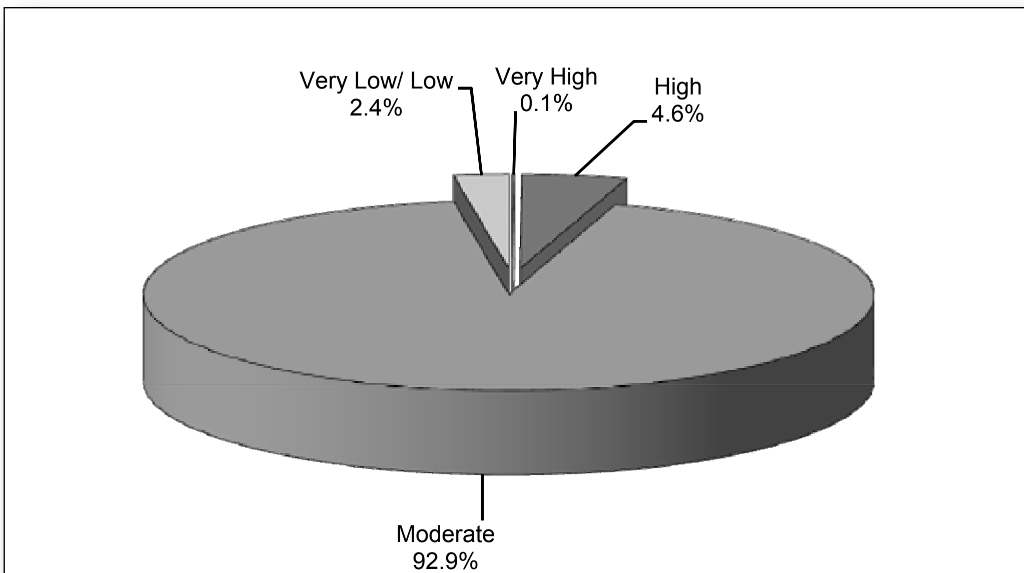


Figure 3-130. Current Fire Hazard Ratings By Percent Of Land Within The Eugene District

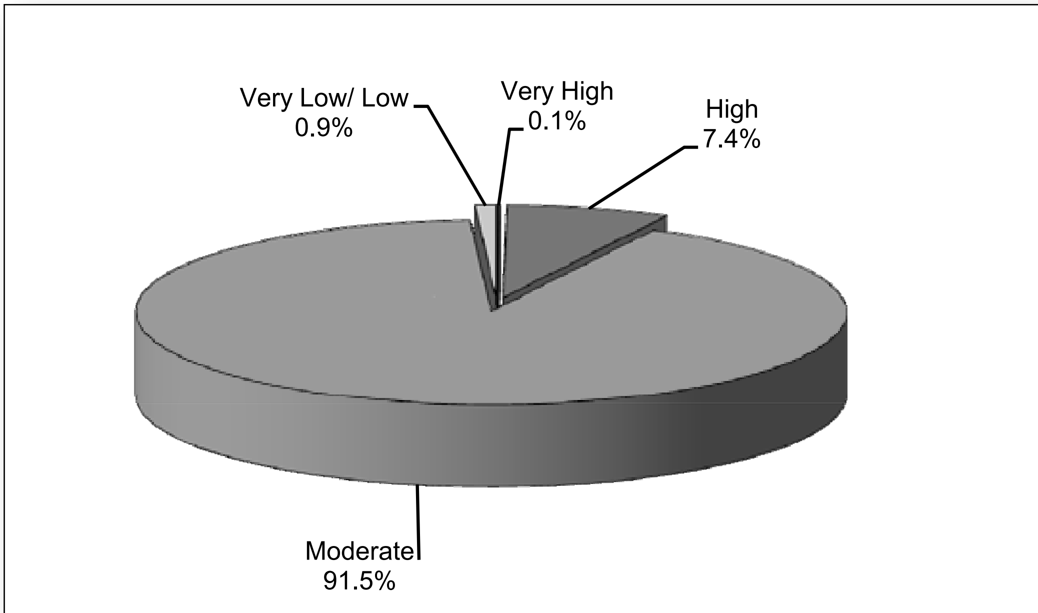


Figure 3-131. Current Fire Hazard Ratings By Percent Of Land Within The Roseburg District

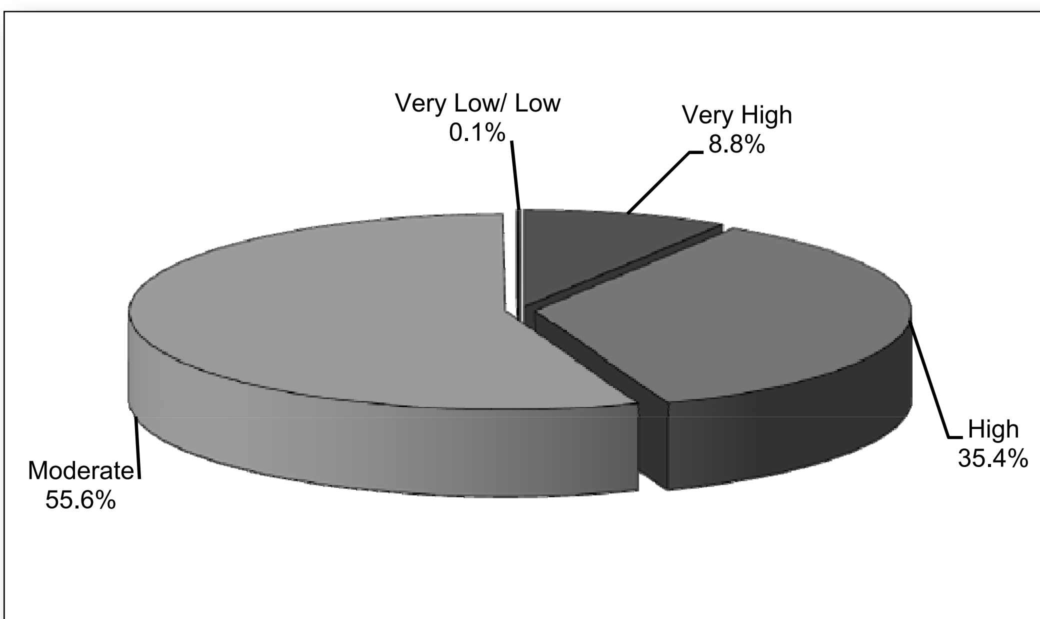


Figure 3-132. Current Fire Hazard Ratings By Percent Of Land Within The Coos Bay District

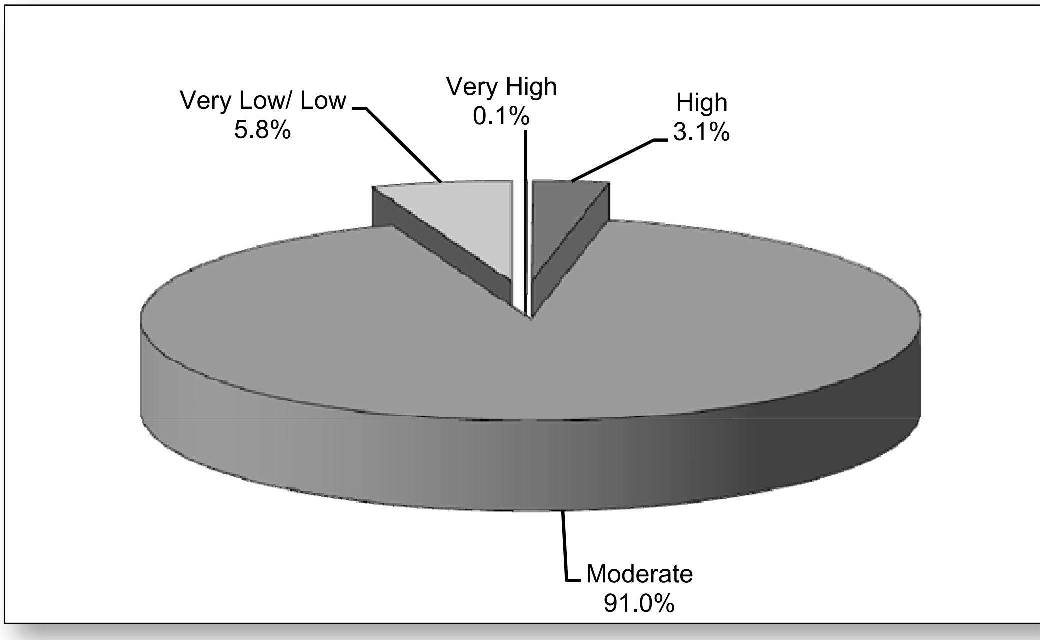


Figure 3-133. Current Fire Hazard Ratings By Percent Of Land Within The Northern Portion Of The Medford District

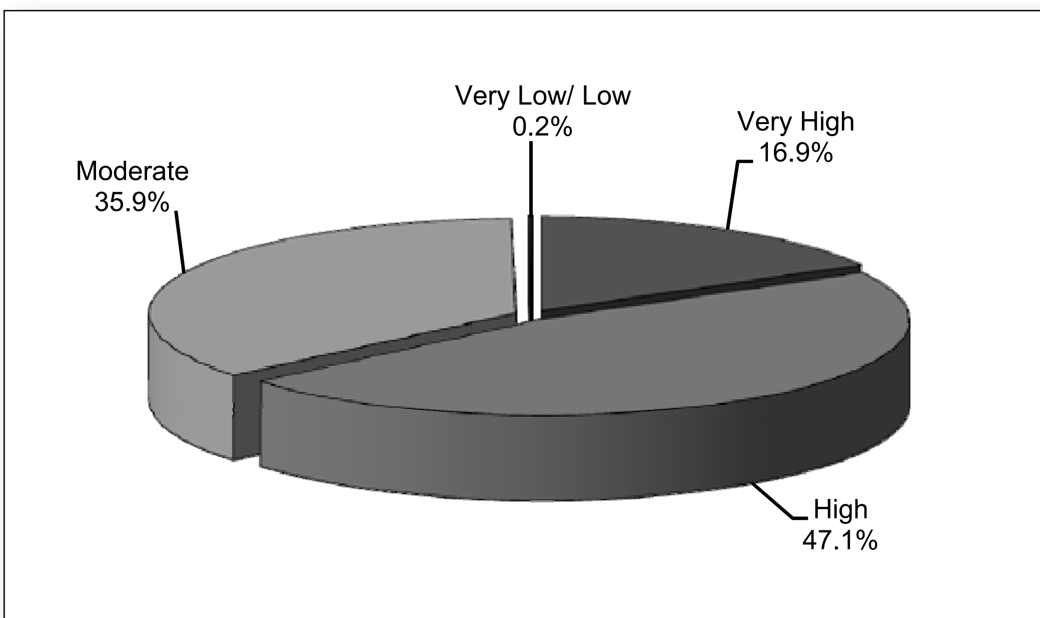


Figure 3-134. Current Fire Hazard Ratings By Percent Of Land Within The Southern Portion Of The Medford District

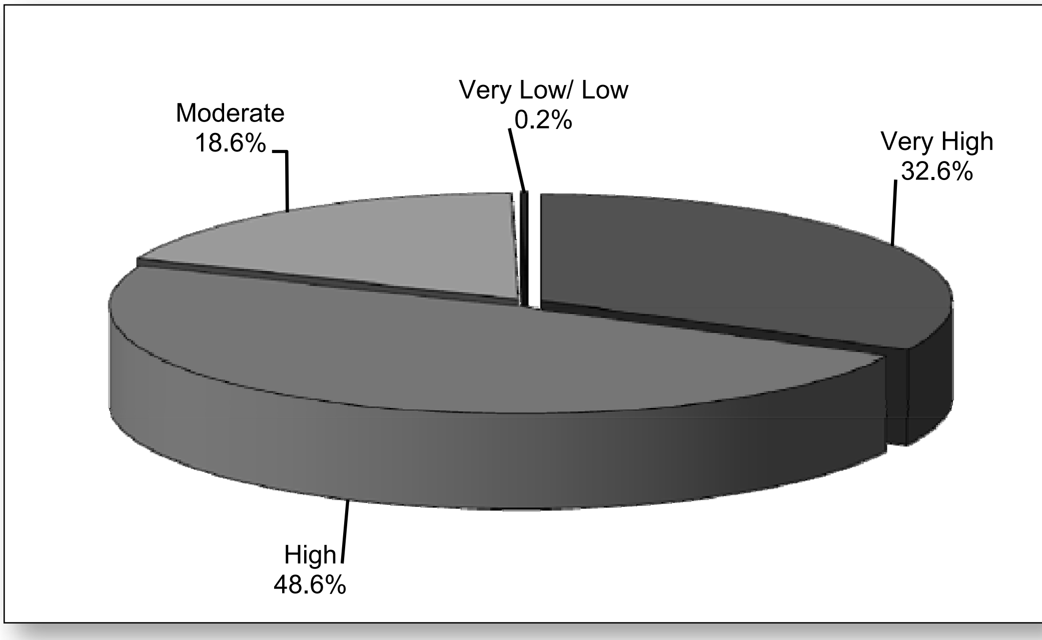
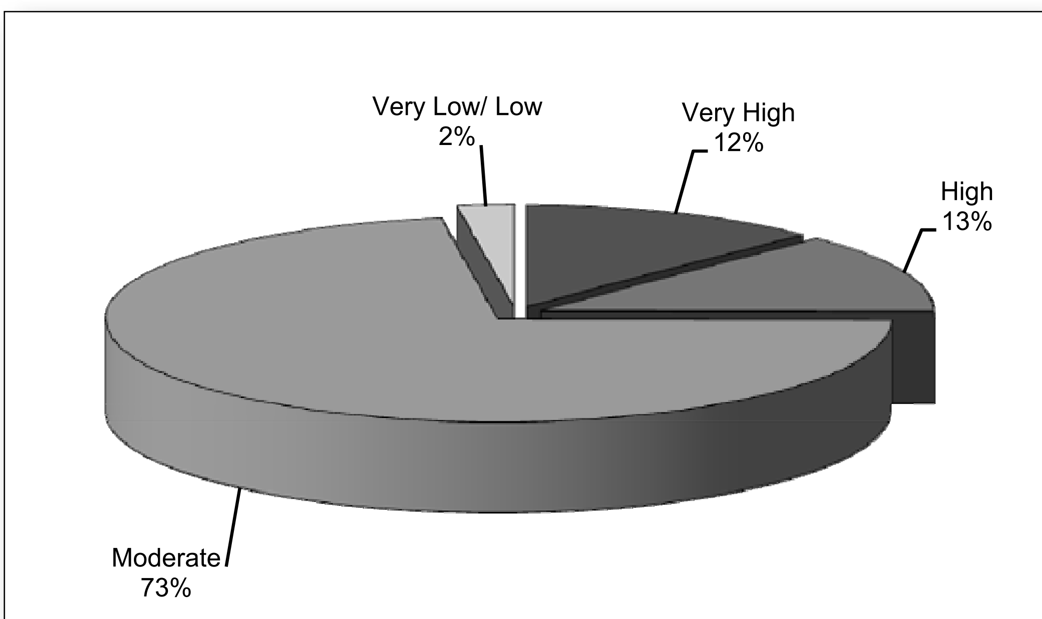


Figure 3-135. Current Fire Hazard Ratings By Percent Of Land Within The Klamath Falls Resource Area Of The Lakeview District



Air

Key Points

- Wildfires contribute large amounts of air pollution to episodic events that often exceed air quality standards over vast areas.
- Prescribed burns contribute negligible amounts of air pollution in smaller, controlled events that exceed air quality standards over smaller, controlled areas.

The standards for air quality are set by the Environmental Protection Agency under the authority of the federal Clean Air Act. There are two primary concerns regarding air quality—health standards and visibility.

Inversion

A layer of warm air that prevents the rise of cool air and traps pollutants beneath it.

Western Oregon has a history of air quality issues due to weather patterns and topography. Weather patterns are dominated in western Oregon by the Pacific high pressure system. This weather pattern creates inversions during the summer and late-winter months that cause air stagnation by trapping pollutants at the lower elevations for extended periods of time. Topography compounds this issue by forming topographic bowls with the valleys in western Oregon and Klamath County. These topographic bowls create the need for moderately intense storms to move the inversions and to mix the air layers. Most prescribed burning is conducted in the spring and fall when the atmosphere is generally unstable, allowing air to mix and pollutants to be transported offsite. All prescribed burning in western Oregon is conducted under the Oregon Smoke Management Plan. This plan requires dispersion, dilution, and avoidance techniques to minimize smoke impacts on local communities and to direct smoke away from Smoke Sensitive Receptor Areas.

> A **Smoke Sensitive Receptor Area** is an area that receives the highest level of protection under the smoke management plan because of its past history of smoke intrusions, incidents, density of population, or other legal status related to visibility such as the Columbia Gorge Scenic Area.
>
> **Class I visibility areas** are areas that have very clean air and are subject to the tightest restrictions on how much additional pollution can be added to their airshed.

The following areas within the planning area have been designated as Smoke Sensitive Receptor Areas, per Oregon Administrative Rules (OAR), accessed March 2008 and available for review at website http://arcweb.sos.state.or.us/rules/OARS_600/OAR_629/629_048.html:

- Carlton, Corvallis, Cottage Grove, Eugene, McMinnville, Portland, Sheridan, Silverton, Springfield, St. Helens, Stayton, Sublimity, Veneta, Willamina, and Yamhill.
- Within the acknowledged urban growth boundaries of the following cities: Astoria, Coos Bay, Grants Pass, Klamath Falls, Lakeview, Lincoln City, Newport, North Bend, Oakridge, Roseburg, The Dalles, and Tillamook.
- The area within the Bear Creek and Rogue River Valleys described in OAR 629-048-0160, including the cities of Ashland, Central Point, Eagle Point, Jacksonville, Medford, Phoenix, and Talent.
- The area within the Columbia River Gorge Scenic Area, as described in 16 U.S.C. Section 544b, (2003).

In Class I visibility areas, the primary concern is protection of visibility. These areas are protected under the Oregon State Implementation Plan, which governs regional haze. The following sites in western Oregon and

Klamath County are designated as Class I visibility areas:

- Mount Hood Wilderness
- Mt. Jefferson Wilderness
- Mt. Washington Wilderness
- Three Sisters Wilderness
- Diamond Peak Wilderness
- Crater Lake National Park
- Kalmiopsis Wilderness
- Mountain Lakes Wilderness
- Gearhart Mountain Wilderness

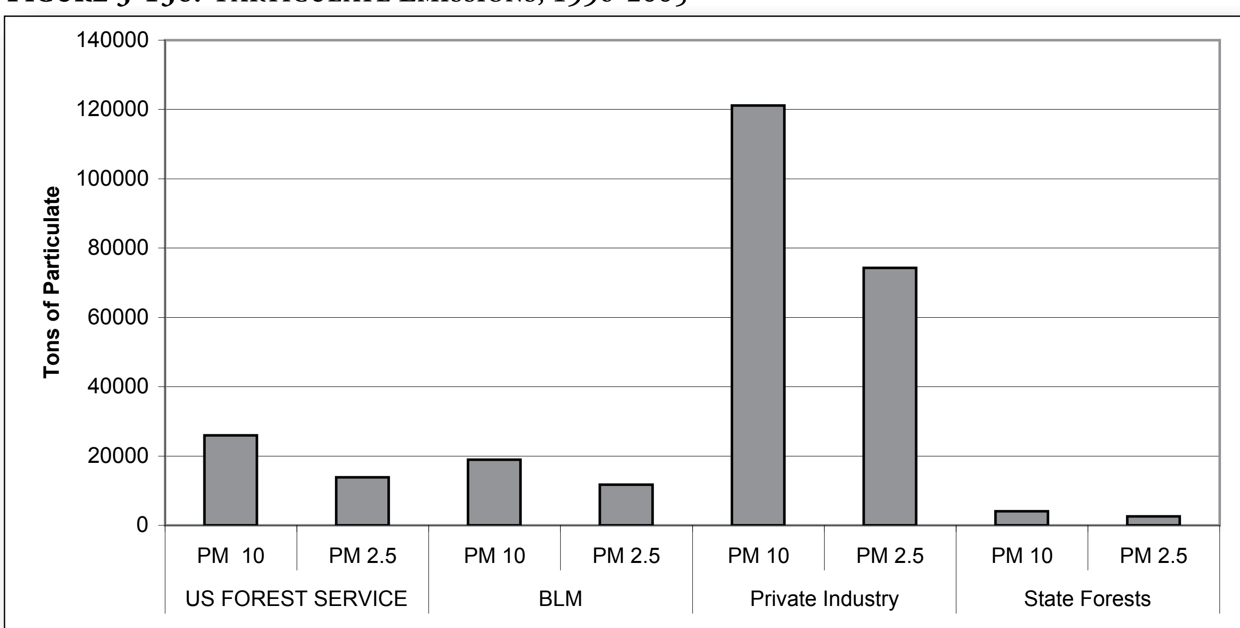
See *Map 3-10 (Smoke sensitive receptor areas and class I visibility areas within the planning area).*

Particulate matter (PM) is measured by two diameter classes: 10 micron (PM10) and 2.5 microns (PM2.5). *Figure 3-136 (Particulate emissions, 1996-2005)* shows particulate emissions by landowner.

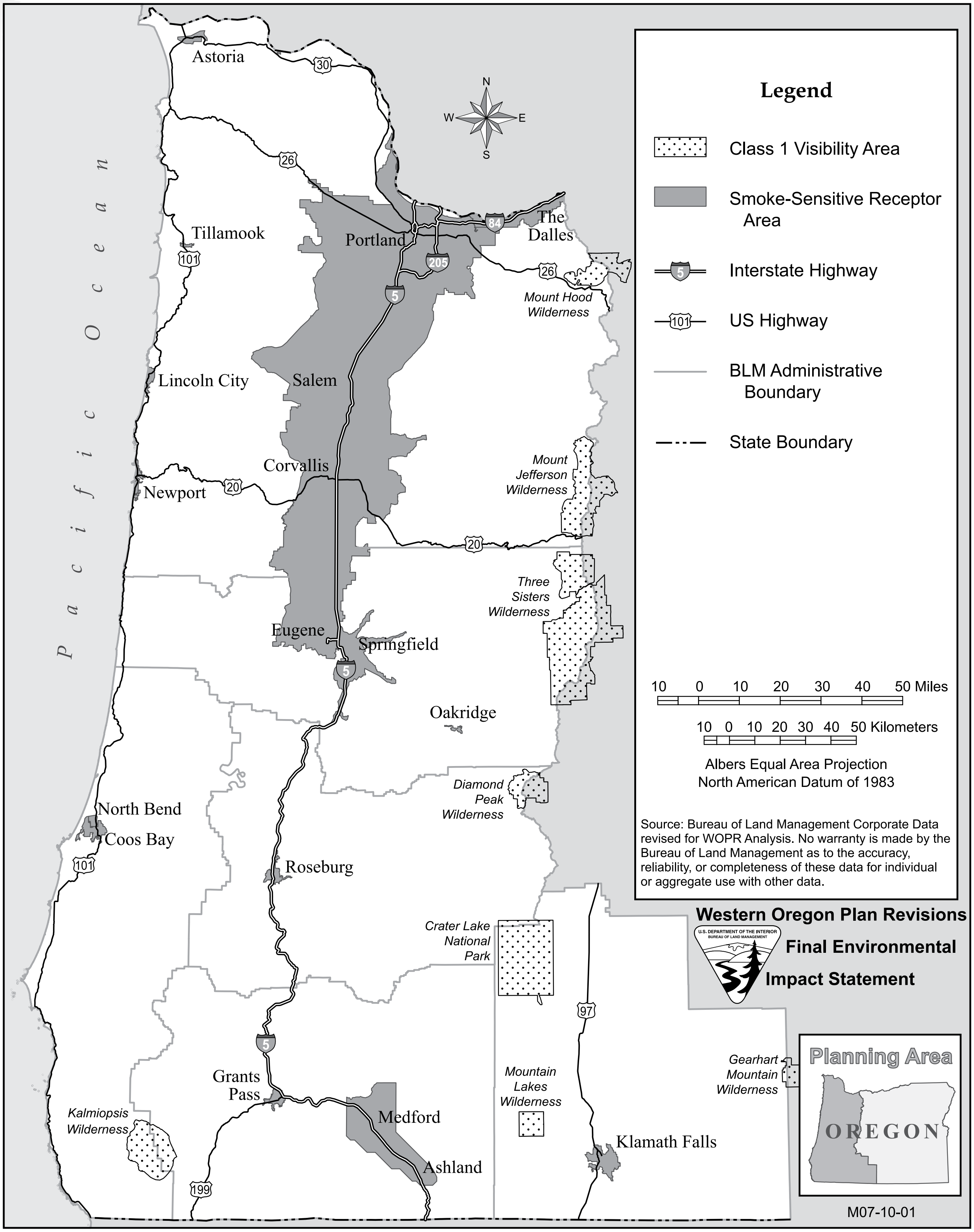
Both classes contribute to regional haze and reduced visibility. Data from air monitoring stations has shown that wildfire has not been a predominant long-term source of visibility impairment in any Class I area, although emissions from fire are an important short-term episodic contributor to visibility aerosols (Sandberg 2002).

Smoke from wildfires and smoke from hazardous fuels treatments are similar in composition; however, the amount of emissions from wildfire is roughly double that from fuels treatments (Huff 1995). In general, particulate matter from the smoke of wildfires and hazardous fuels treatments is the major pollutant of concern to health. Particulate is a general term for a mixture of solid particles and liquid droplets found in the air. Particulate from smoke tends to be very small (less than 1 micron in diameter) and, as a result, is more of a health concern than the coarser particles that typically make up road dust. Particulate matter from wood smoke has a size range near the wave length of visible light (0.4 to 0.7 micron). This makes the particles excellent at scattering light and, therefore, excellent at reducing visibility.

Figure 3-136. Particulate Emissions, 1996-2005



Map 3-10. Smoke Sensitive Receptor Areas And Class I Visibility Areas Within The Planning Area



Carbon monoxide (CO) is a colorless, odorless gas produced from incomplete combustion. It is produced in the largest amounts during the smoldering stages of a fire. Carbon monoxide is potentially one of the most dangerous components of smoke. Concentrations of carbon monoxide drop rapidly as the distance from the fire increases and are usually of concern only to firefighters.

Hazardous air pollutants (such as acrolein, benzene, and formaldehyde) are present in smoke, but in far less concentrations than particulates and carbon monoxide. Nitrogen oxides and volatile organic gasses combine to form ozone. Although not confirmed, there appears to be an indirect link between the large smoke plumes from wildfires and increased ozone levels. The data used to compile the totals of emissions in this document show that approximately 60% of total emissions are 2.5 microns or smaller in diameter.

Recreation

Key Points

- The BLM management actions can affect the recreational setting of an area, which influences the level and distribution of visitor use.
- The growing popularity of off-highway vehicle use has resulted in a trend towards increased demand for this type of activity on BLM-administered lands in western Oregon.

Recreation activities that take place in different settings produce different experiences for visitors. Some settings are more conducive to certain types of activities and preferred by visitors who engage in them. This relationship between recreation activities and setting preferences can, in turn, influence visitor use patterns and levels across the landscape. If a management action changes the recreational setting of an area, it can cause corresponding changes in the public use of that area.

The recreational setting classification system is based on a combination of physical, administrative, and social setting characteristics. The combination of these characteristics determines the overall recreational setting for a particular area. These settings include:

- primitive
- backcountry
- middle country
- front country
- rural

Physical Setting Characteristics

Physical setting characteristics are directly affected by timber management activities. These features include:

- remoteness (proximity to roads and road types)
- naturalness (landscape quality, level of disturbance, forest structural complexity, and age)
- recreational developments (campgrounds, day-use areas, trails, and other facilities)

The remoteness and naturalness are best suited for measuring the effects of timber management on the recreational setting. Management actions that require road building or decommissioning directly affect the level of remoteness of an area. Those actions that affect forest stand structure and age directly influence an area's level of naturalness.

Recreational developments are also considered characteristics of the physical setting. Timber management actions generally do not directly affect these areas. However, recreational developments directly influence the level and distribution of visitor use.

The BLM's functional road classification system is used to assign road types within middle country, front country, and rural settings to determine levels of remoteness. The system is based on traffic volume, vehicle speed, trip distance, travel mobility, and property access. Road types consist of arterial, collector, local, and resource roads (USDI BLM 1996b, updated 2002). Primitive and backcountry settings are assigned to areas based on their proximity away from all of these road types. See *Table 3-68 (Classification of recreational settings by remoteness)* for classification of recreational settings from primitive to rural, by levels of remoteness.

See *Figure 3-137 (Remoteness levels for a portion of the Grants Pass and Glendale Resource Areas of the Medford District)* for the remoteness levels that exist across a portion of the BLM's land base in the Medford District.

Forest structural stage classifications describe development of forest stands over time. These structural stage classes are used to classify naturalness levels for each recreational setting. *See Table 3-69 (Classification of recreational settings by naturalness)* for the classification of recreational settings from primitive to rural by levels of naturalness.

See *Figure 3-138 (Stand visualizations for each classification of naturalness)* for the naturalness levels for each recreational setting using a series of forest stand visualizations.

Table 3-68. Classification Of Recreational Settings By Remoteness

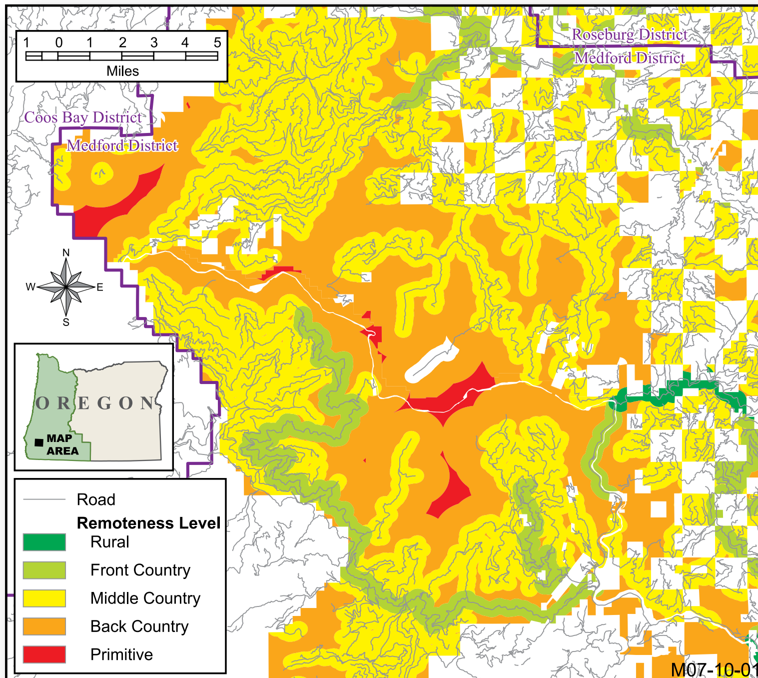
Recreational Setting Classifications	Level of Remoteness
Primitive	Greater than 1 mile from any class of road, excluding those that are permanently closed or decommissioned
Backcountry	0.25 to 1 mile from any class of road, excluding those that are permanently closed or decommissioned
Middle country	Within 0.25 mile of local or resource roads[a]
Front country	Within 0.25 mile of collector roads
Rural	Within 0.25 mile of arterial roads or highways

[a]Collector, local, and resource are functional classifications of roads in the BLM road system. For details, see *Transportation* in *Chapter 3* under *Lands, Realty, Access, and Transportation*.

Table 3-69. Classification Of Recreational Settings By Naturalness

Recreational Setting Classifications	Level of Naturalness
Primitive	• Undisturbed natural landscape • Structurally complex forest with existing old or very old forest
Backcountry	• Natural appearing landscape having modifications not readily noticeable • Mature forest with a single or multiple canopies
Middle country	• Natural appearing landscape having modifications that do not overpower natural features • Young, high-density forest with structural legacies; or, young, low-density forest with or without structural legacies
Front country	• Partially modified landscape with more noticeable modifications • Young, high-density forest without structural legacies
Rural	• Substantially modified natural landscape • Stand establishment forest with or without structural legacies

Figure 3-137. Remoteness Levels For A Portion Of The Grants Pass And Glendale Resource Areas Of The Medford District



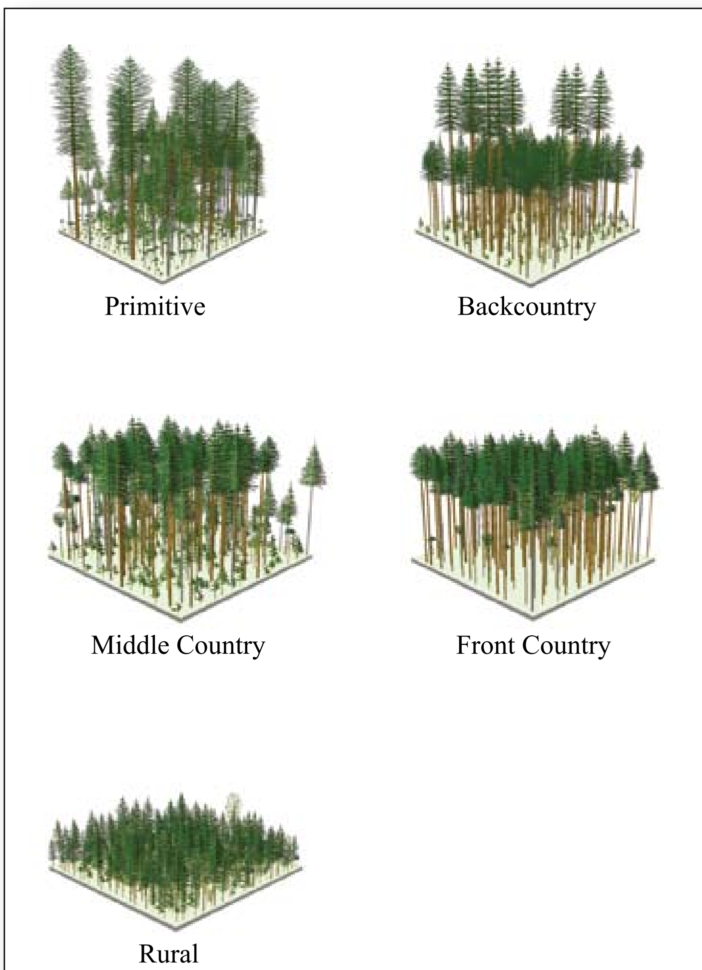


Figure 3-138. Stand Visualizations For Each Classification Of Naturalness

Administrative Setting Characteristics

The BLM provides a wide range of recreational opportunities for the public across western Oregon. These opportunities are supported by a network of recreational developments that include:

- campgrounds
- day-use areas
- trail systems
- backcountry and scenic byways
- environmental education areas
- recreation and public purpose leases to local governments

Included within these areas are wildlife viewing areas, visitor centers, picnic areas, boat ramps, waysides, and other amenities. See tables in *Chapter 2* for a list of all recreational developments by district.

Administrative setting characteristics include:

- management controls and constraints (e.g., legal access, regulatory signing, and law enforcement presence)
- motorized use restrictions (e.g., off-highway vehicle area designations)
- visitor services (e.g., interpretive exhibits, environmental education programs, and on-site personnel)

Timber management actions typically do not directly affect these administrative setting characteristics. However, certain aspects of these administrative setting characteristics are important to understanding the recreation program:

- Legal public access is necessary for visitors seeking to recreate on public lands.
- Recreation management areas set the stage for most aspects of the administrative setting.
- Off-highway vehicle area designations directly influence the distribution of visitor use.

Since a majority of BLM-administered lands in western Oregon are intermingled with private lands, public access can vary greatly. Reciprocal right-of-way agreements, easements, and unsecured access rights across adjacent private lands all have a determining effect on public access, which, in turn, influence visitor use.

The BLM has assigned either a secured or an unsecured legal public access status to every distinct management unit of BLM-administered land throughout western Oregon.

Secured legal public access includes public access rights that have been secured by the United States. Public access rights are generally included in the acquisition of exclusive or access road easements where the United States has acquired control of the right-of-way. Physical access to these blocks of public land must be present and available via roads, trails, or navigable waterways.

Unsecured legal public access includes public access rights that have not been secured by the United States. Administrative access may be legally and physically available to the BLM, although the right-of-way agreements or easements do not include legal access rights for the public.

Within the planning area, there are 1.9 million acres (77%) of BLM-administered lands that are legally accessible to the public and 600,000 acres (23%) that are legally inaccessible to the public. See *Table 3-70 (Legal public accessibility of BLM lands by district)* and *Figure 3-139 (Proportion of BLM lands by district with secured or unsecured legal public access)* for these results by district.

See *Figure 3-140 (Secured and unsecured legal public access to a portion of the BLM's land base in the Coos Bay District)* for an example of secured and unsecured legal public access to a portion of BLM lands in the Coos Bay District.

Table 3-70. Legal Public Accessibility Of BLM Lands By District

District	Secured Legal Public Access		Unsecured Legal Public Access	
	Acres	Percentage	Acres	Percentage
Salem	293,337	73%	109,887	27%
Eugene	196,740	62%	118,475	38%
Roseburg	284,484	67%	141,832	33%
Coos Bay	259,578	81%	62,647	29%
Medford	736,424	85%	131,804	15%
Klamath Falls Resource Area (Lakeview District)	192,190	85%	32,711	15%
Totals	**1,962,754**	**77%**	**597,356**	**23%**

Figure 3-139. Proportion Of BLM Lands By District With Secured Or Unsecured Legal Public Access

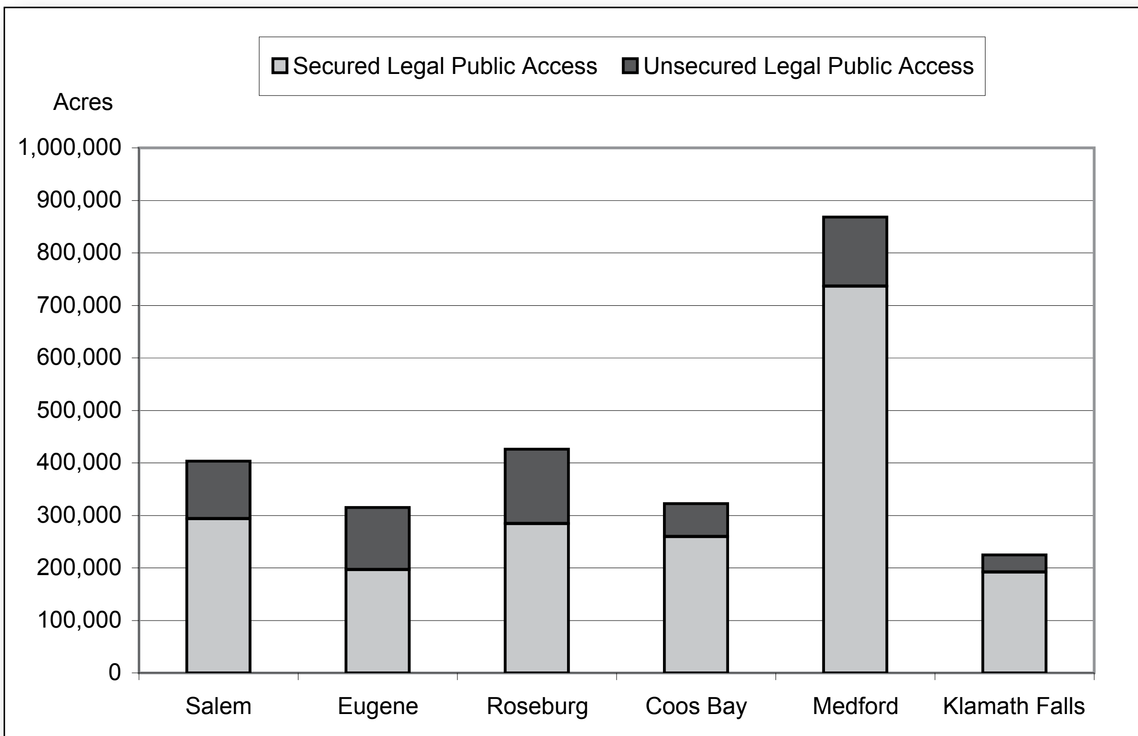
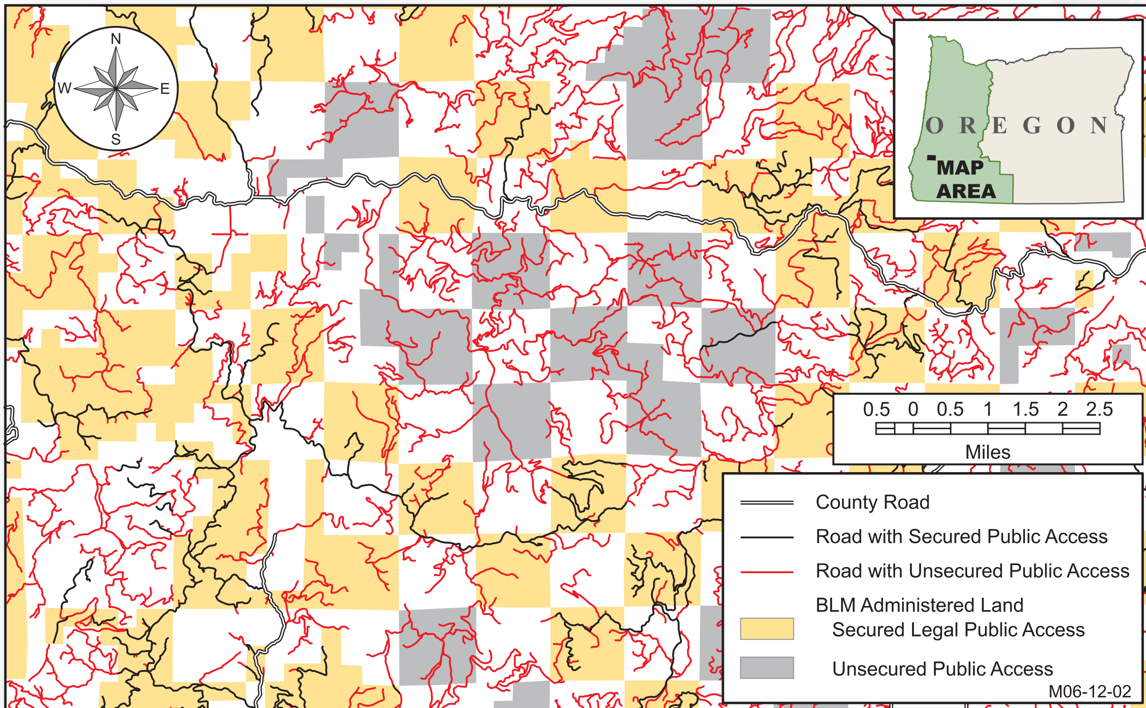


Figure 3-140. Secured And Unsecured Legal Public Access To A Portion Of The BLM's Land Base In The Coos Bay District



All BLM-administered lands are classified as either special or extensive recreation management areas:

- A special recreation management area is a unit of public land identified to provide specific recreational opportunities (i.e., activities, experiences, and benefits). The BLM manages 28 special recreation management areas in western Oregon that total 155,745 acres. Refer to *Table 2-18 (District-specific special recreation management areas)* in *Chapter 2*.
- Extensive recreation management areas include all other BLM-administered lands not classified as special recreation management areas. Recreation management is generally custodial in nature and used to address dispersed recreational demand. Management is designed to ensure visitor safety and to limit resource impacts and visitor conflicts. Extensive recreation management areas total 2.4 million acres across the planning area. Refer to *Table 2-19 (District-specific extensive recreation management areas)* in *Chapter 2*.

All BLM-administered lands are required to be designated as open, limited, or closed to motorized vehicles. Refer to *Table 2-28 (District-specific off-highway vehicle area designations)* in *Chapter 2*.

Designations are based on protecting natural and cultural resources and public safety, and limiting visitor conflicts. Definitions of open, limited, and closed areas are provided below:

- **Open areas**. Areas where off-highway vehicle use is unlimited since there are no issues regarding resources, visitor conflicts, or public safety to warrant limiting cross-country travel.
- **Limited areas**. Areas where off-highway vehicle use is restricted in order to meet recreational and resource management objectives. Restrictions may include the number or types of vehicles; the time or season of use; permitted or licensed use only; and limiting use to existing or designated roads and trails.
- **Closed areas**. Areas that are closed to all motorized vehicle use to protect resources, ensure visitor safety, or reduce visitor conflicts.

The BLM also establishes sub-area designations to make distinctions within larger off-highway vehicle areas. An off-highway vehicle emphasis area is an example of a sub-area designation where off-highway vehicle use is more concentrated and intensively managed. These areas do not allow or prevent off-highway vehicle use. That use is only determined through the broader designations of open, limited, and closed. Currently, the BLM manages six off-highway vehicles emphasis areas, totaling approximately 58,000 acres, within the planning area. Refer to *Table 2-30* (*District-specific off-highway vehicle emphasis areas)* in *Chapter 2*.

The combination of area and sub-area designations affects the administrative setting, which can in turn influence the level and distribution of recreational demand across the landscape.

Social Setting Characteristics

Social setting characteristics include: visitor contacts (number of encounters with other visitors), the distribution of visitors (number of visitors per area), and evidence of visitors (signs of past visitor use). Evaluating the level and distribution of visitors across the range of physical settings aids in understanding how timber management affects recreation use.

Recreation on BLM-administered lands occurs within the larger context of overall recreational demand in western Oregon. When comparing the BLM's most recent visitor use data (USDI BLM 2006c) with the Oregon Parks and Recreation Department's most recent outdoor recreation survey data (OPRD 2003), an estimated 17% of the total recreational demand throughout the planning area occurs on BLM-administered lands.

Recreational demand is measured in two ways: (1) total number of visitors per year, and (2) total number of participants by 13 primary recreation activity categories. Because a single visitor usually participates in more than one activity, the number of participants is generally higher than the number of actual visitors.

Overall recreational demand is increasing at a rate of 1.9% each year in western Oregon (OPRD 2003). If this rate remains constant over the next 10 years, total visitation on BLM-administered lands within the planning area is expected to increase from 5.1 to 6.2 million visitors by the year 2016.

This rate of increase is not the same for all recreation activities, nor does the rate of change for individual activities proportionally affect overall changes in recreational demand. For example, nonmotorized boating is expected to increase 7% annually; however, this activity accounts for less than 1% of the total public use on western Oregon BLM lands. Conversely, camping and picnicking is projected to increase at a rate of 1.2% each year but accounts for 9% of total visitation.

See *Table 3-71* (*Current and projected levels of participation by recreation activity within the planning area from 2006 to 2016*) for the current level of participation for the 13 primary recreation activities on BLM-administered lands in western Oregon, the annual rate of change for each activity (based on statewide trends), and their projected levels by the year 2016. See *Figure 3-141 (Current and projected levels of participation by recreation activity within the planning area from 2006 to 2016)* for an illustration of these trends by activity. See *Figure 3-142 (Proportion of projected recreational demand by activity in the year 2016).* The proportions are based on the current levels and annual rates of change for each activity.

The setting preferences of visitors are used to determine the distribution of recreational demand, which has been adapted from statewide survey data collected for Oregon's Statewide Comprehensive Outdoor Recreation Plan (OPRD 2003). It is assumed that the distribution of recreational demand on BLM-administered lands within the planning area would mimic these statewide results. See *Table 3-72 (Distribution of recreational demand by setting for each recreation activity)* and *Figure 3-143 (Distribution of recreational demand by setting for each recreation activity.* In some cases, visitor preferences may be constrained by the administrative setting. For example, off-highway vehicle riders may prefer the primitive setting (such as wilderness areas). These areas, however, are restricted to non-motorized activities. To avoid such conflicts with BLM policy, these management constraints were taken into account when developing *Table 3-72*.

Table 3-71. Current And Projected Levels Of Participation By Recreation Activity Within The Planning Area, 2006 To 2016

Recreation Activity	Current Level (2006)	Annual Rate of Change	Projected Level (2016)
Nonmotorized winter activities	112,153	1.6%	136,827
Snowmobile and other motorized winter activities	151,061	5.0%	255,897
Motorized boating	161,763	1.0%	183,439
Nonmotorized boating	181,822	7.0%	360,917
Swimming and other water-based activities	277,203	-0.8%	246,156
Motorized off-highway vehicle travel	634,823	2.3%	835,427
Fishing	514,091	5.8%	930,505
Hunting (big game, upland game, and migratory game birds)	1,014,102	1.1%	1,163,175
Nonmotorized travel (hiking, biking, and horseback riding)	1,057,134	2.2%	1,380,617
Camping and picnicking	1,181,868	1.2%	1,373,331
Specialized nonmotorized activities and events	1,297,771	3.1%	1,861,004
Driving for pleasure (along designated BLM roadways)	1,530,294	1.1%	1,764,429
Wildlife viewing, interpretation, and nature study	2,748,317	5.2%	4,738,099

Figure 3-141. Current And Projected Levels Of Participation By Recreation Activity Within The Planning Area From 2006 To 2016

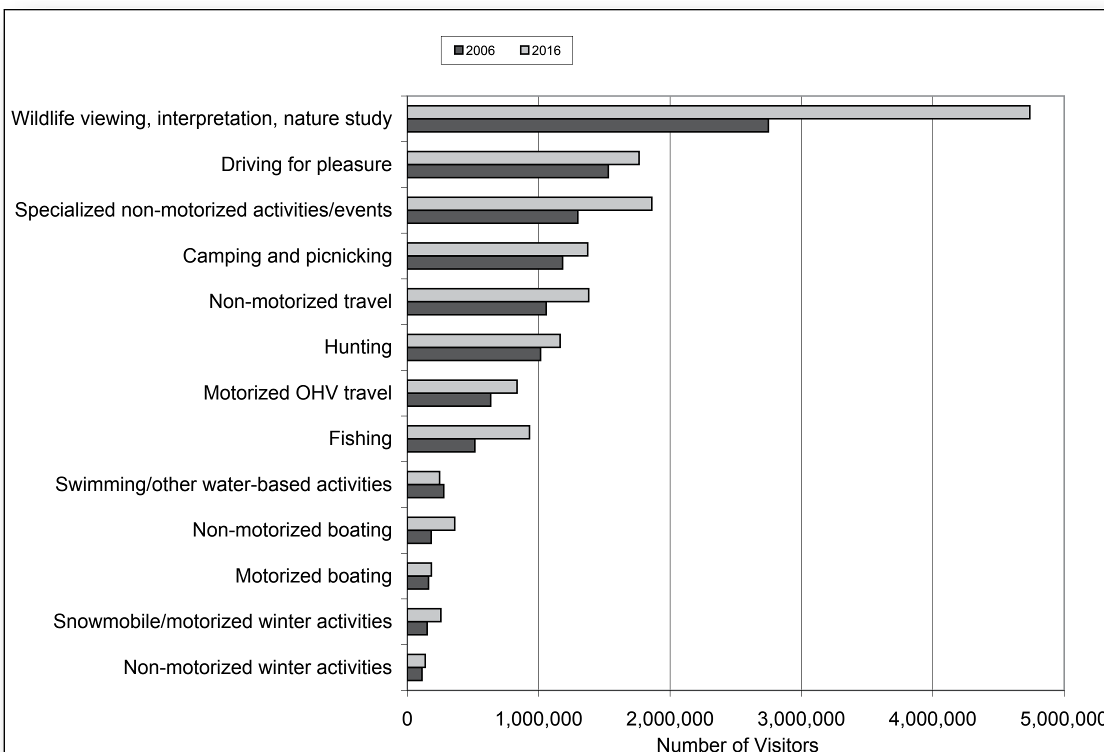


Figure 3-142. Proportion Of Projected Recreational Demand By Activity In The Year 2016

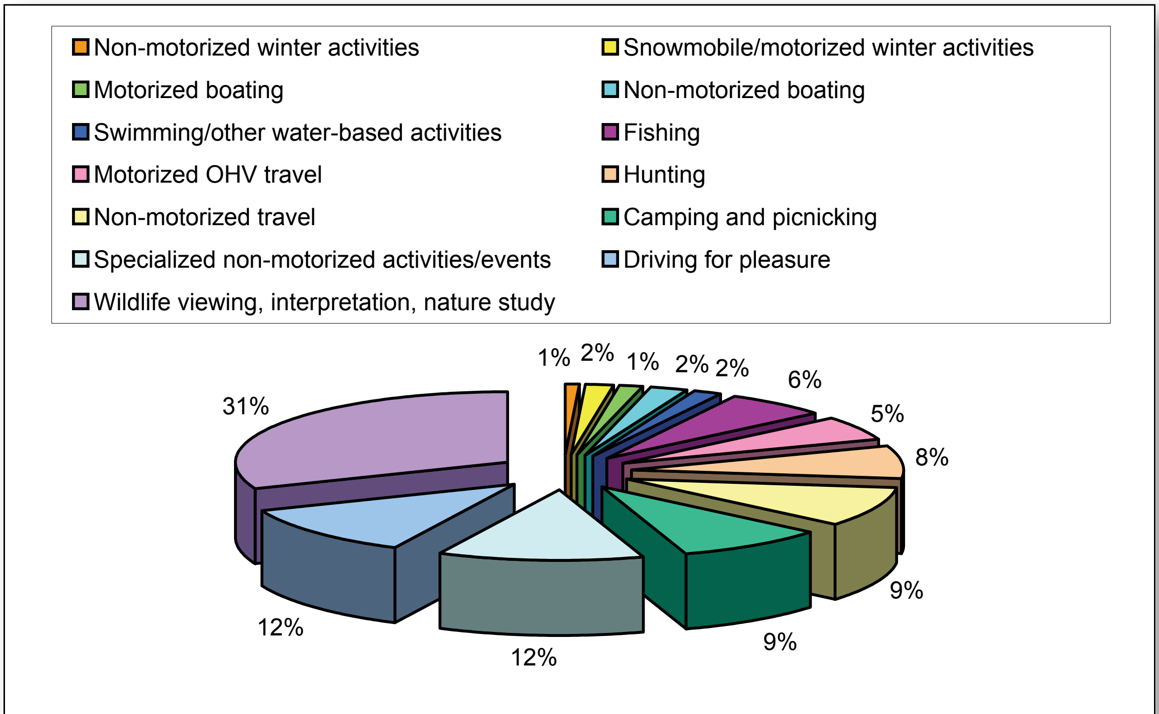
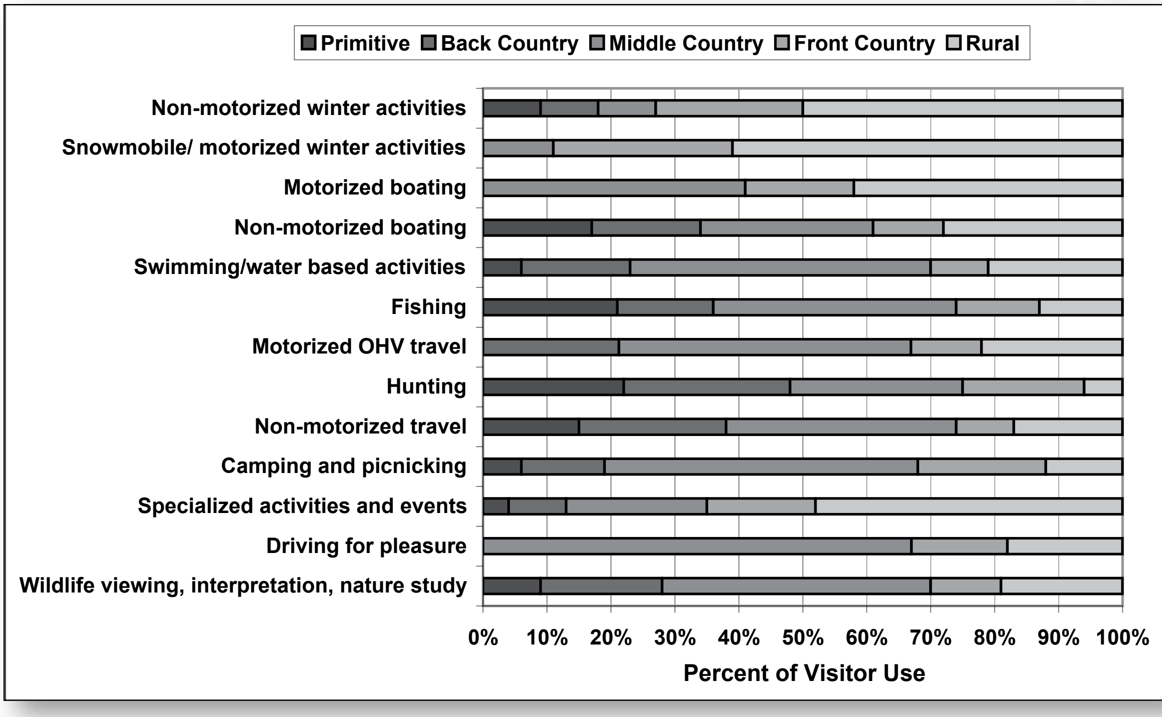


Table 3-72. Distribution Of Recreational Demand By Setting For Each Recreation Activity

Recreational Demand	Distribution of Recreational Demand by Setting (% of visitor use)					
	Primitive	Back Country	Middle Country	Front Country	Rural	Totals by Demand
Wildlife viewing, interpretation, and nature study	9	19	42	11	19	100
Driving for pleasure	0	0	67	15	18	100
Specialized activities and events	4	9	22	17	48	100
Camping and picnicking	6	13	49	20	12	100
Non-motorized travel	15	23	36	9	17	100
Hunting	22	26	27	19	6	100
Motorized off-highway vehicle travel	0	27	42	10	21	100
Fishing	21	15	38	13	13	100
Swimming and other water-based activities	6	17	47	9	21	100
Non-motorized boating	17	17	27	11	28	100
Motorized boating	0	0	41	17	42	100
Snowmobile and other motorized winter activities	0	0	11	28	61	100
Non-motorized winter activities	9	9	9	23	50	100

FIGURE 3-143. DISTRIBUTION OF RECREATIONAL DEMAND BY SETTING FOR EACH RECREATION ACTIVITY



Wilderness Characteristics

Key Point
There are 26,123 acres of BLM-administered lands in western Oregon that have been found to contain wilderness characteristics.

The BLM's authority to conduct wilderness reviews, including the establishment of new wilderness study areas, expired on October 21, 1993 pursuant to Section 603 of the Federal Land Policy and Management Act. However, the BLM retained the authority under Section 201 of the Federal Land Policy and Management Act to inventory wilderness characteristics and to consider such information during land use planning.

Managing for wilderness characteristics may include protecting certain lands of sufficient size in their natural condition and providing opportunities for solitude or recreation that is primitive and unconfined.
To be of sufficient size, an area must be without roads and have at least 5,000 acres. An exception may be made to this acreage requirement when a smaller area is considered large enough to provide for the preservation and use in an unimpaired condition because of its topography, vegetative screening, or other similar features. Another exception is when a BLM area with less than 5,000 acres adjoins an administrative boundary of the U. S. Forest Service and the combined acreage of the two roadless areas is a minimum 5,000 acres.

During scoping for the western Oregon resource management plan revisions, the BLM received 146 public wilderness proposals. Thirteen of these areas are located off BLM-administered lands, or are outside of the western Oregon planning area. Those 13 proposals were not included in the evaluation process. The remaining 133 public wilderness proposals were evaluated to determine if they contain wilderness characteristics. Of these, nine areas were found to contain wilderness characteristics. The remaining 124 areas do not contain wilderness characteristics and, therefore, were not analyzed further.

Six of the nine areas with wilderness characteristics are smaller than 5,000 acres, but meet the sufficient size criteria because they are contiguous with U. S. Forest Service roadless areas. Only the portions of these proposed areas that occur on BLM-administered lands were evaluated and considered during this land use planning process.

None of the proposed areas that are located on BLM-administered lands are currently designated as wilderness areas or wilderness study areas. See *Table 3-73 (Lands with wilderness characteristics)* for the proposed areas that were found to contain wilderness characteristics. Refer to *Chapter 2*, *Table 2-17 (Lands with wilderness characteristics maintained under special management)* for those areas that would receive special management. See *Appendix L - Wilderness Characteristics* for the evaluation process used to identify lands with wilderness characteristics.

Figure 3-144 (*Mt. Hebo wilderness characteristics*) shows an example of a small unit of BLM-administered land with wilderness characteristics abutting a U.S. Forest Service roadless area.

Figure 3-144. Mt. Hebo Wilderness Characteristics

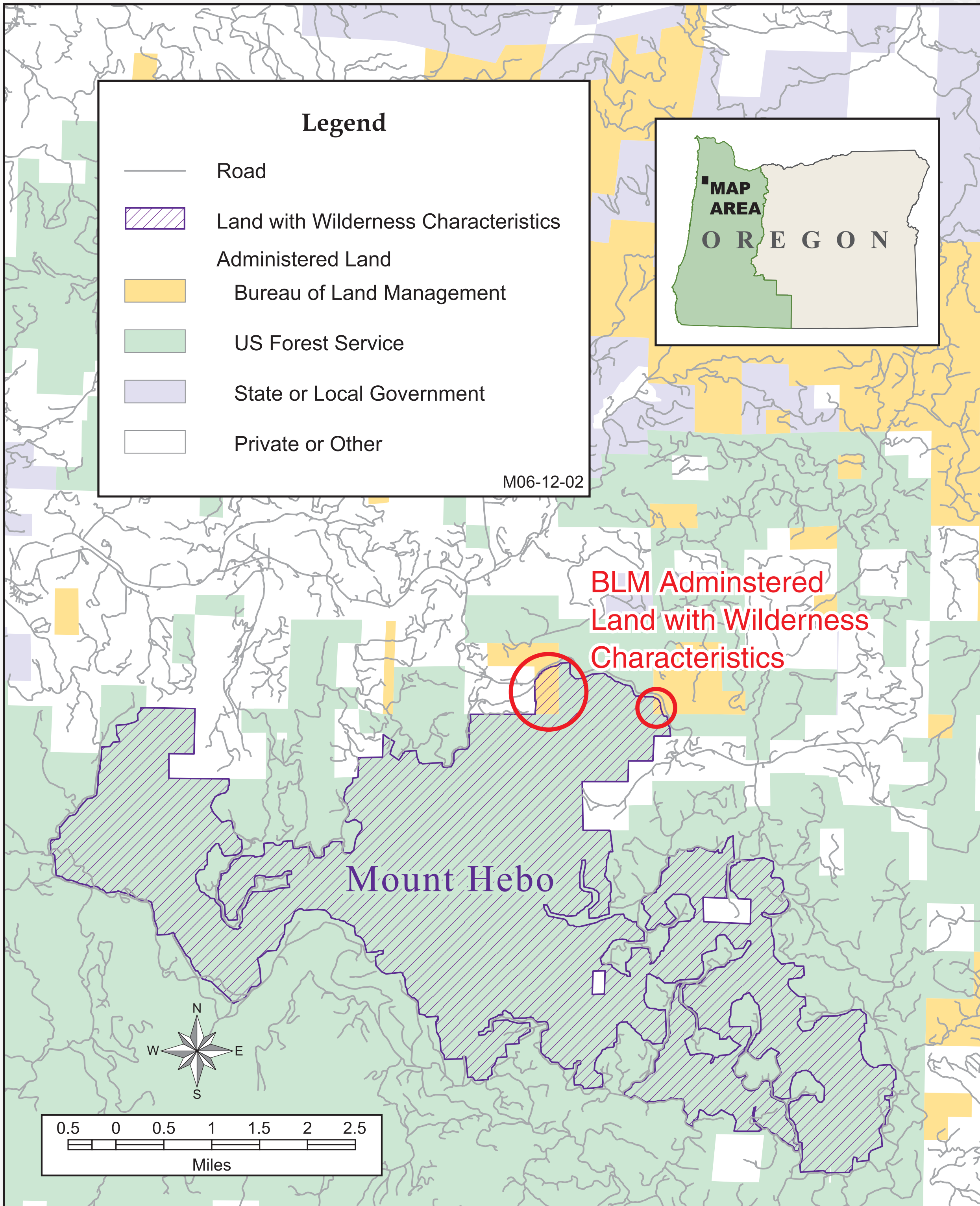


Table 3-73. Lands With Wilderness Characteristics

BLM-administered Lands	Total (acres)	Identified Wilderness Characteristics		
		Naturalness	Outstanding Opportunities for Solitude	Outstanding Opportunities for Primitive, Unconfined Recreation
Salem District				
Bull of the Woods/Opal Creek Additions	3,203	X	X	X
South Fork Clackamas River	919	X	X	
Salmon Huckleberry Additions	637	X	X	X
Mount Hebo	81	X	X	X
Eugene District				
No lands were identified with wilderness characteristics.				
Roseburg District				
Williams Creek	116	X	X	
Coos Bay District				
Wasson Creek	3,408	X	X	X
Medford District				
Berry Creek	6,433	X	X	X
Wellington Mountain	5,659	X		X
Whiskey Creek	5,667	X	X	X
Klamath Falls Resource Area				
No lands were identified with wilderness characteristics.				
Total acres	**26,123**			

Visual Resources

Key Point
Visual resource inventory classes provide a mechanism to assess the visual impacts of management actions.

Visual resource management is a system for minimizing the visual impacts of surface-disturbing activities and for maintaining scenic values. The BLM's visual resource management system consists of two distinct components:

- visual resource inventory classes (one set of classes—Class I through Class IV)
- visual resource management classes (another set of classes—Class I through Class IV)

Visual resource inventory classes portray the relative quality of visual resources. Inventory classes do not establish management direction and are not used as a basis for constraining or limiting surface-disturbing activities, except for the Class I visual resource inventory class. Four inventory classes are assigned to BLM-administered lands through the inventory process:

- **Visual resource inventory Class I.** This class is assigned to areas where a management decision has been made to preserve a natural landscape. This includes areas such as wilderness areas, wilderness study areas, wild and scenic rivers classified as wild, and other congressionally and administratively designated areas.
- **Visual resource inventory Class II, Class III, and Class IV.** These classes are assigned to areas based on a combination of scenic qualities, sensitivity levels, and distance zones.

  Class II visual resource inventory areas have a higher visual resource quality than do Class IV visual resource inventory areas.

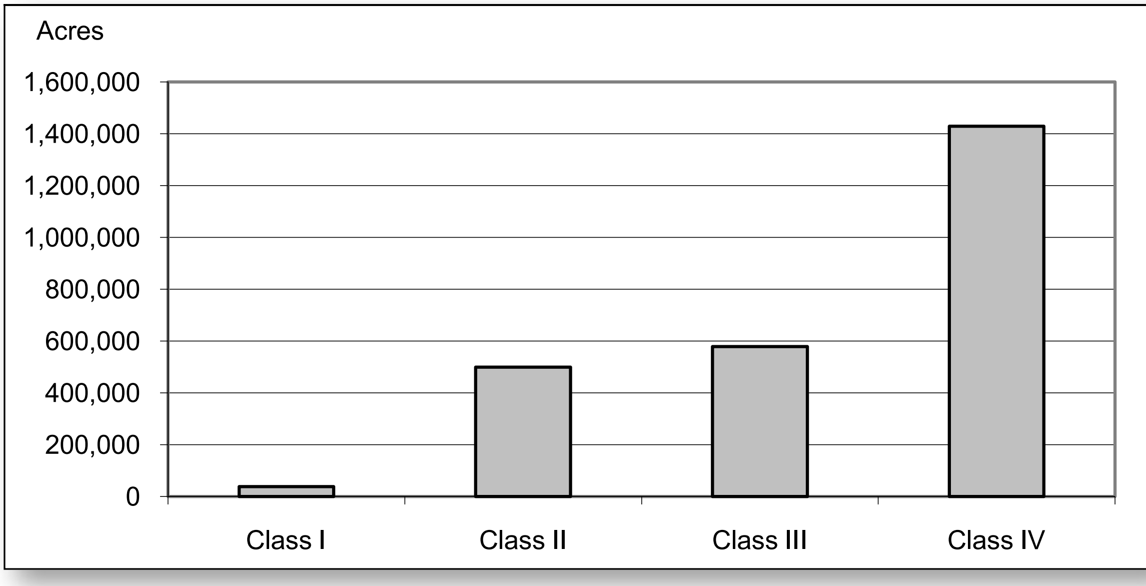
Visual resource management classes are designated through a resource management plan. This class designation can vary from the inventory class designations, except for the Class I visual resource management class. Refer to *Chapter 2* for a description of management objectives and the allocation of visual resource management classes.

See *Table 3-74 (Acres of each visual resource inventory class by district)* and *Figure 3-145 (Acres by visual resource inventory class within the planning area).*

Table 3-74. Acres Of Each Visual Resource Inventory Class By District

BLM District	Visual Resource Inventory Classes (acres)			
	Class I	**Class II**	**Class III**	**Class IV**
Salem	19,593	56,996	56,612	253,869
Eugene	1,187	4,739	34,606	272,836
Roseburg	0	92,354	23,582	307,895
Coos Bay	592	13,455	61,974	245,108
Medford	57,093	266,248	317,049	223,447
Klamath Falls Resource Area (Lakeview District)	340	42,824	79,578	100,876
Totals	**78,805**	**476,616**	**573,401**	**1,404,031**

Figure 3-145. Acres By Visual Resource Inventory Class Within The Planning Area



National Landscape Conservation System

Key Point
The BLM manages a variety of National Landscape Conservation System designations within the planning area

The National Landscape Conservation System, established in June 2000, is designed to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values. The establishment of the system does not create new legal protections. It does, however, provide the administrative structure, staff, and budget that allow BLM to better manage these areas.

All National Landscape Conservation System designated lands are withdrawn from timber harvesting with the exception of designated, suitable, and eligible wild and scenic rivers classified as scenic or recreational. These two classifications allow for limited timber harvesting in a manner that does not impair their free-flowing character, classification, or identified outstandingly remarkable values. Because of this variation in management, only wild and scenic rivers are described in detail below. All National Landscape Conservation System designated lands are summarized in *Table 3-75 (National Landscape Conservation System designated lands by district)*.

Table 3-75. National Landscape Conservation System Designated Lands By District

Designation Type	Name	BLM District	Acres
National Monument			
	Cascade-Siskiyou	Medford	53,000
Wilderness Areas			
	Table Rock	Salem	5,700
	Wild Roque	Medford	8,700
National Scenic Trail			
	Pacific Crest[a]	Medford	488
		Klamath Falls	12
Wilderness Study Areas			
	Soda Mountain	Medford	6,107
	Brewer Spruce	Medford	1,705
	Little Sink	Salem	80
	Cherry Creek	Coos Bay	570
	Mountain Lakes	Klamath Falls	340
Outstanding Natural Area			
	Yaquina Head	Salem	100
Other Congressional Designations			
	Mt. Hood Corridor	Salem	4,700
	Bull Run Watershed Management Unit	Salem	660
Wild and Scenic Rivers [b]			
	See *Table 3-76.*	All districts	**68,312**
		Total	**150,474**

[a]Acreages for the Pacific Crest National Scenic Trail are based on a 100-foot wide corridor with one linear trail mile being equal to 12 acres.

[b]Acreage for the wild and scenic rivers is based on a half-mile wide corridor with one linear river mile being equal to 320 acres.

Most rivers are added to the National Wild and Scenic Rivers System through federal legislation after a study of the river's eligibility and suitability for designation. The result of the study process is a decision on whether to recommend the designation of a river to Congress (USDA USFS and USDI BLM 1999). A number of river segments are at various stages of this process because of the high concentration of free-flowing rivers within the planning area and the in-depth nature of the study process.

Of the 78 designated, suitable, and eligible wild and scenic river segments:

- 12 are designated
- 9 are suitable for recommendation to Congress
- 57 are eligible, but have not yet been studied for suitability

The BLM must provide permanent protection of designated wild and scenic rivers. Interim protection is required for eligible and suitable river segments, until either:

- An eligible river segment is determined, through a suitability study, to be unsuitable for inclusion as a wild and scenic river; or
- A determination is made by Congress to include or remove a suitable river segment from the National Wild and Scenic River System.

All designated, suitable, and eligible wild and scenic river segments must be classified as wild, scenic, or recreational. These classifications are defined as follows.

- **Wild river segments**. River segments that are free of impoundments and generally inaccessible, except by trail. Their watersheds or shorelines are essentially primitive and their waters unpolluted. These represent vestiges of primitive America. No timber harvesting is allowed.
- **Scenic river segments**. River segments that are free of impoundments. Their shorelines or watersheds are largely primitive and undeveloped, but their shorelines are accessible in places by roads. Limited timber harvesting is allowed.
- **Recreational river segments**. River segments that are readily accessible by road or railroad. They may have some development along their shorelines and may have undergone some impoundment or diversion in the past. Limited timber harvesting is allowed.

In addition to meeting one of the above criteria, all designated, suitable, and eligible rivers must possess one or more outstandingly remarkable value. These include: scenic, recreational, geological, fish, wildlife, historic, prehistoric, or other similar values.

See *Table 3-76 (Wild and scenic rivers by district)* for a summary of the wild and scenic river segments that occur on BLM-administered lands within the planning area. *See Figure 3-146 (Wild and scenic rivers by classification)* for a summary of these river segments by classification. Individual wild and scenic river segments are listed by district in the tables in *Chapter 2*.

Figure 3-146. Wild And Scenic Rivers By Classification

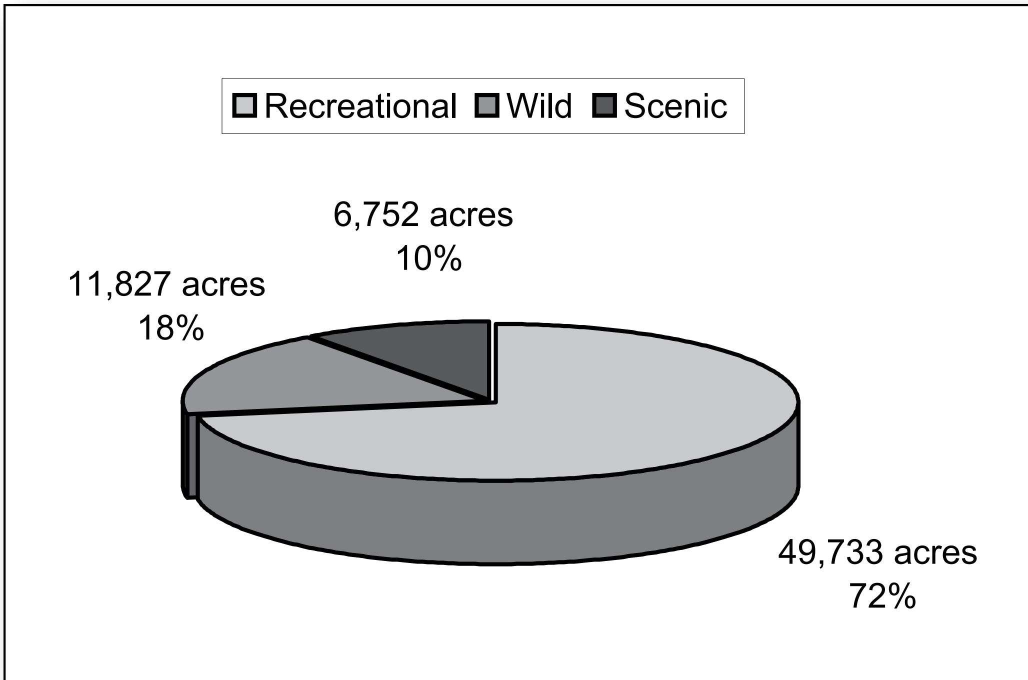


Table 3-76. Wild And Scenic Rivers By District

Wild and Scenic River Classification	Status	District	Number of River Segments	Acres	Limited Timber Harvesting Allowed
Wild	Designated	Salem	1	142	No
		Medford	1	6,602	
	Suitable	Medford	4	5,083	
	Eligible	Medford	0	0	
Scenic	Designated	Salem	3	1,398	Yes
		Klamath Falls	1	2,780	
	Eligible	Salem	3	1,401	
		Medford	1	1,173	
Recreational	Designated	Medford	1	4,911	
		Roseburg	1	2,142	
		Salem	4	2,505	
	Suitable	Salem	2	6,004	
		Eugene	3	6,691	
	Eligible	Salem	25	8,560	
		Coos Bay	4	1,958	
		Eugene	6	2,512	
		Roseburg	3	4,338	
		Medford	15	10,112	
		Totals	**78**	**68,312**	

Soils

Key Points
• Soils perform many functions in the environment that are important for plant growth, water quality, and human benefit.
• Natural events and management actions can change the capacity of a soil to perform these functions.

Physical, chemical, and biological properties determine soil compactibility, erosiveness, and productivity. For example, shallow soils tend to hold less moisture and fewer nutrients, which make them more susceptible to loss of soil productivity than deeper soils. Some soils are more or less susceptible to landslides and debris flows depending on geology and slope.

The potential for plant growth depends on the ability of the soil to accept, hold, and release nutrients and moisture. Soil provides the environment for root growth and development. Soil serves as the habitat for microorganisms that control processes related to plant nutrition, nutrient cycling, and the biological control of pests. The condition of the soil determines the effectiveness of these functions.

Natural events or management actions can change soil properties. Wildfire can reduce the organic matter found in soil and landslides can cause erosion. Timber harvesting, site preparation, road construction, prescribed burns and fuels reduction, off-highway vehicle use, mining, and livestock grazing cause soil compaction or displacement, surface erosion, and mass wasting processes. They also alter nutrient status, soil biology, and long-term soil productivity.

Compaction

Soil compaction is the packing together of soil particles by physical pressure or vibration at the soil surface that results in an increase in soil density and a decrease in pore space. Decreased pore space where water, air, and plant roots have restricted movement can increase surface runoff and reduce plant growth. Compaction can be caused by livestock and timber harvest machinery. Examples of reduced early tree growth due to soil compaction are well documented in literature (Shestak et al. 2005). All soils are susceptible to compaction and displacement. Regardless of soil type, machine type, soil moisture, or other soil characteristics, ground skidding machinery will cause soil compaction (Skaugset 1997). In addition, research and monitoring confirmed that despite their unique design and use, highly mechanized systems (e.g., harvesters and forwarders) for logging younger and smaller timber have the potential to produce significant soil compaction (Adams 2005). Another study (Horn et al. 2007) concluded much the same, saying that all vehicles that were tested caused an impact on forest soils which led to stresses exceeding the pre-compression stress and resulting in plastic deformation. For future forest use, deformed areas must be classified as irreversibly degraded. Deformed areas require many decades of swelling and shrinkage, as well as biological strengthening, to regain pore functioning processes (Horn et al. 2007).

Soil displacement is a process where the soil surface is moved some distance by mechanical means or the hoof action of livestock. If nutrients, water, and soil organisms are removed from the site, the rooting depth is reduced to the point that plant growth is decreased. This process usually occurs concurrently with soil compaction.

Residual compaction and displacement from past timber harvesting occurs across the planning area. Exactly where and how much compaction and displacement remain is not well known. However, based on the amount of ground-based logging performed in the past, a rough estimate of residual detrimental soil compaction would be about 77,000 acres out of the 2,557,800 acres in the planning area.

Soil compaction is also caused by road construction. The road surface must be compacted to hold the weight of rolling vehicular traffic. This compaction results in soil that is unavailable for tree growth. Some literature suggests, however, that the growth of roadside trees may benefit from the increased light, moisture, and reduced competition (Miller et al. 1989). It is not known if increased growth makes up for the loss of trees on the running surface of a road. There are approximately 78,300 acres of land in roads that are administered by the BLM within the planning area, which represents about 3% of BLM-administered land.

Erosion

Erosion is the detachment and movement of soil particles by water, wind, ice, or gravity. All soils are susceptible to erosion. The soils within the planning area are primarily subject to two types of erosion:

- surface erosion
- mass soil movement from debris flows or avalanches, slumps, and earth flows

Surface erosion is rare on undisturbed forest lands within the planning area since soils have a cover of vegetation, duff, and litter, which limits the overland flow of water and the subsequent erosion. Surface erosion can occur on compacted sites such as skid trails and non-surfaced roads. Road ditch lines are another source for eroded material.

The geology and geologic features conducive to mass soil movement cover most of western Oregon. The Tyee, Umpqua and Yamhill formations in the Coast Range and the intrusive, extrusive, and pyroclastic geology of the West Cascades are examples of bedded sediments and volcanics that form unstable soils. Geologic features (such as steep slopes, faults, and high ground water) add to the concern. For example, fast-moving debris flows develop in shallow, coarse-textured soils on steep slopes (greater than 65%) in V-shaped drainages. Slumps and earth flows occur in deep, saturated soils that are high in silt or clay on gentle to moderate slopes. Soils derived from volcanic and deeply weathered sedimentary materials are also subject to this mass movement.

Soil Heating

Wildfires and prescribed burns both cause soil heating. Wildfire is a natural process that occurs with varying frequency, intensity, and severity. Prescribed burns are used as a tool to prepare sites for planting after timber harvests, change vegetative species, and reduce fuels. When soil heating occurs, soil functions are impaired. This impairment is caused by a breakdown in soil structure resulting from a reduction or loss of organic matter and microbial species, and an increase in water repellency or surface erosion.

Burning causes a change in the availability of carbon and nitrogen, which are key soil nutrients. The significance of these changes is directly tied to the productivity of a given ecosystem. With a given change in nitrogen capital, the productivity of a nutrient-rich soil system might not significantly change following burning. A similar loss in nitrogen capital in a nutrient-stressed system could result in a much greater change in productivity (Neary et al. 2005). The majority of soil systems in the planning area benefit from the addition of nitrogen. The more nutrient-rich soil systems tend to occur in the northern portion of the planning area, and the nutrient-stressed soil systems tend to occur in the southern portion of the planning area.

Productivity

Soil productivity is the ability of a soil to produce vegetation. Vegetative growth requires adequate air, water, and nutrients. The physical (texture and structure), chemical (organic matter decomposition and nutrient release), and biological (nutrient cycling and nitrogen fixation) properties of soil supply the required air, water, and nutrients for plant growth. When any of these properties are altered to the point that vegetative growth is reduced, the soil function is impaired and the productivity of the soil is reduced accordingly. The three soil properties are influenced by soil compaction and displacement, erosion, and fire. Impairing soil function for one harvest rotation is considered a long-term impairment.

Soil productivity can be altered through such management actions as the harvesting of timber or the addition of fertilizer. Nitrogen is the main growth-limiting nutrient within the planning area except for some Coast Range soils. All districts have applied nitrogen fertilizer in the past.

Soil carbon in the form of organic matter and its subsequent decomposition and nutrient release is a major factor of long-term soil productivity. The small components of trees and understory vegetation (needles, leaves, and twigs) in timber-dominated sites and the shrub, forb, and grass components of the shrub-steppe grasslands contain the highest concentrations of nitrogen and are the easiest material to remove from a site through displacement, erosion, or fire. Forest ecosystems receive much of their nitrogen from the decomposition and recycling of organic matter, including decayed leaves or needles, branches, fallen trees, and roots. A soil comprised of rich organic matter helps to improve water retention, maintain good soil structure, aid infiltration of water into the soil, store more carbon, and promote growth of soil organisms (Rapp et al. 2000).

Decisions concerning management of dead wood and organic matter can influence site productivity in two ways. First, the productive capacity of soils could be degraded when removal of nutrient and organic matter from site exceeds the replacement capacity provided by mineral weathering and atmospheric inputs of nutrients. Intensive utilization of fiber by whole-tree harvesting, piling of logging slash, and prescribed burning can decrease organic matter and increase nutrient losses (Hayes et al. 2005).

Grazing

Key Points
• The availability of forage and water is generally adequate for livestock.
• The number of vacant allotments and leases within the planning area has increased since 1996 by more than 300%.
• The condition within individual allotments is variable based on historic grazing levels, past management actions, and current grazing management.

The Medford and Coos Bay Districts and the Klamath Falls Resource Area administer livestock grazing on approximately 560,000 acres, which represent 22% of the planning area. See *Figure 2-3 (Lands available for livestock grazing)* in *Chapter 2*. This level of grazing represents 14% of the total federal grazing acres that occur on lands covered by the Northwest Forest Plan. See *Figure 3-147 (Percentage of grazing on BLM and Forest Service lands within the planning area)*.

The existing grazing leases and permits authorize a total of 26,840 active animal unit months during the grazing season. See *Table 3-77 (Livestock grazing authorizations by district)*.

The level of livestock grazing on Forest Service and BLM-administered lands covered by the Northwest Forest Plan decreased between the early 1990s and the early 2000s (Charnley 2006). The reasons for the decline include:

- requirements of the Northwest Forest Plan
- periods of drought
- requirements of the Endangered Species Act
- socioeconomic factors causing the viability of grazing operations to decline
- difficulty of managing livestock across the checkerboard pattern of intermingled private and federal lands

The level, duration, and timing of livestock grazing use permitted or leased within the planning area have been at or below the levels of the current resource management plans.

Figure 3-147. Percentage Of Grazing On BLM And Forest Service Lands Within The Planning Area

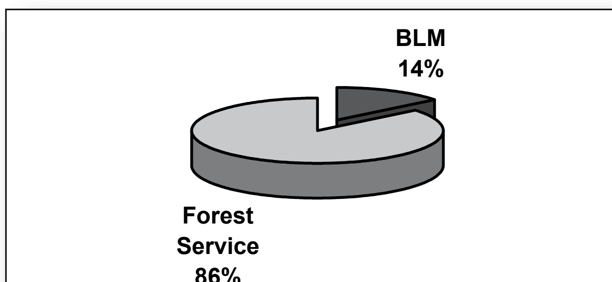


Table 3-77. Livestock Grazing Authorizations By District

Authorization Type	Coos Bay District	Medford District	Klamath Falls Resource Area (Lakeview District)	Total
Allotments	0	95	96	191
Leases	4	0	0	4
Public land acres	16	352,312	207,682	560,010
Active animal unit months	23	13,416	13,401	26,840
Permittees or lessees	3	59	92	154

The number of vacant allotments and leases within the planning area increased from 17 in 1996 (all in the Medford District), to 53 in 2004 (43 in the Medford District, 2 in the Coos Bay District, and 8 in the Klamath Falls Resource Area of the Lakeview District). See *Figure 3-148 (Change in the number of active allotments between 1996 and 2004)*. Some allotments have been vacant since the 1970s. The reasons for the increase of vacant allotments include:

- relinquishment by operators
- cancellation due to nonuse or noncompliance
- lack of interest
- intermingled private land making it difficult to graze within an allotment
- lack of fencing to control livestock on public land

Vacant allotment

A vacant allotment is an allotment that does not currently have an active permit or lease.

The overall number of active animal unit months has decreased within the planning area. See *Figure 3-149 (Change in active animal unit months between 1996 and 2004)*. The increase in the total active animal unit months for the Klamath Falls Resource Area between 1996 and 2004 is a result of a combination of factors, including:

- land sales, acquisitions, and exchanges
- changes based on rangeland health assessments and rangeland survey results
- adjustments to correct past allocation errors

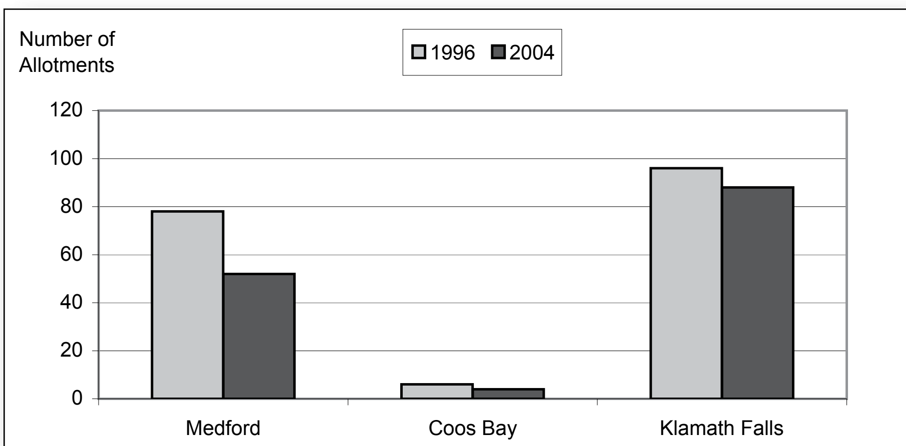


Figure 3-148. Change In The Number Of Active Allotments Between 1996 And 2004

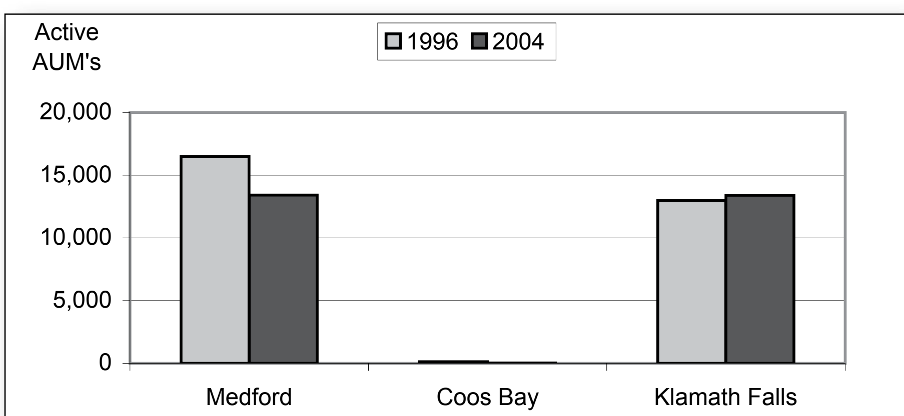


Figure 3-149. Change In Active Animal Unit Months (AUMs) Between 1996 And 2004

The condition within individual allotments is variable based on historic grazing levels, past management actions, and current grazing management. For example:

- In the Coos Bay District, the vegetation on BLM-administered land within the four grazing leases is characterized by a mix of native grass species, noxious weeds, and nonnative pasture vegetation with the nonnative pasture species being the dominant vegetation.
- In the Medford District, the vegetation within grazing allotments is characterized by a mix of grassland, chaparral, and mixed conifers and hardwoods.
- In the Klamath Falls Resource Area of the Lakeview District, the eastern portion of the resource area is characterized by nonforested uplands comprised of sagebrush and juniper communities. The western portion of the resource area is characterized by mixed conifers and hardwoods.

Current grazing regulations direct BLM to manage livestock grazing in accordance with the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington. The standards are the basis for assessing and monitoring rangeland conditions and trends. If livestock is a significant causal factor in the failure to meet a standard, management is implemented to ensure that progress is being made toward attainment of the standard. A total of 116 allotments (59% of the number of allotments and leases, and 56% of the total number of public land acres within the planning area) have been assessed. Livestock was identified as a significant causal factor in the failure to meet one or more of the standards on all or portions of 12 allotments. See *Table 3-78 (Rangeland health standards assessment results)*.

Range improvements have been developed when needed to achieve the standards for rangeland health for Oregon and Washington, resource management plan objectives, or other allotment-specific objectives.

Table 3-78. Rangeland Health Standards Assessment Results

Rangeland Standards Category	Coos Bay District		Medford District		Klamath Falls Resource Area (Lakeview District)		Totals	
	# of Allot-ments	Acres	# of Allot-ments	Acres	# of Allot-ments	Acres	# of Allot-ments	Acres
Meeting or making significant progress toward meeting all standards	4	16	20	19,640	52	106,659	76	126,315
Not meeting or making significant progress, but appropriate action has been taken to ensure significant progress (livestock is a factor)	0	0	3	640	9	35,404	12	36,044
Not meeting or making significant progress toward meeting standards due to causes other than livestock grazing	0	0	18	103,743	10	47,452	28	151,195
Total Assessed	**4**	**16**	**41**	**124,023**	**71**	**189,515**	**116**	**313,554**
Total Not Assessed	**0**	**0**	**54**	**228,289**	**25**	**18,167**	**79**	**246,456**
Totals per District	**4**	**16**	**95**	**352,312**	**96**	**207,682**	**195**	**560,010**

Note: The category of *Rangelands Not Meeting All Standards or Making Significant Progress Toward Meeting the Standard-No Appropriate Action* is provided here to ensure the category *Significant Progress Toward Meeting the Standard (Livestock is a Significant Factor)* is not included in the above table since the numbers would all be zero.

See *Table 3-79 (Range Improvements constructed or maintained from 1996 through 2006)*. Range improvements have been constructed to:

- improve livestock distribution
- provide forage for livestock
- provide for restoration
- protect sensitive areas
- improve wildlife habitat
- facilitate intensive management of livestock by implementing grazing systems.

As overstory canopy cover decreases, understory forage production increases (USDA Soils Conservation Service 1971, Young et al. 1967). Forage production is greater within regeneration harvest units than within thinned stands, because the understory vegetation does not have to compete with the overstory for limited resources. Over time, forage production would decline as juvenile trees continue to grow and begin to outcompete forage for the limited resources. The understory production is also influenced by successional stage and forest type (Walburger et al. 2005). The amount of forage production would be higher within a stand establishment forest than within a young, mature and structurally complex forest. See *Figure 3-150 (Forage production [represented through canopy cover] within a stand establishment forest versus a young forest)*.

Off-highway vehicle use affects livestock grazing through the disturbance or harassment of livestock, and by the type of vehicles and access that permittees and lessees use to manage livestock or to conduct range improvement maintenance. For example:

- Areas designated as open to off-highway vehicle use provide more opportunities for the disturbance or harassment of livestock than areas designated as limited.
- Areas designated as open to off-highway vehicle use do not limit the type of vehicle and availability of access that operators can use to move livestock or conduct range improvement maintenance.

Vegetation treatments affect livestock grazing by changing the use of foraging areas and changing forage production. If vegetation treatments cause conditions in which soil and vegetation are no longer capable of supporting livestock, adjustments to foraging areas would be made. Forage production declines following vegetation treatments, but increases over time as vegetation recovers.

Table 3-79. Range Improvements Constructed Or Maintained From 1996 Through 2006

Type of Project	Coos Bay District		Medford District		Klamath Falls Resource Area (Lakeview District)		Totals	
	Units	Miles	Units	Miles	Units	Miles	Units	Miles
Livestock fences constructed	0	0	18	5	11	19	29	24
Livestock fences maintained	0	0	123	64	21	38	144	102
Reservoirs constructed or springs developed	0	---	6	---	3	---	9	---

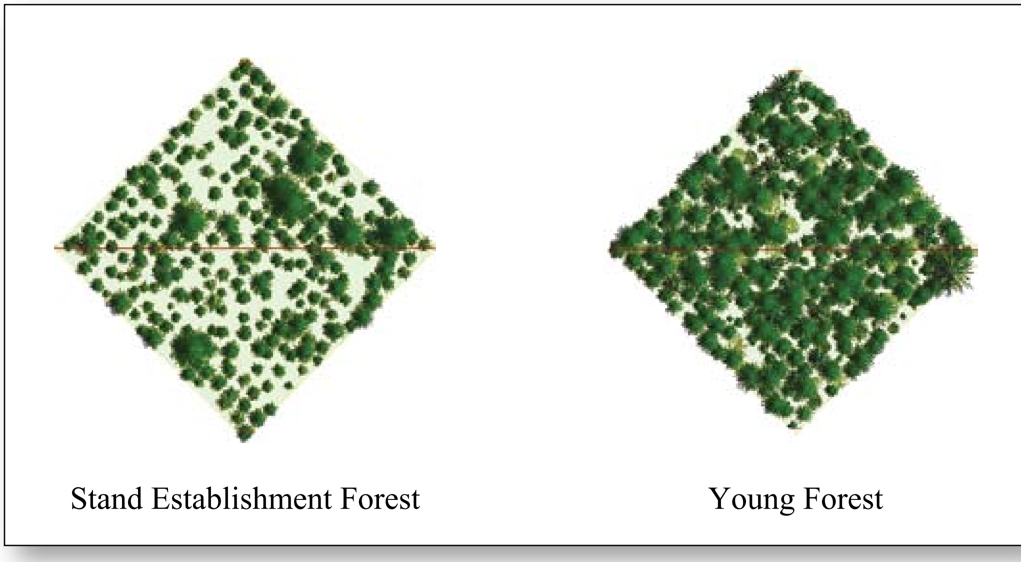


Figure 3-150. Forage Production (Represented Through Canopy Cover) Within A Stand Establishment Forest Versus A Young Forest

Wild Horses

Key Points
The wild horses within the Pokegama Herd Management Area have an appropriate management level of 30 to 50 head.

The Pokegama Herd Management Area is the only herd management area within the planning area. It encompasses a total of 80,885 acres in Oregon and California and includes private, state, and federal lands. About 84% of the herd management area (67,869 acres) is within the planning area. See *Figure 2-3 (Location of Pokegama Herd Management Area) in Chapter 2* and *Figure 3-151 (Wild horses in the Pokegama Herd Management Area)*.

The Wild Free-Roaming Horses and Burro Act of 1971 requires BLM to protect and manage wild horses in areas where they were found at the time of the Act, in a manner designed to achieve and maintain a thriving natural ecological balance. This includes the Pokegama Herd Management Area. Management of the Pokegama Herd Management Area is guided by the Pokegama Wild Horse Herd Management Area Plan (USDI BLM 2002) that identifies specific management objectives and actions.

Approximately 23% of the herd management area that lies within the planning area is located on BLM-administered land; the remainder is on private land. The wild horse herd is estimated to spend approximately 80% to 90% of its time on private land. The herd management area on BLM land is administered by the Klamath Falls Field Office of the Lakeview District. Private landowners have generally allowed wild horses on their lands, providing the horses are within the established appropriate management level and do not range outside the herd management area.

Figure 3-151. Wild Horses In The Pokegama Herd Management Area

The appropriate management level for the Pokegama Herd Management Area is 30 to 50 head. The appropriate management level has been maintained through two captures that were completed in 1996 and 2000. Since designation of the herd management area in 1971, its wild horse population has ranged from 25 in 1972, to 55 in 2000. The current estimate of the herd size is 30 to 35 animals.

The average growth rate for the Pokegama herd is 4% to 5%, which is below the average rate of 20% for other wild horse herds. The lower growth rate for the Pokegama herd may be related to a higher ratio of male to female horses (Gottlieb 1993). The lower growth rate may also be related to young horses being killed by mountain lions during the winter or being illegally removed (USDI BLM 2002). The overall condition of the herd is excellent (USDI BLM 1996c, 2002).

Due to the high percentage of private lands (77%) within the herd management area and the use the herd makes of those lands, 150 animal unit months of forage are allocated to the herd on BLM-administered lands. That amount of forage is based on the proportion of BLM-administered lands in the herd management area.

The Oregon portion of the herd management area lies within the boundaries of two grazing allotments. There is abundant forage and available water within the two allotments that comprise the herd management area, even though the distribution of the wild horses is not uniform. Forage is allocated for livestock, wild horses, deer and elk (USDI BLM 1994f). The Pokegama herd prefers (94%) meadows, open areas, and the tree cover on the edge of meadows (Gottlieb 1993). During the spring and summer, the horses are seen in the northern and central portions of the herd management area. Due to the typically high winter snow accumulations present on the northern and central portions of the herd management area, the horses concentrate in the southern portion of the area from December through March.

Most (95%) of the Californian portion of the herd management area (13,016 acres) is located on private and state land; only 5% is located on BLM-administered land. Usually, the Pokegama herd can be found on the Californian portion of the herd management area during the winter and early spring, although they can be found there at any time of the year.

The diet of the Pokegama herd is predominantly grasses and grass-like species. Their primary water sources include creeks, springs, and reservoirs. The BLM and private landowners have constructed several exclosures to protect riparian areas from wild horse use. The majority (70% to 80%) of developed water sources (springs and reservoirs) for the Pokegama herd is on private land (Lindsey 2006).

Areas of Critical Environmental Concern and Research Natural Areas

Key Points

- Relevant and important resource values are being protected and maintained on BLM-administered lands through the special management attention prescribed within 95 designated and 4 old potential areas of critical environmental concern totaling 82,232 acres.
- There are 33 new potential areas of critical environmental concern totaling 19,751 acres.
- There is a high level of diversity in both the values protected within the areas of critical environmental concern across the planning area and the number and types of values within any one area of critical environmental concern.

Areas of Critical Environmental Concern (ACECs) are defined in the Federal Land Policy and Management Act as areas within the public lands where special management attention is required to protect or to prevent irreparable damage to:

- important historic, cultural, or scenic values
- fish and wildlife resources
- other natural processes or systems
- life and safety from natural hazards

Special management attention is developed to expressly protect relevant and important values. The management measures used for special management attention would not be necessary if the relevant and important values were not present, if they were already protected through some other mechanism, and would not be prescribed in the absence of the designation.

Some special management attention is designed to change the relevant and important value on a trend towards the desired condition. Other special management attention is designed to protect the relevant and important values from management actions or other human activities. This may include prohibiting or modifying certain management activities.

To be considered for designation as an area of critical environmental concern, an area must meet relevance and importance criteria and require special management attention. An area meets the relevance criterion if it contains one or more of the following:

- an important historic, cultural, or scenic value
- a fish and wildlife resource
- a natural process or system
- a natural hazard

The value, resource, process or system, or hazard described above must have substantial significance to satisfy the importance criteria. This generally means that the value, resource, process or system, or hazard is characterized by one or more of the following:

- The qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource, are more than locally significant.
- It has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- It has been recognized as warranting protection to satisfy national priority concerns or to carry out the mandates of the Federal Land Management and Practices Act.

- It has qualities that warrant highlighting to satisfy public or management concerns about safety or public welfare.
- It poses a significant threat to human life or safety, or to property.

Research Natural Areas (RNAs) are designated as a type of area of critical environmental concern. These areas are established and maintained for the primary purpose of research and education because the land has one or more of the following characteristics:

- typical representation of a common plant or animal association
- unusual plant or animal association
- threatened or endangered plant or animal species
- typical representation of common geologic, soil, or water feature
- outstanding or unusual geologic, soil, or water feature

The research natural area network in the Pacific Northwest is designed to represent a wide range of elevation, geology, topography, soils, and vegetation communities throughout the region in partnership with the Forest Service, state natural resource agencies, and key private organizations. This network allows for evaluation of differential responses to environmental change in comparison to forests managed for sustained yield.

Outstanding Natural Areas (ONAs) are dually designated as areas of critical environmental concern. These areas are designated to protect unique scenic, scientific, educational, and recreational values of certain areas within the public lands.

Within the planning area, there are:

- 95 designated areas of critical environmental concern
- 4 potential areas of critical environmental concern under interim management
- 33 designated areas of critical environmental concern that are also research natural areas
- 7 designated areas of critical environmental concern that are also outstanding natural areas

There are 82,232 acres within the designated and old potential areas of critical environmental concern. These potential areas of critical environmental concern are under interim management. (The potential areas of critical environmental concern were nominated during the previous resource management plan process [USDI BLM 1994 a, b, c, d, e, and f] and are referred to in this analysis as "old" potential areas of critical environmental concern.) See *Table 3-80 (Designated and old potential areas of critical environmental concern by district)*.

Each district received new nominations for areas of critical environmental concern for the revisions of the western Oregon resource management plans. Of those nominations, 33 areas were found to meet the relevance and importance criteria and were recommended for further analysis in the plan revisions as new potential areas of critical environmental concern. Although these areas are not currently designated as areas of critical environmental concern, their relevant and important values receive interim management upon nomination and are discussed in this analysis. None of these areas were nominated as research natural areas or outstanding natural areas. There are 19,751 acres within these 33 new potential areas of critical environmental concern. See *Table 3-81 (New potential areas of critical environmental concern by district)*.

Relevant and important values are usually described in four categories. See *Table 3-82 (Value categories for designated and old potential areas of critical environment concern by district*) and *Table 3-83 (Value categories for new potential areas of critical environmental concern by district)*.

- ***Historic, cultural, or scenic values*** include, but are not limited to, rare or sensitive archeological resources and religious or cultural resources that are important to Native Americans.

- ***Fish and wildlife resources*** include, but are not limited to, habitat that is needed for endangered, sensitive, or threatened species, or habitat that is essential for maintaining species diversity.
- ***Natural processes or systems*** include, but are not limited to, endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities that are terrestrial, aquatic, or riparian; or rare geological features.
- ***Natural hazards*** include, but are not limited to, areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs. A hazard caused by human action may be considered a natural hazard if it is determined through the resource management planning process that it has become part of a natural process.

Although it is only necessary for an area to meet the relevance and importance criteria for one value to qualify as an area of critical environmental concern, many areas within the planning area meet these criteria for several values. However, the number of values that meet the relevance and importance criteria can vary widely across the planning area, as can the combination of values that meet these criteria within an area of critical environmental concern. For example, area of critical environmental concern values range from a single special status plant species (Kincaid's lupine) in the Stouts Creek Potential Area of Critical Environmental Concern in Roseburg, to a combination of unique geologic features, vernal pools, special status plants (natural processes and systems), listed fairy shrimp (fish and wildlife), developed interpretive educational area, scenic and cultural values at the Table Rocks Area of Critical Environmental Concern/ Outstanding Natural Area in Medford.

Table 3-80. Designated And Old Potential Areas Of Critical Environmental Concern By District

Areas of Critical Environmental Concern (ACECs)	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls	Totals
Designated ACECs	26	15	10	11	28	5	**95**
Potential ACECs (under interim management)	0	3	0	0	0	1[a]	**4**
Research natural areas[b]	7	5	7	1	12	1	**33**
Outstanding natural areas	4	2	0	0	1	0	**7**
Total ACEC acres per district	**19,157**	**12,755**	**12,022**	**9,752**	**17,320**	**11,226**	**82,232**
Total BLM acres per district	**403,000**	**315,100**	**426,300**	**322,700**	**865,800**	**224,900**	**2,557,800**
% ACEC acres of BLM acres	**4.8%**	**4.0%**	**2.9%**	**3.0%**	**2.0%**	**5.6%**	**3.3%**

[a] At the time of publication of the DEIS, the Bureau of Reclamation (BOR) was considering a proposal to relinquish a withdrawal of public lands known as the Four Mile property. Anticipating that relinquishment, the DEIS included this property in the analysis. However in January 2008, the BOR decided to drop the proposed relinquishment. Thus, the administration over the Four Mile property remains with the Bureau of Reclamation and as such would not be subject to management direction by the BLM's resource management plan. The Four Mile ACEC, therefore, has been removed from analysis in the EIS.

[b] The research natural areas and outstanding natural areas are dually designated as Areas of Critical Environmental Concern, and their numbers are already counted within the designated and potential numbers.

Table 3-81. New Potential Areas Of Critical Environmental Concern By District

Areas of Critical Environmental Concern (ACECs)	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls	Totals
New potential ACECs	11	5	3	5	7	2	**33**
Total potential ACEC acres per district	**4,648**	**2,040**	**205**	**4,053**	**8,620**	**185**	**19,751**
Total BLM acres per district	**403,000**	**315,100**	**426,300**	**322,700**	**865,800**	**224,900**	**2,557,800**
% ACEC acres of BLM acres	**1.2%**	**0.6%**	**0.05%**	**1.3%**	**1.0%**	**0.08%**	**0.8%**

Table 3-82. Value Categories For Designated And Old Potential Areas Of Critical Environment Concern By District

Value Category	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls	Totals
Historic, cultural, and scenic	8	4	2	5	8	4	**31**
Fish and wildlife	17	12	3	5	8	4	**49**
Natural process or system	26	15	9	11	27	6	**94**
Natural hazard	2	0	0	0	0	0	**2**

Table 3-83. Value Categories For New Potential Areas Of Critical Environmental Concern By District

Value Category	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls	Totals
Historic, cultural, and scenic	0	0	0	1	1	1	**3**
Fish and wildlife	1	3	0	2	3	1	**10**
Natural process or system	9	4	3	5	7	2	**30**
Natural hazard	1	0	0	0	0	0	**1**

Cultural Resources

Key Point

Cultural and paleontological sites are not evenly distributed across the districts, but natural features and historic resource use is used to predict the majority of site locations prior to ground disturbance.

Cultural and paleontological resources are nonrenewable and typically consist of physical remains. Some traditional use sites and some historic sites may only be identified through written historic records or oral traditional sources and may not have physical remains. Collectively, these resources can be called heritage resources. See *Table 3-84 (Heritage resources by district)*.

Cultural resource locations are identified as:

- sites (locations of a significant event, a prehistoric or historic occupation or activity, or a building or structure); or
- isolated finds (locations with fewer than 10 artifacts).

Cultural sites may be prehistoric, historic, or both. Sites may be entirely buried, consist of above-ground or built features only (particularly historic sites), include archeological remains, or consist of features that are not native or natural to the specific environment. For example, non-native features such as domestic fruit trees and a clearing may be the only remaining evidence of a homestead site.

Types of Cultural Resource Sites

The types of cultural resource sites include lithic scatters and other prehistoric sites, historic sites, paleontological sites, and traditional use sites.

- Lithic scatters account for at least 80% of the prehistoric sites within the planning area. Lithic scatters are sites that consist primarily of flakes and chipped stone tools.

Table 3-84. Heritage Resources By District

Heritage Resources	BLM Districts					
	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls
Archaeological sites[a]	58	89	223	47	357	1131[c]
Historic sites[b]	142	7	23	45	711	10[c]
National Register of Historic Places (eligible)	7	2	45	5	130	0[d]
National Register of Historic Places (listed)	4	0	2	1	26	0[d]
Percent of district inventoried	25	4	15	10	7	50
Paleontological sites	6	1	18	19	2	Isolated[e]

[a]Sites that contain either or both prehistoric and historic surface and subsurface deposits.
[b]Sites with historic structural remains.
[c]207 sites incorrectly included in Draft EIS as historic; corrected to archaeological on this table.
[d]No formal determinations have been conducted.
[e]A location of fewer than 10 fossilized pieces.

- Other categories of prehistoric sites recorded within the planning area include rock shelters, middens, middens with structural features, rock art, rock features, lithic quarries, house pits, and peeled trees. Human burial sites may occur either as individual sites or as features within larger sites (e.g., middens and housepit villages). Stacked rock hunting blinds and rock ring villages are contained in the Klamath Falls Resource Area of the Lakeview District. Stacked rock cairns in the Klamath Falls Resource Area are often associated with Native American vision quests.
- Historic sites within the planning area are predominantly associated with the following activities:
  — homesteading, ranching, and settlement
  — logging
  — fire suppression
  — mining
  — subsistence living
  — government management of the land
- Paleontological sites consist of the physical remains of past animal or plant life in the form of fossils. Paleontological sites are uncommon within the planning area. With the exception of fish, the known sites do not include vertebrate fossil remains but consist of invertebrate marine and plant species.
- Traditional use sites play a current role in a living community's historically rooted beliefs, customs, and practices. Traditional use sites within the planning area include areas where traditional resources (food resources, basket making resources, and other traditional material sites) are collected, spiritual locations, and sacred sites. Two of the federally recognized Indian tribes within the planning area (the Confederated Tribes of the Warm Springs Reservation of Oregon and the Klamath Tribes, Oregon) have off-reservation treaty rights. The Klamath Tribes, Oregon rights, apply to their former reservation boundaries of which 185 acres lie in the wetlands of the Wood River in Klamath Falls Resource Area. Members of the Confederated Tribes of the Warm Springs Reservation of Oregon exercise their off-reservation rights within the planning area (west of the Cascade crest into the Portland basin and extending south into the northeast reaches of the Eugene District). Trust responsibility directly applies to proposed agency actions that could pose an effect on tribal lands and resources (e.g., water quality, air quality, or fire control).

Locations of Cultural Sites

Prehistoric Sites

West Slopes of the Cascade Mountains – Willamette Province

The majority of prehistoric archaeological sites on property administered by the BLM on the west slopes of the Cascades are situated in predictable locations. Sites are situated along the crests of major ridge systems, often within saddles. Sites occur on river and stream terraces and on upland slump benches and meadows. Sites are also commonly situated on lower reaches of east, south and west aspect slopes within 400 to 500 feet upslope from the boundary between the hill slope and the valley floor of larger secondary streams such as the Mohawk River, the Molalla River, or Fall Creek. Quarry sites occur on slopes.

Ridgeline sites are the most scattered because their locations are strongly associated with saddles that are limited in number and distribution. Not all ridgeline saddles contain archaeological sites. Sites within this location category have a density of one or two per linear mile of ridgeline. Valley margin sites have much higher densities with as many as 14 sites recorded within a single 500-acre tract, for an average density of approximately one site per 37 acres. However, site distribution in this setting is often much more concentrated with as many as six discrete artifact clusters in a 40-acre tract.

Properties administered by the BLM Salem and Eugene Districts, with some notable exceptions, are absent from valley floors of all but the most minor streams. The Roseburg District manages a larger number of acres on river and stream terraces than either Salem or Eugene Districts.

Coast Range

There are only 12 recorded prehistoric archaeological sites located on land administered by the BLM in the Coast Range. The paucity of prehistoric archaeological sites in the Coast Range is attested to by numerous pre-project cultural resource surveys conducted between 1975 and 1992, and by post-project surveys completed between 1992 and the present. The few known sites do not provide enough information to identify high probability topographic settings for site occurrence. Two sites are along a high bald ridgeline, two others are on terraces adjacent to a mountain spring, one is on a grassy bald, and four are on terraces adjacent to major rivers. Sites found on private ownerships indicate that sites occur on terraces along major rivers such as the Alsea and Siuslaw.

The scarcity of known prehistoric sites on BLM-administered land in the Coast Range is at least in part due to the history of BLM land tenure in the Coast Range. Most of the land administered by the BLM is revested O&C Railroad (and Coos Bay Wagon Road) parcels. The steep mid-slope locations of these lands largely preclude habitation areas. In contrast, early homesteading focused on largely flat valley floor and river/stream terrace areas, places where prehistoric habitation is much more likely. Today, these flat areas where prehistoric sites may occur in larger numbers largely remain in private ownership.

Siskiyou Mountains

Known prehistoric sites are located in the vicinity of permanent springs, as well as along river/stream terraces. The underlying serpentine bedrock includes pockets of high quality rock that was used prehistorically for tool production. As least one excavated site on BLM-administered land is located on a small mid-slope terrace with access to tool-making raw materials. Other prehistoric sites on BLM-administered land are found along ridge tops. Availability of water was a greater factor in choosing prehistoric habitation site locations in the Siskiyou Mountains than in either the Coast Range or West Cascades, particularly during the fall acorn harvest.

Known prehistoric site density appears higher in this region than in the Coast Range, although the scattered nature of BLM parcels and surveyed areas limits meaningful quantitative measurement.

Medford

Slope is a prominent factor in the location of prehistoric sites in the Medford District. Slope greater than 35% is associated with a low incidence of prehistoric site occurrence. Other factors include proximity to water and presence of culturally important geologic resources such as tool stone.

Coastal Shelf

The BLM manages scattered parcels within the Oregon Coastal Shelf, which is the area between the Pacific Ocean and Coast Range and the Siskiyou Mountain foothills. This north-south corridor has seen substantial historic settlement and infrastructure development, second only to the central valley (Willamette, Umpqua and Rogue River valleys), and this development has adversely affected preservation of prehistoric cultural resources. Prehistoric resources are most obvious in the form of shell middens. However, many coastal prehistoric sites also contain a non-shell component. Shell middens are associated with stable camps and villages, as well as resource acquisition locations. Prehistoric residents of the coastal shelf also ventured far inland to acquire resources, so "coastal-type" prehistoric sites can be found relatively far upstream along major rivers and at other resource acquisition locations. Several BLM-managed prehistoric sites on the Coastal Shelf have been determined eligible for listing on the National Register of Historic Places.

Klamath Falls Resource Area

Prehistoric cultural resource occurrence reflects a mix of two physiographic provinces—Basin and Range and High Cascades. Cultural influences from California, the Plateau, and the Great Basin are manifest in the assemblages found within sites. Sites tend to be near water sources, within areas affording unobstructed views to prominent landscape features (Mt. Shasta, Mt. McLoughlin, Yainax Butte, Bryant Mountain, etc.), along ridgelines, and adjacent to rock outcrops.

The Klamath River Canyon contains some of the oldest and most significant prehistoric sites known for the Klamath Falls Resource Area. Historic era ranch/homestead sites and logging-related sites are also present throughout the canyon. Many of these sites are on private property, although nearly 30 sites are known to exist on BLM-administered land. This area appears to have been a transition area between the Klamath Indians to the north and the Shasta Indians to the south. Both groups are known to have utilized abundant resources of the canyon over the last several millennia.

The Gerber Block, located in the eastern portion of the Klamath Falls Resource Area, contains the vast majority of known archaeological sites in the resource area. The Modoc Indians were known to utilize this area for hunting as well as gathering. Numerous village sites, lithic and groundstone artifact scatters, and rock cairn sites have been documented in this area.

Historic Sites

Historic site distribution differs from that of prehistoric sites. The majority of historic sites consist of the remains of features constructed as temporary or permanent residences or transportation features for: homesteading or to obtain timber, minerals and other commodity resources; early fire protection activities; or government resource management purposes. Historic sites often contain significant prehistoric cultural resources as well. Homesteading and settlement, logging, and transportation-related sites are found generally in the Cascades, Coast Range, and Siskiyou Mountains. Mining-related sites occur very specifically in relation to economically valuable mineral deposits.

Historic sites occur in various locations including alongside drainages, along ridgelines and on peaks, in and around meadows and wetlands, and along stream terraces. Slope is not a reliable predictor for historic site occurrence, particularly those associated with logging or mining. The presence of geologic resources such as precious metal, however, is a reliable predictor for mining sites. Historic access features (e.g., roads, trails and railroad grades) have often been built over into the current transportation network. A few remnants of historic transportation routes do remain, often as short sections that were not used when more modern transportation roads were constructed.

Few historic structures from the first settlement activities (mid-19h through the early-20th century) can still be found standing. Historic sites representing early settlement activities appear to be more frequent in the Cascades and Siskiyou Mountains than in the Coast Range for several reasons. The Willamette Valley was the destination of Oregon's earliest settlers and, in historic times, was always the most densely populated area in the state relative to other regions. Early settlement of the most agriculturally productive land in the Willamette Valley resulted in later-arriving settlers seeking homesteads along Willamette Valley margins and tributaries and claiming lands that often could not be successfully farmed. Repeated efforts following economic boom and bust cycles in the Willamette Valley led to short-term homesteading or to subsistence living attempts in the Willamette uplands, which have left some cultural remains visible today. Historic site frequency probably was higher in the Siskiyou Mountains, as farming and ranching activities were more easily undertaken in this more open environment. Weather in this more southern environment preserves structural remains longer than in the northern areas and in the Coast Range. To some extent in the Cascade Range and to a greater extent in the Siskiyou Mountains, remaining sites are more visible than in the Coast Range, due to the open vegetation.

Across the historically timbered western regions of Oregon, remnants of early logging activity can still be seen (e.g., logging sleds and springboard cuts in remaining stumps), although these are usually badly deteriorated. Remnants of post-World War II logging are most common and include abandoned machinery, cables, campsites, and garbage dumps. These historic cultural remains can be found wherever previous logging took place and are not limited to flat areas or to locations near modern roads.

Early historic settlement activities focused on portions of the coastal shelf, and although BLM-administered parcels compose a relatively small fraction of this area, important historic sites are located on BLM land. These include several on the National Register of Historic Places. Throughout historic times, the U.S. Government made improvements on coastal headlands for military purposes and shipping safety. Many parcels that were withdrawn by the government for these missions may revert to the BLM after their required use is completed.

Paleontological Sites

Although rare within the planning area, paleontological resources have been found in the sedimentary rock that exists on all districts.

Traditional Use Sites

Identification of traditional use sites cannot be effectively accomplished without the help of recognized tribal governments and other traditional groups who currently use the sites for traditional practices.

The Confederated Tribes of the Warm Springs Reservation of Oregon and Klamath Tribes, Oregon have reserved treaty rights within specific and defined portions of the planning area. Other recognized tribes also have traditional areas and resources of concern within the planning area. A list of tribes with interests within the planning area is included in *Appendix O - Federally Recognized Indian Tribes With Interests in the Planning Area.*

Cultural Resource Significance and Management Category Criteria

After being identified, cultural sites are evaluated and managed according to two different sets of criteria:

- **Eligibility criteria of the National Register of Historic Places.** Eligibility for listing on the National Register of Historic Places is assessed using criteria that addresses site integrity and considers factors that include uniqueness, research potential in the study of history or prehistory, and association with important events or persons that have made contributions to the broad patterns of history. The first element addressed in the National Register of Historic Places significance criteria is site integrity.
- **Criteria of the management use categories of the BLM** (BLM Manual Section 8110.42). Six BLM management use categories (scientific use, conservation for future use, traditional use, public use, experimental use, and discharged from management) are employed to provide for site protection and use standards. Although some scientific and experimental uses result in physical alteration of resources, the uses generally do not imply consumptive use. Managed use of cultural resources can be fully compatible with long-term preservation and also provide the means by which preservation is achieved.

The importance of identified traditional use sites and resources is determined in consultation with federally recognized tribal governments.

Lands, Realty, Access, and Transportation

Key Points
• There has been limited activity in acquisition of lands by purchase under Zone 1. The majority of BLM-administered lands within the plan area is Zone 2 (suitable for exchange), and approximately 55,000 acres are in Zone 3 (suitable for disposal).
• There are 70 communication sites on BLM lands in the planning area.
• The BLM lands are generally available for rights-of-way. The majority of rights-of-way in western Oregon are for logging roads. Some rights-of-way are for access and utilities to private lands due to the checkerboard ownership pattern of BLM lands intermingled with private lands.
• Most legal access to federal and nonfederal timberlands is provided through long-term or perpetual reciprocal right-of-way agreements. An estimated 80% of public land within the planning area is available for road construction and use under reciprocal right-of-way agreements.
• The BLM controls about 14,000 miles of road within the planning area.

Lands and Realty

Land use plans use land tenure zones to identify lands that are available for retention, proposed disposal, or acquisition. The factors considered in evaluating opportunities for the disposal or acquisition of lands can be found in *Appendix P - Lands, Realty, Access, and Transportation*.

The three land tenure zones identify lands as follows:

- Zone 1 - retention and acquisition
- Zone 2 - exchange and consolidation
- Zone 3 - disposal

For the acreage of the land tenure zones under the current Resource Management Plans for the six districts within the planning area, see *Table 3-85 (Acres of existing land tenure zones by district)*. Existing Resource Management Plans contain detailed lists of the parcels.

There has been limited activity in the acquisition of lands by purchase under Zone 1. Ongoing land acquisition projects include the Sandy River/Oregon National Historical Trail (Salem District) and the Susan Creek Recreation Area (Roseburg District).

Table 3-85. Acres Of Existing Land Tenure Zones By District

BLM District	Zone 1	Zone 2	Zone 3
Salem	160,200	228,000	9,900
Eugene	78,175	238,398	36
Roseburg	35,930	380,989	13,352
Coos Bay	4,600	324,000	1,100
Medford	292,100	558,600	7,600
Klamath Falls Resource Area (Lakeview District)	186,000	3,000	23,000
Total acres per zone	**757,005**	**1,732,987**	**54,988**

Source: Current RMPs for the six BLM districts within the planning area (USDI BLM 1994a, b, c, d, e, and f)

The majority of BLM-administered land within the planning area is identified as Zone 2 (suitable for exchange). Land exchanges, as a method of adjusting land tenure, have had limited use in the support of resource management programs. Land exchanges have become extremely controversial and difficult to complete. Most land exchanges and transfer activities within the planning area were directed by federal legislation rather than by a discretionary agency action. Ongoing land exchange projects include the Berry Rock Land Exchange (Medford District).

There are 54,988 acres of BLM-administered land within the planning area that are designated as Zone 3 (suitable for disposal). There have been 2,186 acres sold to date since implementation of the 1994 district RMPs. These lands were sold primarily to resolve unintentional occupancy trespass cases. Lands identified for sale are not sold if project-level reviews show conflicts with the land tenure adjustment criteria.

Section 3 of the Oregon Public Lands Transfer and Protection Act (Public Law 105-321, dated October 23, 1998) established a "no net loss" requirement for lands administered by the BLM in western Oregon. The Act requires that, when selling, purchasing, or exchanging land, the BLM may not:

- reduce the total acres of the Oregon and California Railroad Grant (O&C) lands or the Coos Bay Wagon Road (CBWR) lands.
- reduce the number of acres of O&C, CBWR, and public domain lands that are available for timber harvesting.

The Act requires the BLM to ensure a no net loss of acres on a 10-year basis beginning on the date of enactment and each 10-year period thereafter. To date, the BLM in western Oregon shows a surplus of 50 acres of O&C land and a deficit of 63 acres of harvestable timber land. There has been a general decline in the use of land sales or land exchanges in western Oregon as methods of adjusting land tenure since the enactment of this law.

Withdrawals generally segregate land from operations under the nondiscretionary general land laws, mining laws, and sometimes the mineral leasing laws, but do not always affect BLM surface management. Classifications generally segregate the lands from all forms of appropriation under the public land laws, including the mining laws, but not the mineral leasing laws.

There are 70 communication sites on BLM-administered land within the planning area. Several sites have multiple authorized users or uses, including two-way, microwave, and low power relay. These uses are generally compatible on the same site. Mass media users with associated high power transmissions are generally not compatible with existing low power uses on these developed sites.

Access

The BLM-administered land is generally available for needed rights-of-way where consistent with local comprehensive plans, Oregon statewide planning goals and rules, and the exclusion and avoidance areas identified in resource management plans. Numerous types of rights-of-way have been authorized by the BLM, including:

- state highways
- county roads
- private access roads
- trails
- power transmission lines
- electric distribution and service lines
- telephone and cable television lines
- railroads
- water pipelines and reservoirs
- canals
- federal highway material sites
- communication sites
- oil and gas pipelines
- bicycle paths

The checkerboard land ownership pattern of the O&C lands generates most of the need to cross public lands in order to provide access and utilities to intermingled private lands. New right-of-way proposals across public lands are likely to continue in the future. The location and nature of such proposals is generally not known until an application is received by the BLM.

Major existing right-of-way corridors within the planning area are shown in *Map 2-6 (Utility corridors)* in *Chapter 2*. Existing facilities located within right-of-way corridors include Bonneville Power Administration and private electric transmission lines, pipelines, fiber-optic lines, and transportation infrastructure.

A programmatic environmental impact statement to designate corridors for oil, gas, and hydrogen pipelines, and electricity transmission and distribution facilities on federal lands in 11 western states is currently underway by the Department of Energy. After the environmental impact statement is completed, the BLM will amend relevant land use plans, as necessary, to implement any new energy transmission and distribution corridor designations. The project currently includes the Salem, Eugene, Roseburg, Medford, and Lakeview Districts.

The proposed Jordan Cove Energy Liquid Natural Gas Terminal and Pacific Connector Gas Pipeline project would include an approximately 223-mile-long, 36-inch-diameter natural gas pipeline extending from a new terminal in Coos Bay south-eastward across Coos, Douglas, Jackson, and Klamath Counties in Oregon to an interconnection with an existing pipeline near Malin, Oregon. The proposed route extends across 40 miles of BLM-administered land in the Roseburg, Coos Bay, Medford, and Lakeview Districts. The Federal Energy Regulatory Commission will prepare an environmental impact statement to address the environmental consequences of the project. The final environmental impact statement is scheduled to be completed in 2008.

The proposed Palomar Gas Pipeline project would include an approximately 220-mile-long, 36-inch-diameter natural gas pipeline extending from an existing mainline in Wasco County, Oregon to a delivery point near Molalla, Oregon in Clackamas County, and from there to a proposed Liquefied Natural Gas terminal near Bradwood in Clatsop County, Oregon. The proposed route extends across less than 2 miles of BLM-administered land in the Salem District. The Federal Energy Regulatory Commission will prepare an environmental impact statement to address the environmental consequences of the project. The final environmental impact statement is scheduled to be completed in 2009.

The proposed Ruby Pipeline project would include an approximately 680-mile-long, 42-inch-diameter high pressure natural gas pipeline between the Opal Hub in Lincoln County, Wyoming to the existing mainlines near Malin, Oregon, crossing through the states of Utah, Idaho, and Nevada. The proposed route extends across BLM-administered land in the Lakeview District. The Federal Energy Regulatory Commission will prepare an environmental impact statement to address the environmental consequences of the project. The final environmental impact statement is scheduled to be completed in 2010.

The majority of rights-of-way granted over BLM–administered land in western Oregon are for logging roads. In most cases, other rights-of-way (for such uses as domestic or irrigation waterlines, or utility lines for servicing residences) are authorized within or adjacent to existing road-clearing limits. In addition, there are numerous temporary use permits in effect that authorize other activities on public lands, including:

- apiary (beehive) sites
- agricultural cultivation of small areas
- residential encroachments or other structures pending their removal or long-term authorization
- national guard or military reserve training
- other miscellaneous short-term activities

Leases are issued for land uses involving substantial construction, development, or land improvement. No new permits or leases (under any authority) are allowed for landfills and other waste disposal facilities.

The BLM-administered land within the planning area is predominantly intermingled in a checkerboard pattern with private land. Intermingled nonfederal lands are owned primarily by private timber companies and are managed for commercial timber production. Most of the legal access to the federal and nonfederal timberlands is provided through long-term or perpetual reciprocal right-of-way agreements between the United States and the private timberland owners. Reciprocal right-of-way agreements do not include public access. It is estimated that 80% of the public lands within the planning area are available for road construction and use under reciprocal right-of-way agreements. A reciprocal right-of-way agreement provides the United States and the private landowner with the right to use and construct logging roads on each other's property for forest management and timber removal.

Transportation

The BLM controls approximately 14,000 miles of road within the planning area. Approximately 13,000 miles (about 93%) of BLM roads have some form of surfacing (bituminous, aggregate, or pit run). The primary purpose for development and use of the BLM road system is the transportation of timber. The majority of the BLM road system is authorized for use by intermingled private timberland owners through reciprocal right-of way agreements and used for transportation of timber harvested from their lands.

Although most BLM roads are not public roads, the BLM road system serves as a means for the public to access public lands for recreational activities where public access rights have been obtained or to provide ingress and egress to residences. The roads of the BLM road system are described by the following functional classifications. For a quantitative comparison of the road types, see *Figure 3-152 (Distribution of functional classifications for BLM roads)*.

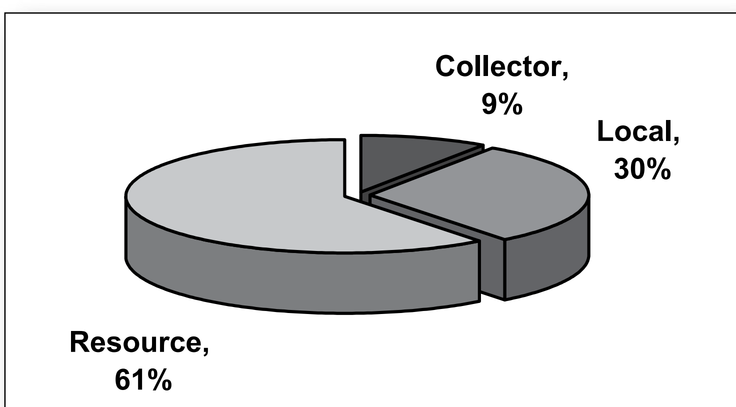
Functional Road Classifications

- **Collector roads.** Those roads that normally provide access to large blocks of public land and connect to state and county road systems.
- **Local roads.** Those roads that primarily provide access to lands that are adjacent to the collector network and serve travel over relatively short distances.
- **Resource roads.** Those roads that are primarily spur roads and provide access for only one or two types of resource management and carry very low traffic volumes.

Road construction standards and maintenance intensity are generally highest on collector roads and lowest on resource roads.

Transportation management includes development of a transportation management plan, reduction of road density, and maintenance of the road system to meet the needs of resource programs. A transportation management plan for western Oregon was developed in 1996 and updated in 2002 (USDI BLM 2002). The BLM has decommissioned approximately 590 miles of road over the past 10 years. Additional miles

Figure 3-152. Distribution Of Functional Classifications For BLM Roads



of BLM roads are identified for potential road closure. It is assumed an additional 200 miles would be decommissioned over the next 10 years. The BLM's contractual obligations in reciprocal right-of-way agreements preclude a substantial reduction in road mileage within fifth-field watersheds.

Maintenance of the BLM road system within the planning area follows guidance in the Western Oregon Transportation Management Plan of 2002 (USDI BLM 2002). Each district develops an annual maintenance operating plan that lists the roads scheduled to be maintained in the current year. Approximately 25% of the BLM road system (3,800 miles) is scheduled to be maintained in any given year. See *Figure 3-153 (Miles of road maintenance)*.

Road maintenance activities include:

- roadside brush removal
- road surface grading and replacement
- pavement maintenance and replacement
- ditch cleaning
- culvert cleaning and replacement
- slough and slide removal

Drainage facilities currently under assessment include:

- 350 bridges
- 500 major culverts (greater than 80 inches in diameter)
- 40,000 minor culverts

Maintenance levels (for the intensity of maintenance) are assigned to BLM roads using a progressive five-level system (1 through 5). Higher maintenance intensity (level 4 or 5) is typically assigned to bituminous or aggregate surface collector roads. Natural surface resource roads receive at least level 1 or 2 maintenance to ensure resource protection. Roads at levels 3, 4 and 5 are maintained on a scheduled basis and may receive more extensive maintenance during periods of short-term increased use for timber hauling.

Table 3-86 (Road functional classification by BLM district within the planning area), Table 3-87 (Road standards by BLM district within the planning area), and *Table 3-88 (Road surface type by BLM district)* provide information about the current inventory of transportation development on, and to, BLM–administered land within the planning area.

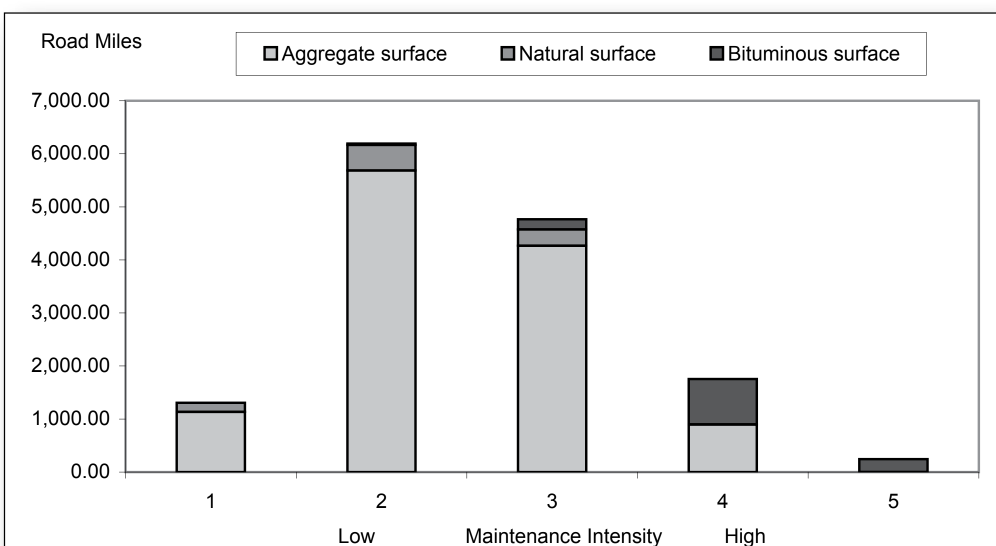


Figure 3-153. Miles Of Road Maintenance

Table 3-86. Road Functional Classifications By BLM District Within The Planning Area

Land Control Category	Functional Classifications of Roads (miles)					
	Arterial	Collector	Local	Resource	Unknown	Road Totals
Salem District						
BLM controlled	0	219	847	1,434	27	2,527
BLM land, no control	15	17	75	67	199	373
Salem Totals	**15**	**236**	**922**	**1,501**	**226**	**2,900**
Eugene District						
BLM controlled	0	138	1,553	350	4	2,045
BLM land, no control	34	20	145	45	41	285
Eugene Totals	**34**	**158**	**1,698**	**395**	**45**	**2,330**
Roseburg District						
BLM controlled	0	372	775	1,637	47	2,831
BLM land, no control	15	12	109	191	45	372
Roseburg Totals	**15**	**384**	**884**	**1,828**	**92**	**3,203**
Coos Bay District						
BLM controlled	0	227	408	1,257	3	1,895
BLM land, no control	17	27	59	109	162	374
Coos Bay Totals	**17**	**254**	**467**	**1,366**	**165**	**2,269**
Medford District						
BLM controlled	0	390	1,091	3,128	102	4,711
BLM land, no control	32	36	72	106	443	689
Medford Totals	**32**	**426**	**1,163**	**3,234**	**545**	**5,400**
Klamath Falls Resource Area (Lakeview District)						
BLM controlled	2	87	133	143	0	365
BLM land, no control	3	8	150	1	188	350
Klamath Falls Totals	**5**	**95**	**283**	**144**	**188**	**715**
Totals (All)	**118**	**1,553**	**5,417**	**8,468**	**1,261**	**16,817**

Table 3-87. Road Standards By BLM District Within The Planning Area

Land Control Category	Width of Roads (miles)				
	Double-Lane	Multiple-Lane	Single-Lane	Unknown	Road Totals
Salem District					
BLM controlled	23	0	2,407	97	2,527
BLM land, no control	16	0	136	221	373
Salem Totals	**39**	**0**	**2,543**	**318**	**2,900**
Eugene District					
BLM controlled	18	0	1,945	82	2,045
BLM land, no control	21	0	214	50	285
Eugene Totals	**39**	**0**	**2,159**	**132**	**2,330**
Roseburg District					
BLM controlled	31	0	2,746	54	2,831
BLM land, no control	20	1	300	51	372
Roseburg Totals	**51**	**1**	**3,046**	**105**	**3,203**
Coos Bay District					
BLM controlled	60	0	1,792	43	1,895
BLM land, no control	5	17	182	170	374
Coos Bay Totals	**65**	**17**	**1,974**	**213**	**2,269**
Medford District					
BLM controlled	25	0	4,557	129	4,711
BLM land, no control	47	2	192	448	689
Medford Totals	**72**	**2**	**4,749**	**577**	**5,400**
Klamath Falls Resource Area (Lakeview District)					
BLM controlled	8	0	312	45	365
BLM land, no control	2	0	26	322	350
Klamath Falls Totals	**10**	**0**	**338**	**367**	**715**
Total (All)	**276**	**20**	**14,809**	**1,712**	**16,817**

Table 3-88. Road Surface Type By BLM District

Land Control Category	Surface Type of Roads (miles)			
	Aggregate	Bituminous	Natural or Unknown	Road Totals
Salem District				
BLM controlled	2,145	139	243	2,527
BLM land, no control	134	25	214	373
Salem Totals	**2,279**	**164**	**457**	**2,900**
Eugene District				
BLM controlled	1,494	224	327	2,045
BLM land, no control	174	25	86	285
Eugene Totals	**1,668**	**249**	**413**	**2,330**
Roseburg District				
BLM controlled	2,057	176	598	2,831
BLM land, no control	183	8	181	372
Roseburg Totals	**2,240**	**184**	**779**	**3,203**
Coos Bay District				
BLM controlled	1,139	414	342	1,895
BLM land, no control	111	10	253	374
Coos Bay Totals	**1,250**	**424**	**595**	**2,269**
Medford District				
BLM controlled	3,005	300	1,406	4,711
BLM land, no control	97	39	553	689
Medford Totals	**3,102**	**339**	**1,959**	**5,400**
Klamath Falls Resource Area (Lakeview District)				
BLM controlled	150	34	181	365
BLM land, no control	13	3	334	350
Klamath Falls Totals	**163**	**37**	**515**	**715**
Totals (All)	**10,702**	**1,397**	**4,718**	**16,817**

Energy and Minerals

Key Points

- Most of the lands within the planning area are open to the exploration and development of energy and minerals.
- Fault and trap structures near Mist and the coal-bearing sandstones and siltstones of the Coos Bay Basin contain methane (natural) gas.
- Coastal and ridgeline areas within the planning unit have outstanding potential for wind-driven power generation.
- Approximately 3 to 5% of all mineral materials produced in Oregon come from public lands. Within the planning area, there are about 250 sites that each has the potential to produce between 1,000 and 25,000 tons per year.

Geologic Terrains

The planning area is divided into five geologic terrains including from west to east: Coast Range, Willamette Valley, Cascade Mountains, Klamath, and the Basin and Range. See *Figure 3-154 (Geologic Terrains)*. The unique geologic origin and morphology of each geologic terrain controls their potential for mineral occurrence.

The heavily vegetated Coast Range consists of a long, narrow belt of moderately high mountains and coastal headlands that extend southward from the Columbia River to the Middle Fork of the Coquille River, and westward from the continental shelf inland to the western edge of the Willamette Valley. This area is approximately 200 miles long and 30 to 60 miles wide. The shoreline depositional basins and fault block structures of this terrain (including the southwest coastal coal beds) hold potential for the accumulation of natural gas.

The Willamette Valley geologic terrain extends southward for 130 miles from the Columbia River to about Cottage Grove. This terrain comprises a low land sedimentary catch basin, from 30 to 40 miles wide, with sub-petroleum structures that lie between the Coast Range and the West Cascades. The valley dips gently from about 400 feet in elevation at its southern end, to near sea level at Portland. It is drained throughout by the northward flowing Willamette River and its tributary systems. Catastrophic melt-water floods during close of the last Ice Age laid down thick deposits of gravels and fine sediments throughout the valley.

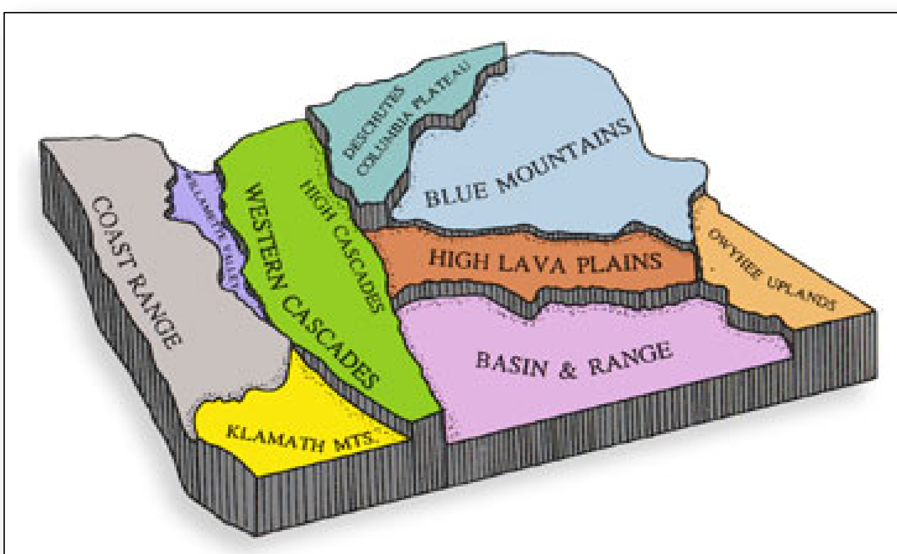


Figure 3-154. Geologic Terrains

Extending from the Columbia River south to California, the complex uplifted and volcanic western and high Cascades separate western Oregon from the High Lava Plains of the Columbia Plateau, and from the Basin and Range geologic terrains to the east. The older, broader, and deeply eroded West Cascades vary in heights from 1,700 feet along the western edge, to 5,800 feet on the eastern margin with the younger snow-capped volcanic peaks of the High Cascades (11,000 feet). The sporadic violence of this terrain is demonstrated by the remains of Mount Mazama, which was destroyed by a catastrophic eruption about 6,800 years ago that left a deep water-filled caldera known as Crater Lake. The uplifted and intruded structures of this terrain have a moderate to high potential for both hydrothermal metallic deposits and geothermal energy.

The southwestern 12,000 square miles of the planning area is dominated by the Klamath Mountains. This terrain has deep, narrow valleys and peaks averaging 7,000 feet in elevation. This area is bounded on the west by a narrow coastal plain with steep headlands and the Cascades Mountains to the east. The complexly folded and faulted accreted metamorphic belt terrains, welded together by subsequent volcanic activity and granitic intrusions, have a high potential for accumulation of hydrothermal metallic deposits and secondary enrichment zones. These are primarily in metamorphosed Jurassic, volcanic, sedimentary, and ophiolite formations containing precious metal ore bodies that give rise to downstream placer deposits.

The Basin and Range geologic terrain of south-central Oregon is dominated by narrow, north-south trending fault-block mountains and alternating broad basins. This area borders the Cascade Mountains to the west and the High Lava Plains of central Oregon to the north. The Basin and Range geologic terrain may contain potential for natural gas in filled lake basins. Its volcanic past has created a high potential for geothermal resources.

Regulation and Availability of Mineral and Energy Resources

Throughout Oregon, the BLM administers the mineral estate on nearly 40 million acres of BLM, U.S. Forest Service, and other federally administered and Indian lands. In addition to the approximately 2.6 million BLM-managed surface acres within the planning unit, there are an additional 68,600 acres of federal subsurface mineral estate beneath private surface. Known and inferred information indicates that about half of this area has a low potential for mineralization of interest, with 40% at a moderate potential and 5% with a higher likelihood. Aside from restrictions imposed by law, regulation, executive and/or secretarial order, more than 90% of the BLM-administered public lands, including O&C lands, are currently available for mineral and energy exploration and development subject to stipulations.

Mineral and energy resource potentials and development guidance are described in greater detail in *Appendix Q* – Energy and Minerals.

Mineral and energy resources on federal lands are managed under the authorities enacted by Congress in the following laws:

- Mining Law of 1872, as amended (locatable, such as metallic minerals)
- Mineral Leasing Act of 1920 (e.g., energy resources and source minerals for industrial chemicals)
- Mineral Materials Sales Act of 1947 (salable materials, such as common variety construction materials)
- Mining and Materials Policy Act of 1970
- Federal Land Policy and Management Act of 1976
- National Materials and Minerals Policy, Research and Development Act of 1980
- Energy Act of 2005

The cornerstone of BLM's minerals management policy is the understanding that public lands will remain open for exploration and development, unless it is clearly in the national interest to withdraw them in whole or in part from mineral entry. Furthermore, the BLM encourages environmentally sound practices for mineral exploration and development on the open public lands by individuals and industry in a manner that satisfies both National and local needs.

Known and Inferred Mineral/Energy Occurrence Potential

Summarized below is the approximate aerial extent of the BLM-administered mineral estate, current acreage open or closed to mineral entry, and the likely potential for the occurrence of economic mineralization for each district within the planning area.

Salem District

Geologic Terrains and Mineral/Energy Potential Within the Salem District

Geologic Terrains (west to east)
- Coast Range
- Willamette Valley
- Cascade Mountains

Mineral Potential
- ferruginous bauxite throughout Willamette Valley
- porphyritic copper and gold in headwater area of Santiam River
- high potential for lode metallics near St. Helens
- scattered low to moderate potential for beach placers
- silica beach sands
- igneous rock, colluvium, and alluvium aggregate is abundant throughout the district

Energy Potential
- high potential for gas near Mist with moderate potential throughout the western portion of the district
- scattered low grade coal deposits east of Salem and Newport

Known Production
- natural gas (Mist Field)
- coal (Columbia County)
- clays (Portland area)

Eugene District

Geologic Terrains and Mineral/Energy Potential Within the Eugene District

Geologic Terrains (west to east)
- Coast Range
- Willamette Valley
- Cascade Mountains

Table 3-89. Known And Inferred Mineral And Energy Occurrence Potential For The Salem BLM District

Category	Acres	Remarks
Federal surface and mineral estate	398,100	
Federal minerals and private surface	27,800	
Locatable (e.g., metallics and gemstones)		
Closed	5,900	Nondiscretionary
Closed	16,200	Discretionary
Open	49,200	Standard restrictions/stipulations
Open	326,800	Additional restrictions
Mineral Occurrence Potential for Locatable		
Unknown or low	321,900	
Moderate	18,000	
High	58,200	
Salable (e.g., sand, gravel, stone, clays, pumice)		
Closed	5,900	Nondiscretionary
Closed	220,400	Discretionary
Open	49,200	Standard restrictions/stipulations
Open	122,600	Additional restrictions
Mineral Occurrence Potential for Salable		
Unknown or low	387,600	
Moderate	5,000	
High	1,000	
Leasable[a] (e.g., oil, gas, geothermal, coal, chemical minerals)		
Closed	100	Nondiscretionary
Open	108,600	Standard restrictions/stipulations
Open	266,200	Additional restrictions
Open	27,700	No surface occupancy
Mineral Occurrence Potential and Development Potential for Leasable		
Unknown or low	378,700	
Moderate potential for occurrence/ moderate potential for development	8,600	
High potential for occurrence/ high potential for development	10,800	

[a]Acres for leasable were estimated using the Geographical Information System (GIS) and not BLM land records, which results in total acres of leasable being different from total acres of surface and mineral estate.

Table 3-90. Known And Inferred Mineral And Energy Occurrence Potential For The Eugene BLM District

Category	Acres	Remarks
Federal surface and mineral estate	318,000	
Federal minerals and private surface	1,300	
Locatable (e.g., metallics and gemstones)		
Closed	400	Nondiscretionary
Closed	15,300	Discretionary
Open	290,600	Standard restrictions/stipulations
Open	10,000	Additional restrictions
Mineral Occurrence Potential for Locatable		
Unknown or low	299,900	
Moderate	13,500	
High	2,900	
Salable (e.g., sand, gravel, stone, clays, pumice)		
Closed	100	Nondiscretionary
Closed	9,100	Discretionary
Open	200	Standard restrictions/stipulations
Open	307,000	Additional restrictions
Mineral Occurrence Potential for Salable		
Unknown or low	300,100	
Moderate	12,500	
High	3,800	
Leasable[a] (e.g., oil, gas, geothermal, coal, chemical minerals)		
Closed	100	Nondiscretionary
Open	140,000	Standard restrictions/stipulations
Open	169,500	Additional restrictions
Open	2,800	No surface occupancy
Mineral Occurrence Potential and Development Potential for Leasable		
Unknown or low	246,000	
Moderate potential for occurrence/low potential for development	72,000	
High potential for occurrence/high potential for development	0	

[a]Acres for leasable were estimated using the Geographical Information System (GIS) and not BLM land records, which results in total acres of leasable being different from total acres of surface and mineral estate.

Mineral Potential

- gold placers in the headwaters of the McKenzie and Middle Fork of the Willamette Rivers, the Dorena Lake area, and the Quartzville District
- metallic placer potential around Eugene
- igneous rock, colluvium , and alluvium aggregate is abundant throughout the district
- clays at Hobart Butte

Energy Potential

- speculative to moderate potential for gas identified in projected plays and petroleum systems in the Willamette Valley and coastal areas

Known Production

- gold

Roseburg District

Geologic Terrains and Mineral/Energy Potential Within the Roseburg District:

Geologic Terrains

- Coast Range
- West Cascades
- Klamath Mountains

Mineral Potential

- nickel laterites east of Riddle
- mercury in the headwaters of the Calapooya and North Umpqua River
- disseminated copper and gold throughout the pre- to late Jurassic rocks along the Umpqua River and its tributaries
- placer metallics east of Drain and Sutherlin
- igneous rock, metamorphic rock, colluvium, and alluvium aggregate is abundant throughout the district

Energy Potential

- scattered low grade coal deposits near Glide, Melrose, and Carson Valley
- moderate potential for gas identified in projected plays and petroleum systems in the Coast Range and Cascade Range margin

Known Production

- nickel (Riddle)

Coos Bay District

Geologic Terrains and Mineral/Energy Potential Within the Coos Bay District:

Geologic Terrains

- Coast Range
- Klamath Mountains

Table 3-91. Known And Inferred Mineral And Energy Occurrence Potential For The Roseburg BLM District

Category	Acres	Remarks
Federal surface and mineral estate	425,600	
Federal minerals and private surface	1,700	
Locatable (e.g., metallics and gemstones)		
Closed	300	Nondiscretionary
Closed	4,800	Discretionary
Open	366,200	Standard restrictions/stipulations
Open	20,800	Additional restrictions
Mineral Occurrence Potential for Locatable		
Unknown or low	307,600	
Moderate	88,000	
High	24,400	
Salable (e.g., sand, gravel, stone, clays, pumice)		
Closed	30	Nondiscretionary
Closed	8,400	Discretionary
Open	381,700	Standard restrictions/stipulations
Open	29,200	Additional restrictions
Mineral Occurrence Potential for Salable		
Unknown or low	5,000	
Moderate	418,700	
High	1,900	
Leasable[a] (e.g., oil, gas, geothermal, coal, chemical minerals)		
Closed	30	Nondiscretionary
Open	98,300	Standard restrictions/stipulations
Open	315,700	Additional restrictions
Open	9,700	No surface occupancy
Mineral Occurrence Potential and Development Potential for Leasable		
Unknown or low	264,600	
Moderate potential for occurrence/low potential for development	124,000	
Moderate potential for occurrence/ moderate potential for development	37,000	
High potential for occurrence/high potential for development	0	

[a] Acres for leasable were estimated using the Geographical Information System (GIS) and not BLM land records, which results in total acres of leasable being different from total acres of surface and mineral estate.

Table 3-92. Known And Inferred Mineral And Energy Occurrence Potential For The Coos Bay BLM District

Category	Acres	Remarks
Federal surface and mineral estate	329,600	
Federal minerals and private surface	12,200	
Locatable (e.g., metallics and gemstones)		
Closed	1,000	Nondiscretionary
Closed	11,500	Discretionary
Open	99,500	Standard restrictions/stipulations
Open	217,600	Additional restrictions
Mineral Occurrence Potential for Locatable		
Unknown or low	208,800	
Moderate	120,300	
High	500	
Salable (e.g., sand, gravel, stone, clays, pumice)		
Closed	600	Nondiscretionary
Closed	14,700	Discretionary
Open	84,600	Standard restrictions/stipulations
Open	229,700	Additional restrictions
Mineral Occurrence Potential for Salable		
Unknown or low	303,900	
Moderate	4,600	
High	900	
Leasable[a] (e.g., oil, gas, geothermal, coal, chemical minerals)		
Closed	0	Nondiscretionary
Open	94,300	Standard restrictions/stipulations
Open	212,000	Additional restrictions
Open	15,000	No surface occupancy
Mineral Occurrence Potential and Development Potential for Leasable		
Unknown or low	233,500	
Moderate potential for occurrence/moderate potential for development	83,000	
High potential for occurrence/high potential for development	12,300	

[a]Acres for leasable were estimated using the Geographical Information System (GIS) and not BLM land records, which results in total acres of leasable being different from total acres of surface and mineral estate.

Mineral Potential

- gold, platinum, and chromite in coastal black beach sands
- disseminated lode and placer copper, chromite, and gold with scattered nickel laterite deposits throughout prelate Jurassic rocks along the Rogue River and its tributaries, and in the Kalmiopsis Wilderness
- silica beach sands
- sandstone and fine alluvium aggregate is abundant throughout the district. Metamorphic rock aggregate is probable in the southern portion of the district. Igneous rock aggregate is limited.

Energy Potential

- moderate to high potential for coal in early Tertiary basins surrounding Coos Bay with associated coal bed methane
- moderate potential for gas identified in projected plays and petroleum systems in the coast range

Known Production

- subbituminous coal (Coos County)
- silica sands
- gold

Medford District

Geologic Terrains and Mineral/Energy Potential Within the Medford District:

Geologic Terrains

- Klamath Mountains
- Cascade Mountains

Mineral Potential

- disseminated lode and placer copper, chromite, and gold with scattered nickel laterite deposits throughout prelate Jurassic rocks throughout the area of the middle Rogue River and tributaries with major mining regions and pocket deposits along contacts of fine-grained slate, argillite, and carbonaceous rock
- igneous rock, metamorphic rock, colluvium, and alluvium aggregate is abundant throughout district

Energy Potential

- low grade coal deposits associated with the Rogue River Coal Field near Medford and Ashland
- geothermal potential throughout West Cascades

Known Production

- gold and precious metals (along Galice, Josephine, Sucker, and Althouse Creeks and the Illinois River)
- talc
- subbituminous coal (Jackson County)
- gold
- nickel

Table 3-93. Known And Inferred Mineral And Energy Occurrence Potential For The Medford BLM District

Category	Acres	Remarks
Federal surface and mineral estate	866,-300	
Federal minerals and private surface	4,700	
Locatable (e.g., metallics and gemstones)		
Closed	16,800	Nondiscretionary
Closed	20,800	Discretionary
Open	536,500	Standard restrictions/stipulations
Open	293,400	Additional restrictions
Mineral Occurrence Potential for Locatable		
Unknown or low	473,100	
Moderate	388,700	
High	10,100	
Salable (e.g., sand, gravel, stone, clays, pumice)		
Closed	24,600	Nondiscretionary
Closed	20,800	Discretionary
Open	17,,200	Standard restrictions/stipulations
Open	803,700	Additional restrictions
Mineral Occurrence Potential for Salable		
Unknown or low	2,000	
Moderate	864,800	
High	--	
Leasable[a] (e.g., oil, gas, geothermal, coal, chemical minerals)		
Closed	80	Nondiscretionary
Open	250,200	Standard restrictions/stipulations
Open	562,100	Additional restrictions
Open	55,000	No surface occupancy
Mineral Occurrence Potential for Leasable		
Unknown or low	833,300	
Moderate potential for occurrence/low potential for development	33,000	
High potential for occurrence/high potential for development	0	

[a]Acres for leasable were estimated using the Geographical Information System (GIS) and not BLM land records, which results in total acres of leasable being different from total acres of surface and mineral estate.

Klamath Falls Resource Area (Lakeview District)

Geologic Terrains and Mineral/Energy Potential Within the Klamath Falls Resource Area:

Geologic Terrains
- Cascade Mountains
- Western Basin and Range

Mineral Potential
- diatomite along Sprague River
- igneous rock, pumice, colluvium, and alluvium aggregate is abundant throughout the district

Energy Potential
- moderately favorable potential for geothermal from Klamath Falls and southward

Known Production
- diatomite

Table 3-94. Known And Inferred Mineral And Energy Occurrence Potential For The Klamath Falls Resource Areas Of The Lakeview BLM District

Category	Acres	Remarks
Federal surface and mineral estate	212,000	
Federal minerals and private surface	21,000	
Locatable (e.g., metallics and gemstones)		
Closed	4,700	Nondiscretionary
Closed	700	Discretionary
Open	191,600	Standard restrictions/stipulations
Open	37,900	Additional restrictions
Mineral Occurrence Potential for Locatable		
Unknown or low	99,000	
Moderate	128,000	
High	900	
Salable (e.g., sand, gravel, stone, clays, pumice)		
Closed	300	Nondiscretionary
Closed	14,500	Discretionary
Open	0	Standard restrictions/stipulations
Open	197,200	Additional restrictions
Mineral Occurrence Potential for Salable		
Unknown or low	10,700	
Moderate	200,000	
High	1,300	
Leasable[a] (e.g., oil, gas, geothermal, coal, chemical minerals)		
Closed	300	Nondiscretionary
Open	75,900	Standard restrictions/stipulations
Open	139,400	Additional restrictions
Open	8,700	No surface occupancy
Mineral Occurrence Potential and Development Potential for Leasable		
Unknown or low	212,000	
Moderate potential for occurrence/moderate potential for development	0	
High potential for occurrence/high potential for development	0	

[a]Acres for leasable were estimated using the Geographical Information System (GIS) and not BLM land records, which results in total acres of leasable being different from total acres of surface and mineral estate.

Energy Resources

Current and historic exploration and development of in-ground energy resources within the planning area are focused on the hydrocarbon potential (i.e., coal and natural gas) that is generally associated with Cenozoic marine sediments. Small quantities of low-grade coal have been mined in both the Salem and Coos Bay Districts. There is a potential for occurrence elsewhere in the Coast Range and Willamette Valley geologic terrains. The potential for renewable wind energy has yet to be tapped, but is generally rated at good to excellent over most of the planning area.

Natural Gas

Conventional natural gas has been produced since the 1970s near the community of Mist in west-central Columbia County. Since its discovery in 1979, the Mist Gas Field has produced more than 65 billion cubic feet of gas with a value of about $125 million. Modern seismic technology is being used to guide discovery of new pools at the field. Nonfederal leasing and applications for drilling permits are currently focused in the Mist Gas Field, which has 16 current production wells and 8 pending applications for production permits (Houston 2007). The Mist Gas Field now includes two commercial underground natural gas storage projects. There are no currently producing "conventional" federally leased gas wells. However, the potential exists for gas deposits in many coastal and Coast Range areas of western Oregon, based on past leasing of nearly 6 million acres from federal, state, and local agencies and the permitting of more than 500 wells in the 1980s.

In western Oregon, there are up to 100,000 onshore acres prospective for natural gas production. Interest in these lands is enhanced by excellent year-round access via logging and fire control roads and the availability of already constructed timber recovery staging areas (landings) for drilling sites. There are currently no producing conventional gas wells on federal leases.

To date, the state of Oregon's Department of Geology and Mineral Industries has formally designated only one gas field encompassing the area at Mist. The designation is required to accomplish state requirements for well-spacing designations, mineral rights, and the control of drainage. Field designation also increases interest and competition among development companies. Another gas field designation by the state of Oregon is expected for the Coos Basin.

Coal Bed Methane (Coal Bed Natural Gas)

Existence of coal bed methane was recently proved up along Oregon's southwest coast with the likelihood of commercial development in the Coos Bay BLM District. In the Coos Basin, there are over 115,000 non-federal acres leased. Foreseeable development of coal bed methane plays could result in around 25,000 acres of BLM-managed resources being offered for lease. To develop this resource, the industry estimates a near-term build-out of between 300 and 719 wells may be needed. Approximately 37 to 77 of these wells could be on BLM-administered lands.

The coal-bearing sandstones and siltstones of the Coos Bay Basin are estimated to form a cumulative multi-seam stratigraphic section up to 6,600 feet thick containing over 1.2 trillion cubic feet of methane gas (approximately 10 billion cubic feet per section). A commercial drilling program is underway near the Coos County natural gas line and within a few miles of unleased federal coal.

Geothermal

Oregon has the distinction of being a state where geothermal resources are available in many areas. These resources are suitable for several different types of uses, including the current dominant production for direct heat applications.

Although Oregon has yet to achieve commercial generation of electricity from geothermal energy, the potential is there. A U.S. Interior Department report identifies 7 sites as being among the 35 highest potential geothermal regions in the country (DOI and DOE 2003). These sites include the Newberry Crater near Bend (a location of past geothermal exploration), as well as sites near Klamath Falls, Lakeview, Crump Lake, Summer Lake, and along the Malheur River and near Vale in southern and eastern Oregon.

Wind

Nationally, about 20% of installed wind energy capacity is on federal lands. Currently, about 500 megawatts (MW) of installed wind capacity occurs under right-of-way (ROW) authorizations administered by BLM in accordance with requirements of the Federal Land Policy and Management Act of 1976 (FLMPA) (*United States Code*, Title 43, Section 1701 [43 USC 1701]) and BLM's Interim Wind Energy Development Policy (BLM 2002). The policy is consistent with requirements of Executive Order (E.O.) 13212, "*Actions to Expedite Energy-Related Projects*," issued May 2001, which calls for federal agencies to take appropriate actions, consistent with applicable laws, to expedite projects that increase the production, transmission, or conservation of energy. Policies and best management practices will be developed for all wind energy projects on BLM-administered lands in accordance with the findings of the *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Land in the Western United States* (June 2005 [FES 05-11]). Site-specific and species-specific concerns, and the development of additional mitigation measures, would be addressed in project-level reviews, including NEPA analyses, as required.

In Oregon, coastal areas, river corridors, and ridge lines within the planning area are rated as having good to excellent potential for wind-driven power generation—the better portion of the statewide 7,991 megawatt potential. Oregon currently has some 435 megawatts of installed wind power generating capacity with another 140 megawatts proposed (American Wind Energy Association 2007). By 2025, some 196 megawatts are projected to originate from BLM-administered lands.

Notable areas with a good to excellent potential include the Columbia River corridor and the Oregon coast. Although the Columbia River gorge is generally an area of high wind resource, the complex terrain causes considerable local variability. The annual average wind resource at exposed areas ranges from Class 3 to Class 6. Spring and summer are the seasons of maximum wind power for most of the planning area. Wind power potential for most of western Oregon is Class 4. In western Oregon, winter is the season of maximum power potential at sites well exposed to the prevailing south and southeasterly winds. During the summer, wind power potential is high along the central and southern Oregon coast at sites well exposed to northerly winds. The wind power potential along those coastal areas is associated with the strong surface pressure gradients created by the cold Pacific Ocean water and the relatively warm interior (Wind Energy Resource Atlas of the United States 2007).

Energy Transmission

The proposed 223-mile long Pacific Connector Gas Pipeline (with an estimated capacity of 1 billion cubic feet per day) is being jointly developed by Williams' Northwest Pipeline, Pacific Gas and Electric Company, and Fort Chicago Energy Partners L.P.(Fort Chicago). The Pacific Connector Gas Pipeline will join the proposed Jordan Cove liquefied natural gas terminal being developed by Fort Chicago near Coos Bay, Oregon, to the Williams' Northwest pipeline system near Myrtle Creek, Oregon, and then to Pacific Gas and Electric Company's backbone gas transmission system near Malin, Oregon. A federal right-of-way will be required, as about 56 miles of the proposed pipeline route cross federal lands managed by the BLM and the Forest Service. Environmental reviews and public participation are underway as part of the Federal Energy Regulatory Commission pre-filing process.

National Energy Policy

Within the planning area, implementation of the National Energy Policy is a priority for modernizing the energy infrastructure; increasing supplies of renewable and nonrenewable energy; and accelerating conservation, protection, and improvement of the environment.

Oregon's contribution to this effort is focused on:

- Acting in a timely manner on requests for rights-of-way and easements for energy exploration and development (e.g., geophysical surveys and infrastructure to develop and transport renewable and nonrenewable energy, and emphasizing parallel use of existing rights-of-way wherever possible).
- Being receptive to alternative energy proposals and the completion of an environmental impact statement relating to authorization of wind energy projects. (Nevada, Idaho, Oregon, Arizona, and Utah are principal areas identified for development.)
- Being prepared for increased interest in oil and gas drilling in the southwest Oregon coastal area and northwest Oregon coastal mountain area, based on promising exploration taking place on private lands.
- Emphasizing adjudication of lands nominated for oil, gas, and geothermal leasing; timely processing of drilling permits; development of wind and geothermal resources; hydropower relicensing; monitoring to ensure environmentally sound practices; and integrating study findings of the Energy Policy Act study findings into BLM land use plans.
- Facilitating National Energy Policy goals for modernizing energy infrastructure, increasing energy supplies, accelerating protection and improvement of the environment, and providing opportunities for environmentally sound commercial development.
- Supporting land use plan decisions for renewable and nonrenewable energy exploration, development, and transportation of energy sources.
- Reducing impediments that are limiting access across public lands.
- Issuing right-of-way authorizations for necessary infrastructure to develop and transport renewable and nonrenewable energy (e.g., oil or gas from producing areas or electricity generated from a variety of sources, such as hydropower, coal or gas-fired generators, and geothermal).

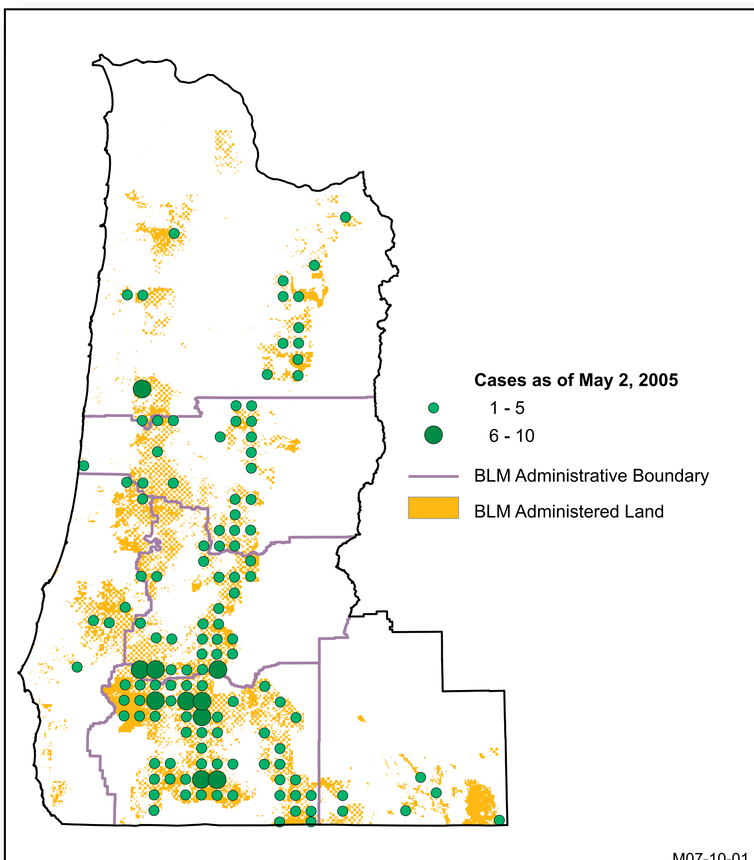


Figure 3-155. Active Mineral Materials Cases On BLM-Administered Lands By Township

Summary of Mineral/ Energy Occurrence Potential

Currently, none of the types of mineral entry (i.e., locatable, salable, or leasable) contribute significantly to the economic base of communities within the planning area.

Salable Mineral Materials

Mining district

A mining district is a section of country that is usually designated by name and described or understood as being confined within certain natural boundaries in which gold, silver, or other minerals may be found in paying quantities.

Within the planning area, the BLM's principal mineral material (common sand, gravel, rock, volcanic cinders, and clay) program functions are related to designation of sites (community pits and common use areas), issuing sale contracts and free use permits, and conducting compliance inspections. Mineral materials are the most commonly mined mineral commodities in Oregon. See *Figure 3-155 (Active mineral materials cases on BLM-administered lands by township)* for the spatial distribution of material sites to the nearest township.

Production from BLM material (community) pits and quarries has declined since the 1980s due to the decrease in logging road construction. Approximately 3% to 5% of all mineral materials produced in Oregon comes from public lands, including some 250 sites within the planning area that each could yield between 1,000 and 25,000 tons per year. This trend is expected to continue with an average annual growth rate of approximately 1% requiring significant quantities of crushed stone, sand, and gravel to come from yet to be delineated resources. Despite its low unit value, the aggregate and crushed stone industry is a major contributor to the regional economics (USDI USGS 2007).

Currently, mineral material production is limited primarily to small sales and the use of larger volumes by other federal, state, and local agencies. In many portions of the planning area, rock sources are becoming scarce or are encumbered by restrictions that limit the availability of rip-rap, large boulders, and surfacing material required for restoration projects or timber harvesting activities. In the rapidly developing urban areas, expensive mineral materials are being purchased from private sources and transported to BLM projects, at times by-passing potential BLM-administered sources.

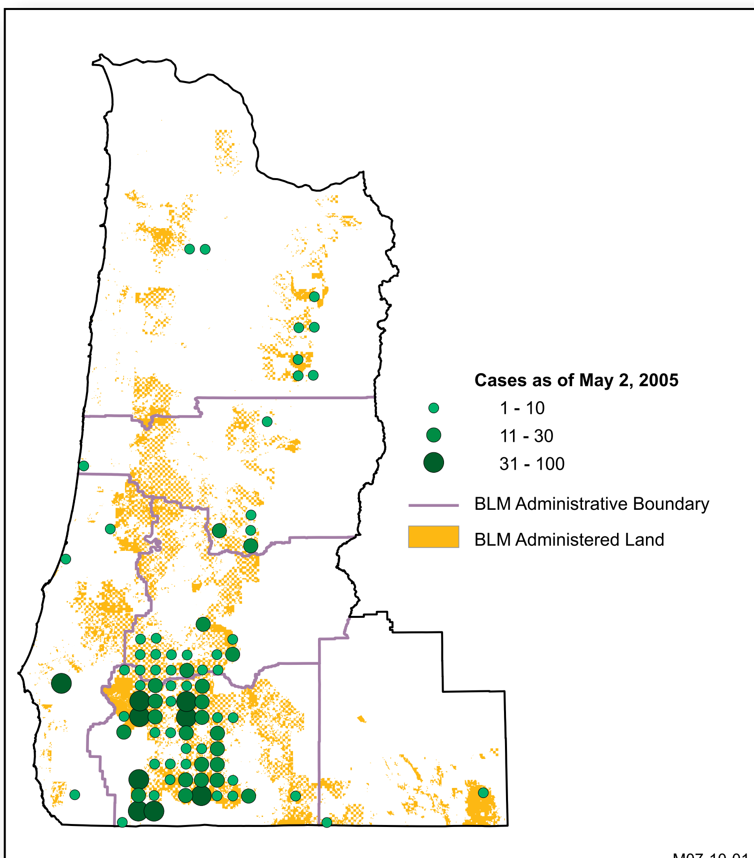


Figure 3-156. Active Mining Claim Cases On BLM-Administered Lands By Township

Salable mineral availability is considered to have a moderate to high potential across the planning area.

Locatable Minerals

Locatable minerals include metallic minerals (e.g., gold, silver, lead, and zinc) and some nonmetallic minerals (e.g., fluorspar, asbestos, mica, gemstones, and uncommon varieties of sand, gravel, and stone). Large areas of southwestern Oregon are within historic mining districts. Most claim sites within the planning area are situated in the Klamath Mountains and the West Cascades.

Sporadic small-scale placer gold mining is the main type of locatable production occurring on BLM-administered lands within the planning area, particularly in the southern districts. The number of active mining claims in western Oregon has generally declined due to changes in federal regulations that have resulted in increased fees for recording and maintaining claims.

All BLM districts within the planning area carry out actions related to the administration of some 2,500 mining claims of active record. See *Figure 3-156 (Active mining claim cases on BLM-administered lands by township)* for the spatial distribution of claim sites to the nearest township.

Occurrence for locatable metallic deposits is moderate to highly favorable throughout southwestern Oregon and in the vicinity of St. Helens in Columbia County. Production has been reported for gold in Jackson, Lane, Coos, Josephine, and Curry counties, and for nickel in Douglas and Josephine counties.

Related actions include:

- processing of mining notices and plans of operations
- inspection of mining claims and mill sites for surface management compliance
- determination of mining claim validity
- processing of patents that are not otherwise precluded by moratorium
- mitigation of trespass and unauthorized occupancy cases

Leasable Minerals

For western Oregon, the mineral occurrence potential for leasables can generally be described as follows:

- **Natural gas.** Sub-marginal to moderately favorable for natural gas from Coos County northward to the Columbia River with areas of high potential surrounding Coos Bay and in the vicinity of Mist in Columbia County. Conventional oil and gas potential exist as identified speculative petroleum systems (Ryu et al. 1990) within a structural sedimentary basin system that extends on- and off-shore from the Klamath Terrains beginning near the Middle Fork of the Coquille River and extending north to the Columbia River and beyond into Washington state, and from the continental shelf east to the Willamette Valley.
- **Coal bed natural gas (methane).** Coalbed natural gas potential is focused mainly on the Coaledo Formations of the onshore portion of the Coos Basin (an area of approximately 250 square miles located on the western edge of the Coos Bay BLM District). Federally managed mineral rights encompass approximately 12.3% of the Coos Basin, with nearly 7.6% under direct BLM administration.
- **Coal.** Occurrence is highly favorable in the Coos Bay Field and Eden Ridge Field in southern Coos County, although of generally poor quality with interstratified non-carbonaceous shale. Coal occurs in the Rogue River Coal Field of Jackson County. Smaller amounts of coal are associated with all of the marine basins throughout western Oregon.

See *Table 3-95 (Summary of the mineral occurrence potential within the planning area by resource type)*.

Restrictions

Restrictions that could affect the exploration and development of energy and mineral resources can be divided into five categories:

- nondiscretionary closures
- discretionary closures
- no surface occupancy stipulations
- standard stipulations
- additional restrictions

See *Table 3-96 (Acres of the restrictions that could affect the exploration and development of energy and mineral resources)* for the acres of the existing restrictions.

Table 3-95. Summary Of The Mineral And Energy Occurrence Potential Within The Planning Area By Resource Type

Resource Type	Unknown or Low Potential[a]	Moderate Potential[b]	High Potential[c]
	Acres (rounded to nearest 1,000)[d]		
Locatable	1, 710,300	756,500	97,000
Salable	1,000, 300	1,505, 600	8,900
Leasable	2,186,700	292,800	23,100
Wind	20% of planning area in Wind Class 1 – 2[e]	75% of planning area in Wind Class 4	5% of planning area in Wind Class 5 – 6

[a]Geological formations and processes are not favorable for accumulation of mineral resources, or there is insufficient information to make a determination of the mineral potential.

[b]Geological formations and processes are favorable for accumulation of mineral resources. For example, there may be additional mineral resources in old mines and prospects or new resources in areas with a high level of mining notice filing.

[c]Geological formation and processes are favorable for accumulation of mineral resources. These are areas of known active mines or active exploration and development activities, indicating high potential for accumulation of mineral resources.

[d]Since areas may have more than one resource type, the acreages may also overlap.

[e]Wind class: According to the Wind Energy Resource Atlas of the United States, wind classes are as follows, with W/m^2 representing the wind density: Class 1 (<200 W/m^2), Class 2 (200 to 300 W/m^2), Class 4 (400 to 500 W/m^2), Class 5 (500 to 600 W/m^2), and Class 6 (600 to 800 W/m^2).

Table 3-96. Acres Of The Restrictions That Could Affect The Exploration And Development Of Energy And Mineral Resources

Restrictions	Unknown/low Potential	Moderate Potential	High potential
	Acres rounded to nearest 1,000		
Non-discretionary closures	389,000	128,000	59,000
Discretionary closures	25,000	8,000	1,000
No surface occupancy stipulations	56,000	121,000	0
Standard stipulations	2,629,000	2,397,000	255,000
Additional restrictions	354,000	286,000	5,000

Note: The sum of acres for each resource type (locatable, salable, leasable) includes overlapping acres.

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WESTERN OREGON PLAN REVISIONS

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SPINE TEXT

Final Environmental Impact Statement

for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management - Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District

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