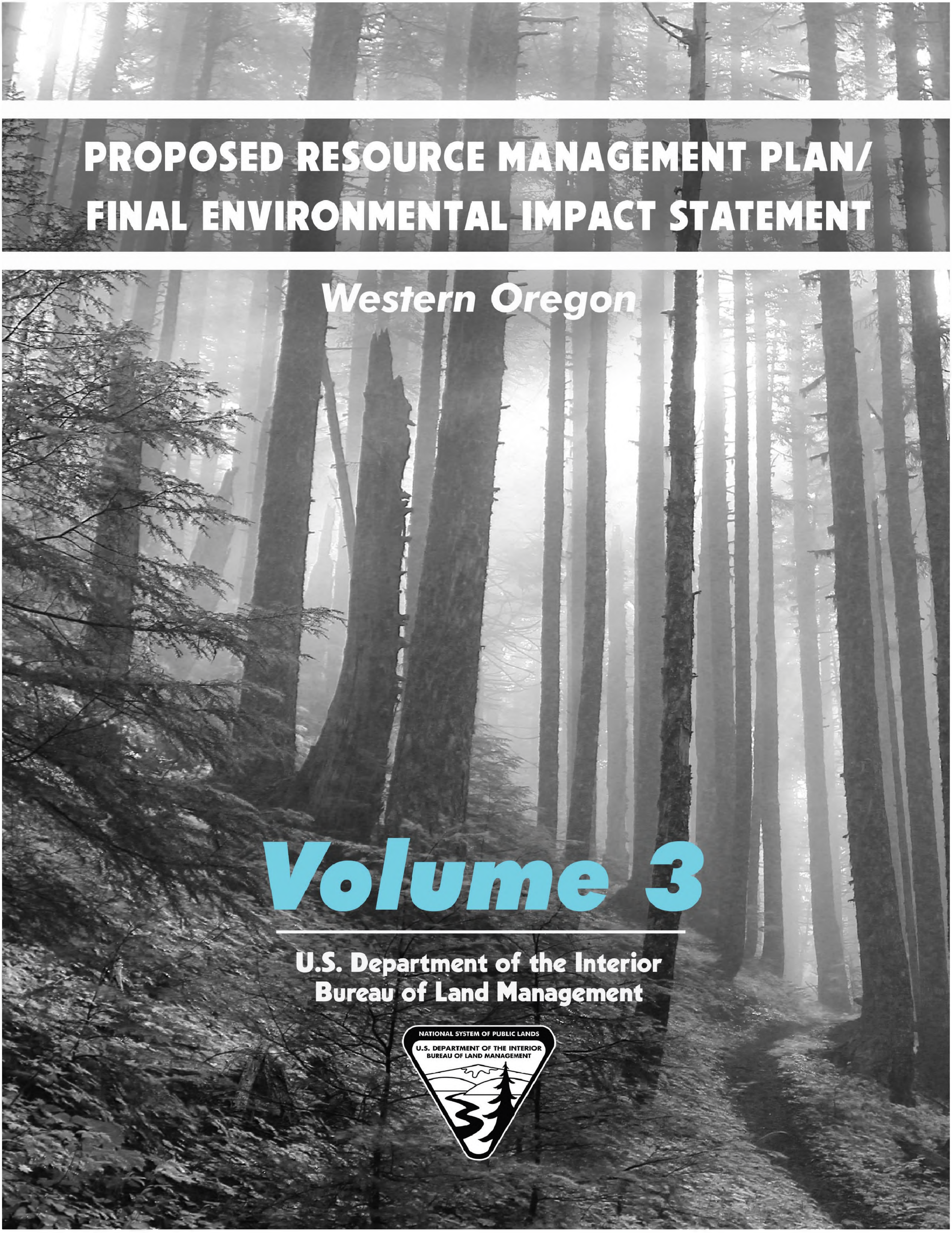

# PROPOSED RESOURCE MANAGEMENT PLAN/ FINAL ENVIRONMENTAL IMPACT STATEMENT

## *Western Oregon*

# Volume 3

U.S. Department of the Interior
Bureau of Land Management

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

The BLM manages more than 245 million acres of public land, the most of any Federal agency. This land, known as the National System of Public Lands, is primarily located in 12 western states, including Alaska. The BLM also administers 700 million acres of sub-surface mineral estate throughout the nation.

The BLM's mission is to manage and conserve the public lands for the use and enjoyment of present and future generations under our mandate of multiple-use and sustained yield. In fiscal year 2013, the BLM generated $4.7 billion in receipts from public lands.

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NATIONAL SYSTEM OF PUBLIC LANDS

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

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# Appendix A – Major Legal Authorities

The following is a list of the major legal authorities[1] that are relevant to the BLM land use planning process, including laws, executive orders, and secretarial orders:

## Laws

- The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act of 1937 (O&C Act) as amended, (43 U.S.C. 1181a, *et seq.*) provides the legal authority for management of O&C lands by the Secretary of the Interior. 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 (*sic*) 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."

- The Federal Land Policy and Management Act of 1976 (FLPMA), as amended (43 U.S.C. 1701 *et seq.*), provides the authority for BLM land use planning. The following are the more relevant sections:
    - Sec. 102 (a) (7) and (8) sets forth the policy of the United States concerning management of the public lands.
    - Sec. 201 requires the Secretary of the Interior to prepare and maintain an inventory of the public lands and their resource and other values, giving priority to areas of critical environmental concern (ACECs), and, as funding and workforce are available, to determine the boundaries of the public lands, provide signs and maps to the public, and provide inventory data to State and local governments.
    - Sec. 202 (a) requires the Secretary, with public involvement, to develop, maintain, and when appropriate, revise land use plans that provide by tracts or areas for the use of the public lands.
    - Sec. 202 (c) (1–9) requires that, in developing land use plans, the BLM shall use and observe the principles of multiple use and sustained yield; use a systematic interdisciplinary approach; give priority to the designation and protection of areas of critical environmental concern; rely, to the extent it is available, on the inventory of the public lands; consider present and potential uses of the public lands; consider the relative scarcity of the values involved and the availability of alternative means and sites for realization of those values; weigh long-term benefits to the public against short-term benefits; provide for compliance with applicable pollution control laws, including State and Federal air, water, noise, or other pollution standards or implementation plans; and consider the policies of approved State and tribal land resource management programs, developing land use plans that are consistent with State and local plans to the maximum extent possible consistent with Federal law and the purposes of this Act.
    - Sec. 202 (d) provides that all public lands, regardless of classification, are subject to inclusion in land use plans, and that the Secretary may modify or terminate classifications consistent with land use plans.
    - Sec. 202 (f) and Sec. 309 (e) provide that Federal, State, and local governments and the public be given adequate notice and an opportunity to comment on the formulation of standards and criteria for, and to participate in, the preparation and execution of plans and programs for management of the public lands.

[1] This is not a complete list of all the legal authorities that direct BLM management.

- Sec. 302 (a) requires the Secretary to manage BLM lands under the principles of multiple use and sustained yield, in accordance with available land use plans developed under Sec. 202 of FLPMA. There is one exception: where a tract of the BLM lands has been dedicated to specific uses according to other provisions of law, it shall be managed in accordance with such laws.
    - Sec. 302 (b) recognizes the entry and development rights of mining claimants, while directing the Secretary to prevent unnecessary or undue degradation of the public lands.
    - Sec. 701 (b) provides that notwithstanding any provision of FLPMA, in the event of conflict with or inconsistency between FLPMA and the O&C Act, insofar as they relate to management of timber resources and disposition of revenues from lands and resources, the O&C Act shall prevail.

- The National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 *et seq.*), requires the consideration and public availability of information regarding the environmental impacts of major Federal actions significantly affecting the quality of the human environment. This includes consideration of alternatives and mitigation of impacts.

- The Clean Air Act of 1990, as amended (42 U.S.C. 7418), requires Federal agencies to comply with all Federal, State, and local requirements regarding control and abatement of air pollution. This includes abiding by requirements of State Implementation Plans.

- The Clean Water Act of 1972, as amended (33 U.S.C. 1251), establishes objectives to restore and maintain the chemical, physical, and biological integrity of the Nation's water.

- The Healthy Forests Restoration Act of 2003, as amended (16 U.S.C. 6501), contains a variety of provisions to expedite hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk of wildland fire or insect and disease epidemics. It also provides other authorities and direction to help reduce hazardous fuels and restore healthy forest and rangeland conditions on lands of all ownerships.

- The Federal Water Pollution Control Act of 1948, as amended (33 U.S.C. 1323), requires Federal land managers to comply with all Federal, State, and local requirements, administrative authorities, process, and sanctions regarding the control and abatement of water pollution in the same manner and to the same extent as any nongovernmental entity.

- The Safe Drinking Water Act of 1974, as amended (42 U.S.C. 201), is designed to make the Nation's waters 'drinkable' as well as 'swimmable.' Amendments in 1996 establish a direct connection between safe drinking water and watershed protection and management.

- The Endangered Species Act (ESA) of 1973, as amended, (16 U.S.C. 1531 *et seq.*):
    - Provides a means whereby the ecosystems upon which endangered and threatened species depend may be conserved and provides a program for the conservation of such endangered and threatened species (Sec. 1531 [b], Purposes).
    - Requires all Federal agencies to seek to conserve endangered and threatened species and utilize applicable authorities in furtherance of the purposes of the Endangered Species Act (Sec. 1531 [c] [1], Policy).
    - Requires all Federal agencies to avoid jeopardizing the continued existence of any species that is listed or proposed for listing as threatened or endangered, or destroying or adversely modifying its designated or proposed critical habitat (Sec. 1536 [a], Interagency Cooperation).

- Requires all Federal agencies to consult (or confer) in accordance with Sec. 7 of the ESA with the Secretary of the Interior, through the Fish and Wildlife Service and/or the National Marine Fisheries Service, to ensure that any Federal action (including land use plans) or activity is not likely to jeopardize the continued existence of any species listed or proposed to be listed under the provisions of the ESA, or result in the destruction or adverse modification of designated or proposed critical habitat (Sec. 1536 [a], Interagency Cooperation, and 50 CFR 402).

- The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 *et seq.*), decrees that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected. The Migratory Bird Treaty Act is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource.

- The Wild and Scenic Rivers Act of 1968, as amended (16 U.S.C. 1271 *et seq.*), requires Federal land management agencies to identify potential river systems, and then study these rivers for potential designation as wild, scenic, or recreational rivers. The Wild and Scenic Rivers Act also provides for agencies to manage designated rivers to protect their outstanding values.

- The Wilderness Act of 1964, as amended (16 U.S.C. 1131 *et seq.*), authorizes the President to make recommendations to Congress for Federal lands to be set aside for preservation as wilderness. The Wilderness Act also provides for agencies to manage designated wilderness to protect wilderness values.

- The Antiquities Act of 1906 (54 U.S.C. § 320301 *et seq.*), protects cultural resources on Federal lands and authorizes the President to designate National Monuments on Federal lands.

- The National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 *et seq.*), expands protection of historic and archaeological properties to include those of national, State, and local significance and directs Federal agencies to consider the effects of proposed actions on properties eligible for or included in the National Register of Historic Places. The National Historic Preservation Act also directs the pro-active management of historic resources.

- The American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996 *et seq.*), establishes a national policy to protect and preserve the right of American Indians to exercise traditional Indian religious beliefs or practices.

- The Recreation and Public Purposes Act of 1926, as amended (43 U.S.C. 869 *et seq.*), authorizes the Secretary of the Interior to lease or convey BLM lands for recreational and public purposes under specified conditions.

- The Federal Coal Leasing Amendments Act of 1976 (30 U.S.C. 201 (a) (3) (A) (i)), requires that coal leases be issued in conformance with a comprehensive land use plan.

- The Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 *et seq.*), requires application of unsuitability criteria prior to coal leasing and to proposed mining operations for minerals or mineral materials other than coal.

- The Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 *et seq.*), authorizes the development and conservation of oil and gas resources.

- The Onshore Oil and Gas Leasing Reform Act of 1987 (30 U.S.C. 181 *et seq.*), provides that a study be conducted by the National Academy of Sciences and the Comptroller General that results in recommendations for improvements which may be necessary to ensure the following are adequately addressed in Federal land use plans:
  - Potential oil and gas resources are identified.
  - The social, economic, and environmental consequences of exploration for and development of oil and gas resources are determined.
  - Any stipulations to be applied to oil and gas leases are clearly identified.

- The General Mining Law of 1872, as amended (30 U.S.C. 21 *et seq.*), allows the location, use, and patenting of mining claims on sites on public domain lands of the United States.

- The Mining and Mineral Policy Act of 1970, as amended (30 U.S.C. 21a) establishes a policy of fostering the orderly development of economically stable mining and minerals industries and studying methods for reclamation and the disposal of waste.

- The Taylor Grazing Act of 1934, as amended, (43 U.S.C. 315 *et seq.*), authorizes the Secretary of the Interior "to establish grazing districts, or additions thereto and/or to modify the boundaries thereof of vacant, inappropriate and unreserved lands from any part of the public domain . . . which in his opinion are chiefly valuable for grazing and raising forage crops[.] . . ." The Act also provides for classification of lands for particular uses.

## Executive Orders

- Executive Orders 11644 and 11989 (both titled Use of Off-Road Vehicles on the Public Lands; 37 FR 2877 and 42 FR 26959, respectively) establish policies and procedures to ensure that off-road vehicle use shall be controlled to protect public lands.

- Executive Order 11988 (Floodplain Management) requires Federal agencies to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

- Executive Order 11990 (Protection of Wetlands) requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

- Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations; 49 FR 7629), requires that each Federal agency consider the impacts of its programs on minority and low-income populations.

- Executive Order 13007 (Indian Sacred Sites; 61 FR 26771), requires Federal agencies to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions to:
  - Accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners; and
  - Avoid adversely affecting the physical integrity of such sacred sites.

- Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments; 65 FR 218) provides, in part, that each Federal agency shall establish regular and meaningful consultation and collaboration with Indian tribal governments in developing regulatory practices on Federal matters that significantly or uniquely affect their communities.

- Executive Order 13112 (Invasive Species; 64 FR 6183) provides that no Federal agency shall authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk or harm will be taken in conjunction with the actions.

- Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds; 66 FR 3853) directs the Fish and Wildlife Service, in coordination with Federal agencies and Executive departments, to take certain actions to further the implementation of the Migratory Bird Treaty Act in promoting conservation of migratory bird populations.

- Executive Order 13443 (Facilitation of Hunting Heritage and Wildlife Conservation; 72 FR 46537) provides, in part, that Federal agencies shall, consistent with agency missions evaluate the effects of agency actions on game species and their habitats; manage wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities; work collaboratively with State governments to manage and conserve game species and their habitats; and seek the advice of State fish and wildlife agencies.

- Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance; 74 FR 52117) directs agencies to measure, manage, and reduce greenhouse gas emissions toward agency-defined targets for agency actions such as vehicle fleet and building management.

- Executive Order 13653 (Preparing the United States for the Impacts of Climate Change) directs agencies to assess climate change related impacts on and risks to the agency's ability to accomplish its missions, operations, and programs and consider the need to improve climate adaptation and resilience.

## Secretarial Orders

- Secretarial Order 3175 (Departmental Responsibilities for Indian Trust Resources), incorporated into the Departmental Manual at 512 DM 2, requires that if Department of the Interior (DOI) agency actions might impact Indian trust resources, the agency must explicitly address those potential impacts in planning and decision documents, as well as consult with the tribal government whose trust resources are potentially affected by the Federal action.

- Secretarial Order 3215 (Principles for the Discharge of the Secretary's Trust Responsibility), incorporated into the Departmental Manual at 303 DM2, provides guidance to the employees of the DOI who are responsible for carrying out the Secretary's trust responsibility as it pertains to Indian trust assets.

- Secretarial Order 3289A1 (Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources) establishes a Department-wide approach for applying scientific tools to increase understanding of climate change and to coordinate an effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages.

- Secretarial Order 3308 (Management of the National Landscape Conservation System) seeks to further the purposes of the Omnibus Public Land Management Act of 2009, which established the National Landscape Conservation System under the jurisdiction of the BLM in order to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations, and the President's initiative on America's Great Outdoors.

- Secretarial Order 3310 (Protecting Wilderness Characteristics on Lands Managed by the Bureau of Land Management) affirms that the protection of the wilderness characteristics of public lands is a high priority for the BLM, and is an integral component of its multiple use mission; provides direction to the BLM regarding its obligation to maintain wilderness resource inventories on a regular and continuing basis for public lands under its jurisdiction; and further directs the BLM to protect wilderness characteristics through land use planning and project-level decisions unless it is determined that impairment of wilderness characteristics is appropriate and consistent with other applicable requirements of law and other resource management considerations.

- Secretarial Order 3330 (Improving Mitigation Policies and Practices of the Department of the Interior) establishes a Department-wide mitigation strategy that will ensure consistency and efficiency in the review and permitting of infrastructure development projects and in conserving our Nation's valuable natural and cultural resources.

- Secretarial Order 3335 (Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries) sets forth guiding principles that bureaus and offices will follow to ensure that the DOI fulfills its trust responsibility.

# Appendix B – Management Objectives and Direction

This section identifies the management objectives and direction that would apply under the Proposed RMP. Appendix B of the Draft RMP/EIS includes management objectives and direction for action alternatives analyzed in the Draft RMP/EIS, which is incorporated here by reference.

Management objectives are descriptions of desired outcomes for BLM-administered lands and resources in an RMP; the resource conditions that the BLM envisions or desires would eventually result from implementation of the RMP. As such, management objectives are not rules, restrictions, or requirements by which the BLM determines which implementation actions to conduct or how to design specific implementation actions. Through effectiveness monitoring, the BLM will assess whether implementing actions in accordance with the management direction is achieving the management objectives of the RMP (**Appendix V**).

Management direction identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-administered lands and resources. Through implementation monitoring, the BLM will assess whether the BLM is implementing actions in accordance with management direction of the RMP (**Appendix V**).

Following approval of the RMP, the BLM will take actions that are specifically provided for in the RMP, or if not specifically mentioned, clearly consistent with the terms, conditions, and decisions of the RMP, consistent with 43 CFR 1601.0–5(b) and 43 CFR 1610.5–3.

## Proposed RMP

The Proposed RMP includes management objectives and management direction for land use allocations and for resource programs. The management objectives and management direction described for land use allocations apply only within that land use allocation. The management objectives and management direction described for resource programs apply across land use allocations, unless otherwise noted.

In the Proposed RMP, the Harvest Land Base and Late-Successional Reserve have specific, mapped sub-allocations, some of which have differing management objectives or management direction. For these sub-allocations, the management objectives and management direction of the broader allocation apply, as well as the management objectives or management direction specific to that sub-allocation. For example, the Harvest Land Base includes three sub-allocations: Low Intensity Timber Area, Moderate Intensity Timber Area, and Uneven-Aged Timber Area. In each of these three sub-allocations, both the management objectives and management direction described below for the Harvest Land Base and the individual sub-allocation applies.

In addition, the Riparian Reserve has differing management objectives and management direction for Riparian Reserve west of Highway 97 (i.e., in the Coos Bay, Eugene, Medford, Roseburg, and Salem Districts, and the portion of the Klamath Falls Field Office west of Highway 97) and Riparian Reserve east of Highway 97 (i.e., within the Eastside Management Area in the Klamath Falls Field Office). Although the management objectives are the same for all of the Riparian Reserve west of Highway 97, the management direction varies among three classes of subwatersheds. In addition, for the Riparian Reserve west of Highway 97, some management direction varies for the sub-allocations of the Riparian Reserve – Moist and Riparian Reserve – Dry.

The Proposed RMP requires the future allocation of marbled murrelet occupied stands[2] to the Late-Successional Reserve for occupied sites identified[3] after March 26, 2015 as a result of BLM marbled murrelet surveys in (1) all land use allocations within 35 miles of the Pacific Coast, and (2) Late-Successional Reserve and Riparian Reserve between 35–50 miles from the Pacific Coast and outside of exclusion Areas C and D (shown in **Figure 3-166**). In addition, the Proposed RMP requires the future allocation of red tree vole "habitat areas"[4] to the Late-Successional Reserve for occupied sites identified as a result of BLM red tree vole surveys within the range of the North Oregon Coast Distinct Population Segment of the red tree vole north of Highway 20.

[2] Marbled murrelet occupied stand refers to all forest stands, regardless of age or structure, within 1/4 mile (1,320 feet) of the location of marbled murrelet behavior indicating occupancy and not separated from the location of marbled murrelet behavior indicating occupancy by more than 328 feet of non-forest.
[3] In this context, "identified after March 26, 2015," means that survey data for occupied marbled murrelet sites was entered into the BLM corporate database after March 26, 2015.
[4] Red tree vole "habitat areas" are described in the management direction below.

# Land Use Allocations

## Congressionally Reserved Lands and the National Landscape Conservation System

### Management Objectives

- Conserve, protect, and restore the identified outstanding cultural, ecological, and scientific values of the National Landscape Conservation System and other congressionally designated lands.
- Preserve the wilderness character of designated Wilderness Areas.
- Preserve wilderness characteristics in Wilderness Study Areas in accordance with non-impairment standards as defined under the management policy for Wilderness Study Areas (BLM Manual 6330 – Management of BLM Wilderness Study Areas; USDI BLM 2012), until Congress either designates these lands as Wilderness or releases them for other purposes.
- Protect and enhance the free-flowing condition, water quality, and outstandingly remarkable values of eligible, suitable, and designated Wild and Scenic River corridors.[5]
- Provide protection to Wild and Scenic River corridors that are suitable for inclusion as components of the National Wild and Scenic Rivers system until Congress makes a decision on designation.
- Provide protection to Wild and Scenic River corridors that are eligible but have not yet been studied for suitability as components of the National Wild and Scenic Rivers system pending suitability evaluations.

### Management Direction

- In designated Wilderness Areas, exclude all prohibited uses of Wilderness (as defined in the Wilderness Act of 1964 and BLM Manual 6340 – Management of Designated Wilderness (USDI BLM 2012)), unless they have been demonstrated to be the minimum necessary (using the minimum requirements decision guide) to administer the area for the purposes of the Wilderness Act.
- Provide for the enjoyment and appreciation of the resources, qualities, values, and associated settings and primary uses within National Trail rights-of-way (including those classified as Scenic, Historical, and Recreational) and for which National Trails are designated.
- Enhance, promote, and protect the scenic, natural, and cultural resource values associated with current and future designated National Scenic and Historic Trails.
- Conduct silvicultural treatments in National Trail management corridors (including those classified as Scenic, Historical, and Recreational) only as needed to protect or maintain recreation setting characteristics or to achieve recreation objectives.
- Conduct management actions, including but not limited to fuels treatments, invasive species management, riparian or wildlife habitat improvements, forest management, and trail construction, in Wild and Scenic River corridors only if consistent with designated or tentative classifications and if any reductions in outstandingly remarkable values would be temporary and outstandingly remarkable values would be protected or enhanced over the long term.
- Do not use ground-disturbing equipment or aerial application of non-fugitive retardant in areas visible from the river within Wild and Scenic River corridors during wildfire management operations, except where the wildfire is deemed a threat to human safety or private property, or where use is essential for wildfire control.
- Conserve and develop the scenic, natural, and historic values of the Yaquina Head Outstanding Natural Area, and allow the continued use of the area for the purposes for which it was designated.

[5] Wild and Scenic River corridors include all of the river classifications – Wild, Scenic, and Recreational.

## District-Designated Reserves

### Management Objectives

- Maintain the values and resources for which the BLM has reserved these areas from sustained-yield timber production.

### Management Direction

- Manage constructed facilities and infrastructure, such as seed orchards, roads, buildings, quarries, communication sites, pump chances, heliponds, and maintenance yards, as needed for the purposes for which the BLM constructed them.
- Maintain access to roads and facilities by removing hazard trees and blowdown. Logs may be retained as down woody debris, moved for placement in streams for fish habitat restoration, or removed through a commercial harvest.
- Manage seed orchards consistent with the Seed Orchard Records of Decision for Integrated Pest Management (Eugene, Medford, Salem Districts; USDI BLM 2005a, 2006, 2005b).

### District-Designated Reserve – Timber Production Capability Classification

### Management Objectives

- *See District-Designated Reserves management objectives.*

### Management Direction

- Manage areas identified as unsuitable for sustained-yield timber production through the Timber Production Capability Classification system, for other uses if those uses are compatible with the reason for which the BLM has reserved these lands (as identified by the Timber Production Capability Classification codes (USDI BLM 1984)).
- Apply silvicultural or fuels treatments, including prescribed fire, that restore or maintain community-level structural characteristics, promote desired species composition, and emulate ecological conditions produced by historic fire regimes, in areas identified as unsuitable for sustained-yield timber production through the Timber Production Capability Classification system,
- Designate additional lands as District-Designated Reserve – Timber Production Capability Classification through updates to the Timber Production Capability Classification system and remove those lands from the Harvest Land Base when examinations indicate that those lands meet the criteria for reservation.
- Un-designate lands as District-Designated Reserve – Timber Production Capability Classification and return those lands to the Harvest Land Base through updates to the Timber Production Capability Classification system when examinations indicate that those lands do not meet the criteria for reservation.

### District-Designated Reserve – Lands Managed for their Wilderness Characteristics[6]

**Management Objectives**

- Protect wilderness characteristics (i.e., roadlessness, naturalness, opportunities for solitude and primitive unconfmed recreation, and identified supplemental values), while allowing competing resource demands that do not conflict with preserving long-term wilderness characteristics.

**Management Direction**

- Allow mechanical vegetation treatment consistent with Visual Resource Management Class II for the purpose of improving ecological condition, contributing to threatened or endangered species recovery, or enhancing long-term wilderness characteristics.
- Do not construct new buildings or new temporary or permanent roads.
- Allow fuels treatments, invasive species management, riparian or wildlife habitat improvements, forest management, and other vegetation management only if any reductions in wilderness characteristics are temporary and wilderness characteristics are protected over the long term.
- Do not use ground-disturbing equipment or aerial application of non-fugitive retardant during wildfire management operations, except where the wildfire is deemed a threat to human safety or private property or where use is essential for wildfire control.
- For lands identified for protection of wilderness characteristics where the BLM-administered lands rely on adjoining Federal lands being managed to protect the same values to meet the size criteria (BLM Manual 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands; USDI BLM 2012) and the agency managing the adjoining lands revises its land use plan to no longer protect wilderness characteristics, the BLM-administered lands will no longer meet the minimum size criteria and thus will no longer possess wilderness characteristics.
    - The BLM will no longer protect wilderness characteristics on these lands and the accompanying land use plan allocations (e.g., right-of-way exclusion, Visual Resource Management Class II) applied specifically to protect the wilderness characteristics will automatically be dropped as part of plan maintenance.
    - The BLM will then manage these lands consistent with the land use allocations, management objectives, and management direction of comparable or adjacent BLM-administered lands.

## Eastside Management Area

### Eastside Management Area – Forested Lands

**Management Objectives**

- Manage forested lands on a sustainable basis for multiple uses including wildlife and riparian habitats, recreational needs, cultural resources, community stability, and commodity production, including commercial timber and other forest products.
- Promote development of fire-resilient forests.
- Offer for sale the probable sale quantity of 350 Mbf of timber per year.

[6] These objectives and direction apply to lands outside of designated Wilderness Areas and Wilderness Study Areas that the BLM has identified as having wilderness characteristics and for which the BLM is proposing to manage for the protection of those wilderness characteristics.

## Management Direction

- Utilize uneven-aged management when managing forest stands. This will include use of harvesting methods such as thinning, single tree selection harvest, and group selection harvest.
- Conduct uneven-aged management harvests for the removal and sale of timber or biomass. Harvests will be applied to stands of any age, and throughout all diameters, for any of the following purposes:
    - Maintain growth and vigor of the stand.
    - Adjust stand composition or structure.
    - Reduce stand susceptibility to natural disturbance such as fire, windstorm, disease, or insect infestation.
    - Improve merchantability and value.
    - Promote multi-structural conditions in forest stands.
- Retain an overstory component of trees in uneven-aged management harvest units to provide shade, reduce wind speed, and promote overall fire resiliency in the stand. Maintain relative density between 15 and 55, but allow relative density to vary outside of this range based on vegetative type, site productivity, and fire risk factors such as slope, aspect, and elevation.
- Incorporate group selection harvest of up to 5 acres in size individually, and an aggregate level of up to 25 percent of the area of the treated stand within uneven-aged management harvest units.
- Implement timber salvage harvest after disturbances as needed to recover economic value and to minimize commercial loss or deterioration of damaged trees. Retain overstory trees as needed within regeneration harvest areas to provide for seedling shade, frost protection, seeding, or other silvicultural needs.
- Convert lands historically supporting conifer species (other than juniper) that are currently growing primarily brush or hardwoods to conifer species suitable to the site.
- Conduct prescribed burns, and mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires. Apply maintenance treatments at appropriate intervals to retain or improve fire resilient conditions.
- Apply pre-commercial thinning to forest stands to achieve long-term management objectives.
- Apply pruning to enhance timber value and for fuels and disease management.
- During silvicultural treatment of stands, retain existing—
    - Snags ≥ 6” DBH
    - Down woody material ≥ 6” in diameter at the large end and > 20 feet in length

  except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6” DBH felled for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material.
- Create new snags when the existing level of snags > 16” DBH is less than 2 snags per acre on the average over the treatment stand, to meet this level. When the existing level of down woody debris over 12” in diameter and 12 feet in length is less than a total of 40 feet per acre on average over the treatment stand, create new down woody debris to meet this level. In addition:
    - Snag and down woody material levels described above will be met by any combination of the creation of new snags and down woody material from live conifer trees and the retention of existing levels of snags (decay classes I and II) and down woody material (decay classes I and II) (USDI BLM 2010). If existing levels of snags and down woody material are insufficient to meet these levels in a thinning project, the desired levels can be satisfied by including in the project decision the creation of snags and down woody material to meet these levels within 5 years after completion of yarding the timber in the timber sale or completion of associated fuels treatment.
    - Snag and down woody material retention or creation levels will be met at the scale of the harvest unit and are not intended to be attained on every acre. Snag and down woody material retention will be variable per acre throughout the treatment area.

- If the pre-harvest quadratic mean diameter of the stand is less than 16”, then the snags to be created or retained will be 2 snags per acre on average over the treatment stand with a diameter larger than the quadratic mean diameter of the stand.

## Eastside Management Area – Non-forested Lands

### Management Objectives

- Manage non-forested lands with the intent of maintaining or improving wildlife habitat and rangeland conditions based on ecological site parameters. Where conditions are currently late seral or potential natural community, maintain these conditions. Where conditions are early or mid seral, improve conditions towards late seral or potential natural community.
- Manage non-forested lands for multiple uses in addition to those listed above including recreational needs, community stability, and commodity production. Commodities include firewood, logs, biomass, chips, and other products and byproducts from juniper woodlands and rangelands.
- Promote development of fire-resilient woodlands and rangelands.
- Provide for the conservation of Bureau Special Status Species.

### Management Direction

- Treat vegetation communities encroached by invasive juniper using prescribed fire, mechanical, chemical, and manual juniper removal treatments.
- Manage and retain juniper woodlands on sites they occupied historically (pre-European settlement), as identified by ecological site inventories or other methods.
- Cut encroaching juniper that hinders attainment of desired forage conditions to maintain and restore forage for big game and to restore unoccupied or historic greater sage-grouse habitat. Remove, utilize, or pile and burn cut juniper.
- Plant or seed native species to improve unoccupied or historic greater sage-grouse habitat
- Retain old-growth ‘legacy’ juniper when the BLM determines it meets the following definition: Individual trees that likely originated in the pre-settlement period, before 1870. These trees are commonly found in rocky areas where vegetation is sparse and fire frequency is naturally low. The BLM will evaluate trees based on the following characteristics of old-growth juniper:
    - Flat, rounded, broad at top, or irregular crown (as opposed to the more pointed tops of younger trees) or dead “spike” top
    - Numerous dead branches
    - Coarse, bright yellow-green lichen (*Letharia* or wolf lichen) covered branches
    - Large diameter lower branches
    - Large diameter trunk relative to height
    - Spirally twisted bark and deep furrows on the trunk
    - Hollow trunk

  Trees need not have all of these characteristics for the BLM to determine that the trees are old-growth juniper.
- Apply prescribed burns, mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires. Apply maintenance treatments at appropriate intervals to retain or improve fire-resilient conditions.
- Manage unoccupied or historic greater sage-grouse habitat consistent with the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon (ODFW 2011) and with the Oregon Sage-Grouse Action Plan (Sage-grouse Conservation Partnership 2015).
- Maintain or enhance wildlife habitat on rangelands.

- Continue the existing road closures to motorized vehicles, except for administrative purposes, between November 1 and April 15 in the designated closure areas within the Interstate and Klamath Deer Winter Ranges. These seasonal road closures include South Gerber, Willow Valley, Harpold Ridge, Bryant Mountain, North Bryant, Windy Ridge, Stukel Mountain, and Lorella.
- Plant or seed native forage species for deer and elk along roadsides, skid trails, and on disturbed areas, or create forage plots when forage quality is determined to be a limiting factor in achieving the management goals of the Oregon Department of Fish and Wildlife. Include forage retention requirements for wildlife when implementing silvicultural treatments or habitat management activities.

## Eastside Management Area – Riparian Reserve

### Management Objectives

- Provide for conservation of Bureau Special Status fish and other Bureau Special Status riparian-associated species.
- Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood sources, and stream bank stability.
- Maintain and restore water quality and hydrologic functions.
- Maintain and restore access to stream channels for all life stages of aquatic species.
- Maintain and restore the proper functioning condition and ecological site potential of riparian and wetland areas.

### Management Direction

**Table B-1.** Eastside Management Area – Riparian Reserve distances by water feature

| Feature | Riparian Reserve Distance* |
|---|---|
| Fish-bearing streams and/or perennial streams | 150 feet on each side of a stream channel from the ordinary high water line or from the outer edge of the channel migration zone for low-gradient alluvial shifting channels. |
| Non-fish-bearing intermittent streams, all lakes, all natural ponds, constructed water impoundments > 1 acre, constructed ponds > 1 acre, and wetlands > 1 acre | 100 feet on each side of the water feature from the ordinary high water line. |
| Wetlands < 1 acre, constructed water impoundments < 1 acre, and constructed ponds < 1 acre. | 25 feet on each side of the water feature from the ordinary high water line. |

* Reported distances are measured as slope distance.

#### *All Water Features*

- Implement instream and riparian restoration activities, such as gravel augmentation, aspen restoration, or placement of boulders and large wood in streams, including tree lining from adjacent riparian areas for all streams. Use manual or ground-based methods. Place an emphasis 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.

- Remove or modify human-caused fish passage barriers to restore access to stream channels for all life stages of aquatic species.
- Fall and move trees as needed for safety or operational reasons, including, but not limited to, hazard tree removal, creation of yarding corridors, and road construction, improvement, or maintenance.
- Retain existing snags and down woody material during silvicultural treatment of stands, except for safety, operational, or fuels reduction reasons. Retain snags felled for safety or operational reasons as down woody material.
- Apply vegetation treatments and prescribed burns as needed to reduce the potential for uncharacteristic wildfires.
- Do not conduct timber salvage, except when necessary to protect public safety, or to keep roads and other infrastructure clear of debris.
- Manage livestock grazing at a level that meets Rangeland Health Standards (USDI BLM 1997) and allows for maintenance or development of an upward trend toward the proper functioning condition of riparian and wetland plant communities. Implement practices such as installing and maintaining livestock exclosures, managing season of use and intensity, developing off-stream watering facilities, and other techniques to attain this condition.
- Remove conifer encroachment where conifers are interfering with the natural vegetation community type, or where excessive erosion may occur.
- Apply Best Management Practices (BMPs) for roads, stream and riparian restoration work, and vegetation management as needed to maintain or restore water quality and hydrologic function (**Appendix J**).

#### *Fish-bearing Streams and Perennial Streams*

- Conduct thinning and other vegetation treatments to accelerate the development of potential natural forest stand conditions including late-successional stand characteristics and native riparian shrub communities.
- When conducting thinning or other vegetation treatments, do not use ground-based machinery within 75 feet (slope distance) on either side of the edge of the stream channel, as measured from the ordinary high water line.
- When conducting thinning or other vegetation treatments, do not use ground-based machinery on slopes > 35 percent, soils sensitive to displacement, rutting, or compaction, or in slide-prone areas.
- Retain and promote long-term site-potential shade conditions.

#### *Non-fish-bearing Intermittent Streams*

- Conduct thinning and other vegetation treatments to speed the development of large trees to provide an eventual source of large woody material to stream channels.
- When conducting thinning or other vegetation treatments, do not use ground-based machinery on slopes > 35 percent, soils sensitive to displacement, rutting, or compaction, or in slide-prone areas.

#### *Lakes, Natural Ponds, and Wetlands*

- Conduct thinning and other vegetation treatments within the Riparian Reserve to speed the development of potential natural vegetation communities.
- When conducting thinning or other vegetation treatments, do not use ground-based machinery within 50 feet (slope distance) on each side of the ordinary high water line of the water feature, or seasonally saturated soils (whichever is greatest).

### *Constructed Water Impoundments and Constructed Ponds*

- Follow inspection guidelines for BLM infrastructure (e.g., dams and spillway structures), and implement maintenance and repair as needed.
- Dredge constructed water impoundments as necessary to maintain capacity.
- Maintain vegetation, access, and plumbing associated with sources of water for fire management purposes for all types of firefighting equipment (e.g., engines, aircraft, and tenders).

# Harvest Land Base

## Management Objectives

- Manage forest stands to achieve continual timber production that can be sustained through a balance of growth and harvest.
- Offer for sale the declared Allowable Sale Quantity of timber.
- Recover economic value from timber following disturbances, such as fires, windstorms, disease, or insect infestations.
- In harvested or disturbed areas, ensure the establishment and survival of desirable trees appropriate to the site and enhance their growth.
- Enhance the economic value of timber in forest stands.

## Management Direction

- Conduct silvicultural treatments to contribute timber volume to the Allowable Sale Quantity.
- Conduct silvicultural treatments to enhance timber values and to reduce fire risks and insect and disease outbreaks.
- Implement timber salvage harvest after disturbances to recover economic value and to minimize commercial loss or deterioration of damaged trees.
- During commercial harvest,[7] except timber salvage, retain existing—
  - Snags > 20” DBH
  - Snags 6–20” DBH in decay classes III, IV, and V (USDI BLM 2010)
  - Down woody material > 20” in diameter at the large end and > 20’ in length
  - Down woody material 6–20” in diameter at the large end and > 20’ in length in decay classes III, IV, and V (USDI BLM 2010)

  except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6” DBH felled for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material.
- When implementing commercial harvest, except timber salvage, create new snags in the amounts and sizes specified in **Table B-2** within 1 year of completion of yarding the timber in the timber sale. If insufficient trees are available in the pre-harvest stand in the size class specified, use trees from the

[7] In the context of management direction for the Harvest Land Base, **commercial harvest** means stand harvesting in which some or all of the cut trees are removed from the stand for timber volume and a monetary value assessed. Commercial harvest in this context does not include the following:

- Individual tree falling
- Stand thinning in which all of the cut trees are left in the stand for restoration purposes or the cut trees are removed for firewood or other non-commercial harvest
- Fuels reduction treatments in which cut trees are burned, chipped, or otherwise disposed of without removal from the stand for timber

Commercial harvest may be implemented through a variety of mechanisms, including timber sale contracts, stewardship agreements, or other types of contracts.

largest size class available. Meet snag creation levels as an average at the scale of the harvest unit; snag creation levels are not required to be attained on every acre. When creating the required number of snags, locate them according to the following criteria:

- Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
- Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete.
- Concentrate the creation of snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Meet snag creation levels with trees from any species.

**Table B-2.** Snag creation levels within the Harvest Land Base

| District/ Field Office | Province | Number of Snags/Acre Created Within 1 Year of Yarding the Timber in the Timber Sale | | |
|---|---|---|---|---|
| | | > 20" DBH | > 10" DBH | Total Snags |
| Coos Bay | All | 1 | - | 1 |
| Eugene | OR Coast Range | 1 | - | 1 |
| | Western Cascades | 1 | - | 1 |
| Klamath Falls | All | 1 | - | 1 |
| Medford | All | - | - | - |
| Roseburg | OR Coast Range | 3 | - | 3 |
| | Western Cascades | 3 | 3 | 6 |
| | Klamath | - | - | - |
| Salem | OR Coast Range | 1 | - | 1 |
| | Western Cascades | 1 | - | 1 |

- Employ site preparation methods such as mechanical treatments (e.g., machine piling), manual treatments (e.g., brushing), and prescribed burns to prepare newly harvested and inadequately stocked areas for the regeneration of desirable tree species.
- Manually apply supplemental nutrients where necessary to enhance vigor and growth of desired vegetation. Do not use aerial application methods.
- If not suitable for commercial removal, make felled hazard trees available for habitat restoration purposes in any land use allocation, including off-site from the location where such hazard trees are felled.

## Harvest Land Base – Low Intensity Timber Area (LITA)

### Management Objectives

- *See Harvest Land Base management objectives.*
- Provide complex early successional ecosystems.
- Develop diverse late-successional ecosystems for a portion of the rotation.
- Provide a variety of forest structural stages distributed both spatially and temporally.

## Management Direction

- *See Harvest Land Base management direction.*
- Apply regeneration harvest[8] for any of the following reasons:
  - Produce timber to contribute to the attainment of the declared Allowable Sale Quantity.
  - Adjust the age class distribution in the LITA in each sustained-yield unit.
  - Manage insect and disease infestations.
  - Convert stands capable of supporting conifer species that are currently growing primarily hardwoods or shrubs to a mix of conifer and hardwood species suitable to the site.
  - Increase or maintain vegetative species diversity.
  - Restore and maintain habitat for Bureau Special Status Species.
  - Create growing space for hardwood and pine species persistence and regeneration.
  - Produce complex early successional ecosystems.
  - Reset stand development in overly dense stands that would not respond well to commercial thinning.
- In each regeneration harvest unit, retain 15–30 percent of pre-harvest stand basal area in live trees. Retain trees in a variety of spatial patterns, including aggregated groups, stringers, and individual trees. Include among retained trees all trees that are both ≥ 40” DBH and that the BLM identifies were established prior to 1850, except where removal is necessary for safety or operational reasons and no alternative harvesting method is economically viable or practically feasible. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM.
- After regeneration harvest, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 130 trees per acre within 5 years of harvest.
- Conduct commercial thinning for any of the following reasons:
  - Produce timber to contribute to the attainment of the declared Allowable Sale Quantity.
  - Adjust stand composition or dominance.
  - Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation.
  - Improve stand merchantability and value.
  - Increase or maintain vegetative species diversity.
  - Promote or enhance the development of structural complexity.
  - Create growing space for the creation or augmentation of Bureau Special Status plant populations.
  - Create growing space for hardwood and pine persistence and regeneration.
- Maintain stand densities through commercial thinning above densities needed to occupy the site, but below densities that will result in loss of stand vigor and health.
  - Conduct thinning to result in a stand average relative density between 25 percent and 45 percent after harvest.
  - Leave untreated areas (skips) and create group selection openings[9] to provide structural complexity in the post-treatment stand. Leave at least 5 percent of the planned harvest unit in untreated areas. Do not exceed 10 percent of the planned harvest unit in group selection openings.
  - Include among retained trees all trees that are both ≥ 40” DBH and that the BLM identifies were established prior to 1850, except where removal is necessary for safety or operational reasons and no alternative harvesting method is economically viable or practically feasible. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such

[8] For the purpose of management direction for the Harvest Land Base – Low Intensity Timber Area, regeneration harvest does not include timber salvage, which has separate management direction.

[9] **Group selection openings** are defined as areas with ≤ 2 live trees ≥ 7” DBH per acre. Roads, landings, yarding corridors, and skid trails do not count as group selection openings.

as evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM.

- Implement timber salvage harvest after disturbance events to recover economic value and to minimize commercial loss or deterioration of damaged trees where the BLM determines that removal is economically viable.
    - In timber salvage harvest units, retain at least 15 percent of pre-harvest stand basal area in live trees or snags in individual harvest units. Retain trees and snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
    - After salvage harvest, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 130 trees per acre (including surviving trees) within 5 years of harvest.
- For areas without timber salvage harvest after disturbance events, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 130 trees per acre (including surviving trees) within 10 years of the disturbance event, to the extent possible given safety and operational constraints.

## Harvest Land Base – Moderate Intensity Timber Area (MITA)

### Management Objectives

- *See Harvest Land Base management objectives.*
- Provide complex early successional ecosystems.
- Develop diverse late-successional ecosystems for a portion of the rotation.
- Provide a variety of forest structural stages distributed both temporally and spatially.

### Management Direction

- *See Harvest Land Base management direction.*
- Conduct regeneration harvest[10] for any of the following reasons:
    - Produce timber to contribute to the attainment of the declared Allowable Sale Quantity.
    - Adjust the age class distribution in the MITA in each sustained-yield unit.
    - Manage insect and disease infestations.
    - Convert stands capable of supporting conifer species that are currently growing primarily hardwoods or shrubs to a mix of conifer and hardwood species suitable to the site.
    - Increase or maintain vegetative species diversity.
    - Restore and maintain habitat for Bureau Special Status Species.
    - Create growing space for hardwood and pine species persistence and regeneration.
    - Produce complex early successional ecosystems.
    - Reset stand development in overly dense stands that would not respond well to commercial thinning.
- In each regeneration harvest unit, retain 5–15 percent of pre-harvest stand basal area in live trees. Retain trees in a variety of spatial patterns, including aggregated groups, stringers, and individual trees. Include among retained trees all trees that are both ≥ 40" DBH and that the BLM identifies were established prior to 1850, except where removal is necessary for safety or operational reasons and no alternative harvesting method is economically viable or practically feasible. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as

[10] For the purpose of management direction for the Harvest Land Base – Moderate Intensity Timber Area, regeneration harvest does not include timber salvage, which has separate management direction.

evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM.

- After regeneration harvest, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 150 trees per acre within 5 years of harvest.
- Conduct commercial thinning for any of the following reasons:
  - Produce timber to contribute to the attainment of the declared Allowable Sale Quantity.
  - Adjust stand composition or dominance.
  - Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation.
  - Improve stand merchantability and value.
  - Increase or maintain vegetative species diversity.
  - Promote or enhance the development of structural complexity.
  - Create growing space for the creation or augmentation of Bureau Special Status plant populations.
  - Create growing space for hardwood and pine persistence and regeneration.
- Maintain stand densities through commercial thinning above densities needed to occupy the site, but below densities that will result in loss of stand vigor and health.
  - Conduct thinning to result in stand average relative density between 25 percent and 45 percent after harvest.
  - Leave untreated areas (skips) and create group selection openings to provide structural complexity in the post-treatment stand. Leave at least 5 percent of the planned harvest unit in untreated areas. Do not exceed 10 percent of the planned harvest unit in group selection openings.
  - Include among retained trees all trees that are both ≥ 40" DBH and that the BLM identifies were established prior to 1850, except where removal is necessary for safety or operational reasons and no alternative harvesting method is economically viable or practically feasible. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM.
- Implement timber salvage harvest after disturbance events to recover economic value and to minimize commercial loss or deterioration of damaged trees where the BLM determines that removal is economically viable.
  - In timber salvage harvest units, retain at least 5 percent of pre-harvest stand basal area in live trees or snags in individual harvest units. Retain trees and snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
  - After salvage harvest, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 150 trees per acre (including surviving trees) within 5 years of harvest.
- For areas without timber salvage harvest after disturbance events, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 150 trees per acre (including surviving trees) within 10 years of the disturbance event, to the extent possible given safety and operational constraints.

## Harvest Land Base – Uneven-aged Timber Area (UTA)

### Management Objectives

- *See Harvest Land Base management objectives.*
- Increase diversity of stocking levels and size classes within and among the stands.

## Management Direction

- *See Harvest Land Base management direction.*
- Utilize integrated vegetation management[11] in designing and implementing treatments. Conduct integrated vegetation management for any of the following:
    - Produce timber to contribute to the attainment of the declared Allowable Sale Quantity.
    - Promote the development and retention of large, open grown trees and multi-cohort stands.
    - Develop diverse understory plant communities.
    - Increase or maintain vegetative species diversity.
    - Restore and maintain habitat for Bureau Special Status Species.
    - Promote or enhance the development of structural complexity and heterogeneity.
    - Create growing space for hardwood and pine persistence and regeneration.
    - Create and maintain areas for hardwood and shrub dominance.
    - Adjust stand composition or dominance.
    - Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation.
- In forest stands ≥ 10 acres treated with selection harvest or commercial thinning, harvest to result in stand average relative density between 20 percent and 45 percent after harvest.
    - Do not create group selection openings more than 4 acres in size.
    - Do not create group selection openings on more than 30 percent of the stand area.
    - Leave untreated areas (skips) on at least 10 percent of the stand area.
- When regenerating group selection openings created from selection harvest or commercial thinning, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to an average density across the opening of at least 150 trees per acre within 5 years of harvest.
- When treating stands with integrated vegetation management, retain dominant Douglas-fir (*Pseudotsuga menziesii*) and pine (*Pinus* spp.) trees that are both ≥ 36" DBH and that the BLM identifies were established prior to 1850 and madrone (*Arbutus menziesii*), bigleaf maple (*Acer macrophyllum*), and oak (*Quercus* spp.) trees > 24" DBH, except where removal is necessary for safety or operational reasons and no alternative harvesting method is economically viable or practically feasible.
    - The BLM identification of Douglas-fir and pine trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM.
    - Protect and develop these retained trees by reducing competition to improve vigor and resistance to fire, drought, disease, and other disturbances and removing adjacent fuels to reduce risk of fire-related mortality.
- Apply prescribed fire for any of the following:
    - Promote the development and retention of large, open-grown trees and multi-cohort stands.
    - Develop diverse understory plant communities.
    - Increase or maintain vegetative species diversity.
    - Restore and maintain habitat for Bureau Special Status Species.
    - Promote or enhance the development of stand structural complexity and heterogeneity.
    - Create growing space for hardwood and pine persistence and regeneration.
    - Create and maintain areas for hardwood and shrub dominance.
    - Adjust stand composition or dominance.

[11] **Integrated vegetation management** includes the use of a combination of silvicultural or other vegetation treatments, fire and fuels management activities, harvest methods, and restoration activities. Activities include, but are not limited to, vegetation control, planting, snag creation, prescribed fire, biomass removal, thinning, single tree selection harvest, and group selection harvest. For the purpose of management direction for the Harvest Land Base – Uneven-aged Timber Area, integrated vegetation management does not include timber salvage, which has separate management direction.

  - Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation.
- Treat fuels to improve, enhance, or maintain landscape and ecosystem resilience. Identify sites for fuels treatments based on risk of large-scale, high-intensity fire, operationally strategic locations, and near highly valued resources and assets.
- Modify fuel loading to produce fire behavior and fire effects representative of the natural fire regime. Implement interim fuels treatments (e.g., hand pile and burn) in areas that are highly departed from natural conditions in order to facilitate prescribed fire in the future.
- Implement prescribed fire in low/mixed severity or high-frequency fire regimes to emulate historic fire function and processes. Apply prescribed fire across the landscape to create a mosaic of spatial and temporal stand conditions and patterning (appropriate to the fire regime).
- Implement timber salvage harvest after disturbance events to recover economic value and to minimize commercial loss or deterioration of damaged trees where the BLM determines that removal is economically viable.
  - In timber salvage harvest units, retain at least 5 percent of pre-harvest stand basal area in live trees or snags in individual harvest units. Retain trees and snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
  - After salvage harvest, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 150 trees per acre (including surviving trees) within 5 years of harvest.
- For areas without timber salvage harvest after disturbance events, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to a stand-level average of at least 150 trees per acre (including surviving trees) within 10 years of the disturbance event, to the extent possible given safety and operational constraints.

## Late-Successional Reserve

### Management Objectives

- Maintain[12] nesting-roosting habitat for the northern spotted owl and nesting habitat for the marbled murrelet.

[12] **Maintain northern spotted owl nesting-roosting habitat** refers to a silvicultural activity that changes a conifer forest stand but maintains structural characteristics such that the stand continues to support the same northern spotted owl life history requirements: nesting-roosting habitat continues to support northern spotted owl nesting-roosting. Scientific findings support the idea that conifer forest stands can be altered in a manner that does not necessarily change their use by northern spotted owls (see the summary in the Revised Recovery Plan for the Northern Spotted Owl, USDI FWS 2011, p. III-15). Although structural characteristics vary across the northern spotted owl's range, northern spotted owl nesting-roosting habitat generally is characterized by conifer stands with a multi-layered, multispecies canopy dominated by large (> 30" DBH) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods, ≥ 60 percent canopy cover, 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 northern spotted owls to fly within and beneath it. Activities needed to protect the overall health of the stand or adjacent stands, such as fuels reduction and insect and disease control, and wildfire management actions/activities may occur even if they downgrade or remove northern spotted owl habitat.

**Maintain marbled murrelet habitat** refers to a silvicultural activity that changes a conifer forest stand but maintains structural characteristics such that the stand continues to support marbled murrelet nesting opportunities. Activities needed to protect the overall health of the stand or adjacent stands, such as fuels reduction and insect and disease control, and wildfire management actions/activities may occur even if they remove marbled murrelet habitat.

- Promote the development of nesting-roosting habitat for the northern spotted owl in stands that do not currently support northern spotted owl nesting and roosting.
- Promote the development of nesting habitat for the marbled murrelet in stands that do not currently meet nesting habitat criteria.
- Promote the development and maintenance of foraging habitat for the northern spotted owl, including creating and maintaining habitat to increase diversity and abundance of prey for the northern spotted owl.

## Management Direction

- Manage for large blocks of northern spotted owl nesting-roosting habitat that support clusters of reproducing spotted owls, are distributed across the variety of ecological conditions, and are spaced to facilitate the movement and survival of spotted owls dispersing between and through the blocks.
- In stands that are currently northern spotted owl nesting-roosting habitat, maintain nesting-roosting habitat function, regardless of northern spotted owl occupancy.
- Protect[13] stands of older, structurally-complex conifer forest. Such stands are a subset of, and represent the highest value, northern spotted owl nesting-roosting habitat.
- Undertake activities such as individual tree removal, including the felling of hazard trees and stream logs, and the construction of linear and non-linear rights-of-way or other facilities, including communication sites, as long as northern spotted owl nesting-roosting habitat continues to support northern spotted owl nesting and roosting at the stand level, and northern spotted owl dispersal habitat continues to support northern spotted owl movement and survival at the landscape level.
- Protect marbled murrelet occupied stands. In this context, **protect marbled murrelet occupied stands** means to prohibit activities in the occupied stand except for the following: felling of live or dead hazard trees, felling trees for habitat restoration, and the construction or maintenance of linear and nonlinear rights-of-way, spur roads, yarding corridors or other facilities, as long as the occupied stand continues to support marbled murrelet nesting. Implement wildfire management actions and activities needed to protect the overall health of the stand or adjacent stands, such as fuels reduction and insect and disease control, as long as the occupied stand continues to support marbled murrelet nesting.
- During silvicultural treatment of stands, retain existing—
    - Snags ≥ 6” DBH
    - Down woody material ≥ 6” in diameter at the large end and > 20 feet in length

  except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6” DBH felled for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material.
- Cut individual green trees in the Late-Successional Reserve and move for placement in streams for fish habitat restoration.

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[13] **Protect older, structurally-complex conifer forest** means to prohibit harvesting activities in a conifer forest stand except as provided in this definition. Harvesting activities are limited to the following: felling of live or dead hazard trees and logs for streams, the construction, modification, maintenance and removal of linear and nonlinear rights-of-way, spur roads, yarding corridors or other facilities, as long as the forest stand continues to support the same northern spotted owl and marbled murrelet life history requirements: nesting-roosting habitat continues to support northern spotted owl nesting-roosting; dispersal habitat continues to support northern spotted owl movement and survival; and marbled murrelet nesting habitat continues to support marbled murrelet nesting. Activities needed to protect the overall health of the stand or adjacent stands, such as fuels reduction and insect and disease control, and wildfire management actions/activities may occur even if they downgrade or remove northern spotted owl habitat or remove marbled murrelet habitat.

- Maintain access to roads and facilities by removing hazard trees and blowdown. Logs may be retained as down woody debris, moved for placement in streams for fish habitat restoration, or removed through a commercial harvest.
- In stands that are not northern spotted owl nesting-roosting habitat, apply silvicultural treatments to speed the development of northern spotted owl nesting-roosting habitat or improve the quality of northern spotted owl nesting-roosting habitat in the stand or in the adjacent stand in the long term. Limit such silvicultural treatments (other than forest pathogen treatments) to those that do not preclude or delay by 20 years or more the development of northern spotted owl nesting-roosting habitat in the stand and in adjacent stands, as compared to development without treatment. Allow silvicultural treatments that do not meet the above criteria if needed to treat infestations or reduce the spread of forest pathogens.
- Utilize integrated vegetation management[14] in designing and implementing treatments. Conduct integrated vegetation management for any of the following:
    - Promote the development and retention of large, open grown trees and multi-cohort stands.
    - Develop diverse understory plant communities.
    - Increase or maintain vegetative species diversity.
    - Restore and maintain habitat for Bureau Special Status species.
    - Promote or enhance the development of structural complexity and heterogeneity.
    - Create growing space for hardwood and pine persistence and regeneration.
    - Create and maintain areas for hardwood and shrub dominance.
    - Adjust stand composition or dominance.
    - Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation.
- In stands ≥ 10 acres treated with selection harvest or commercial thinning,
    - Conduct harvest to result in stand average relative density percent between 20 percent and 45 percent after harvest.
    - Do not create group selection openings[15] more than 4 acres in size.
    - Do not create group selection openings on more than 25 percent of the stand area.
    - Leave untreated skips on at least 10 percent of the stand area.
- In stands < 10 acres treated with selection harvest or commercial thinning, do not create group selection openings more than 2.5 acres in size.
- When regenerating group selection openings created from selection harvest or commercial thinning, use natural or artificial regeneration to reforest a mixture of species appropriate to the site to an average density across the group selection openings of at least 75 trees per acre within 5 years of harvest.
- When conducting commercial harvest, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If insufficient trees are available in the size class specified, use trees from the largest size class available. Meet snag creation levels as an average at the scale of the harvest unit; snag creation levels need not be attained on every acre. When creating the required number of snags, locate them according to the following criteria:
    - Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
    - Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete.

[14] **Integrated vegetation management** includes the use of a combination of silvicultural or other vegetation treatments, fire and fuels management activities, harvest methods, and restoration activities. Activities include but are not limited to vegetation control, planting, snag creation, prescribed fire, thinning, single tree selection harvest, and group selection harvest.
[15] **Group selection openings** are defined as areas with ≤ 2 live trees ≥ 7" DBH per acre. Roads, landings, yarding corridors, and skid trails do not count as group selection openings.

- Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years.

**Table B-3.** Snag creation levels within the Late-Successional Reserve and Riparian Reserve

| District/ Field Office | Province | Snags/Acre | | |
|---|---|---|---|---|
| | | > 20” DBH | > 10” DBH | Total Snags |
| Coos Bay | All | 5 | 5 | 10 |
| Eugene | OR Coast Range | 5 | 5 | 10 |
| | Western Cascades | 5 | 20 | 25 |
| Klamath Falls | All | 2 | 5 | 7 |
| Medford | All | 1 | 1 | 2 |
| Roseburg | OR Coast Range | 6 | 7 | 13 |
| | Western Cascades | 6 | 25 | 31 |
| | Klamath | 1 | 1 | 2 |
| Salem | OR Coast Range | 5 | 5 | 10 |
| | Western Cascades | 5 | 20 | 25 |

- When conducting fuels reduction or prescribed fire treatments, retain down woody material at levels specified in **Table B-4** post-treatment. Meet down wood levels as an average at the scale of the treatment area following the treatment; down wood levels need not be attained on every acre.

**Table B-4.** Down woody material retention levels when implementing fuels reduction or prescribed fire treatments within the Late-Successional Reserve and Riparian Reserve

| District/ Field Office | Province | Down Wood Percent Cover* |
|---|---|---|
| Coos Bay | All | 6% |
| Eugene | OR Coast Range | 6% |
| | Western Cascades | 10% |
| Klamath Falls | All | 3% |
| Medford | All | 2% |
| Roseburg | OR Coast Range | 6% |
| | Western Cascades | 10% |
| | Klamath | 2% |
| Salem | OR Coast Range | 6% |
| | Western Cascades | 10% |

* Percent cover of down wood > 4” diameter.

- Do not conduct timber salvage, except when necessary to protect public safety, or to keep roads and other infrastructure clear of debris.

## Late-Successional Reserve – Dry

### Management Objectives

- *See Late-Successional Reserve management objectives.*
- Enable forests to: (1) recover from past management measures, (2) respond positively to climate-driven stresses, wildfire and other disturbance with resilience, (3) ensure positive or neutral ecological impacts from wildfire, and (4) contribute to northern spotted owl recovery.
- Reduce the risk of loss of key late-successional structure through the development of vertical and horizontal heterogeneity.
- Increase diversity of stocking levels and size classes within the stand and the landscape.

### Management Direction

- *See Late-Successional Reserve management direction.*
- Apply selection harvest or commercial thinning treatments in Late-Successional Reserve – Dry in the South River Field Office of Roseburg District to at least 4,500 acres per decade.
- Apply selection harvest or commercial thinning treatments in Late-Successional Reserve – Dry in the Medford District to at least 17,000 acres per decade.
- When treating stands with integrated vegetation management, retain dominant Douglas-fir (*Pseudotsuga menziesii*) and pine (*Pinus* spp.) trees that are ≥ 36" DBH and were established prior to 1850 and madrone (*Arbutus menziesii*), bigleaf maple (*Acer macrophyllum*), and oak (*Quercus* spp.) trees > 24" DBH, except where removal is necessary for safety or operational reasons.
  - The BLM identification of Douglas-fir and pine trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM.
  - Protect and develop these retained trees by reducing competition to improve vigor and resistance to fire, drought, disease, and other disturbances and removing adjacent fuels to reduce risk of fire related mortality.
- Treat fuels to improve, enhance, or maintain landscape and ecosystem resilience. Identify sites for fuels treatments based on risk of large-scale crown fire, operationally strategic locations, and potential for hazard reduction near highly valued resources.
- Modify fuel beds to produce characteristic fire behavior and fire effects representative of the fire regime. Implement interim fuels treatments (e.g., hand pile and burn) in areas that are highly departed from natural conditions in order to facilitate prescribed fire in the future.
- Apply prescribed fire in low/mixed severity or high-frequency fire regimes to emulate historic fire function and processes. Apply prescribed fire across the landscape to create a mosaic of spatial and temporal stand conditions and patterning (appropriate to the fire regime). Based on site-specific considerations, take measures to prevent and control fire regime altering species.
- Apply prescribed fire and mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires. Apply maintenance treatments at appropriate intervals to retain or improve fire-resilient conditions.
- Maintain access to roads and facilities by removing hazard trees and blowdown. Logs may be retained as down woody debris, moved for placement in streams for fish habitat restoration, removed through a commercial timber sale, or treated as necessary for fuels reduction.

# Riparian Reserve (West of Highway 97)

## Riparian Reserve – Moist

### Management Objectives

- Contribute to the conservation and recovery of ESA-listed fish species and their habitats and provide for conservation of Bureau Special Status fish and other Bureau Special Status riparian-associated species.
- Maintain and restore natural channel dynamics, processes, and the proper functioning condition of riparian areas, stream channels, and wetlands by providing forest shade, sediment filtering, wood recruitment, stream bank and channel stability, water storage and release, vegetation diversity, nutrient cycling, and cool and moist microclimates.
- Maintain water quality and streamflows within the range of natural variability, to protect aquatic biodiversity, provide quality water for contact recreation and drinking water sources.
- Meet ODEQ water quality criteria.
- Maintain high quality water and contribute to the restoration of degraded water quality for 303(d)-listed streams.
- Maintain high quality waters within ODEQ-designated Source Water Protection watersheds.

### Management Direction

- Maintain access to roads and facilities by removing hazard trees and blowdown. Retain logs as down woody material or move for placement in streams for fish habitat restoration, unless removal of logs, including through commercial harvest, is necessary to accomplish removal of hazard trees or blowdown to maintain access to roads and facilities.
- Allow yarding corridors, skid trails, road construction, stream crossings, and road maintenance and improvement where there is no operationally feasible and economically viable alternative to accomplish other resource management objectives.
- Use site-specific BMPs (**Appendix J**) to maintain water quality during land management actions, including discretionary actions of others crossing BLM-administered lands.
- In new recreational developments, install sanitation systems that maintain water quality (e.g., sealed vault or similar).
- Do not operate ground-based machinery for timber harvest within 50 feet of streams (slope distance), except where machinery is on improved roads, designated stream crossings, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream.
- Do not operate ground-based machinery on slopes > 35 percent. Mechanical equipment with tracks (e.g., excavators, loaders, forwarders, and harvesters) may be used on short pitch slopes of greater than 35 percent but less than 45 percent when necessary to access benches of lower gradient (length determined on a site-specific basis, generally less than 50 feet (slope distance)).
- During silvicultural treatment of stands, retain existing—
  - Snags ≥ 6" DBH
  - Down woody material ≥ 6" in diameter at the large end and > 20 feet in length

  except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6" DBH felled for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material.
- Prohibit timber salvage, except when necessary to protect public safety, or to keep roads and other infrastructure clear of debris.
- Implement sudden oak death (SOD) eradication activities that do not exceed (at the HUC 10 watershed scale)—

- The removal of > 30 percent canopy cover over a contiguous 0.5 mile stream length or removal of > 50 percent canopy cover over a contiguous 0.25 mile stream length for small perennial streams (active channel width < 27 feet) where a 4,600-foot separation of non-treatment between sequential contiguous treatments would be maintained;
    - The removal of > 50 percent canopy cover over a contiguous 0.5 mile stream length for medium-large perennial streams (active channel width > 27 feet) where a 4,600-foot separation of non-treatment between sequential contiguous treatments would be maintained; and
    - A limit of 3 miles of treatment for any 5-year period and 3 percent of the total Federal perennial stream miles.

  Implement SOD eradication activities that exceed these limitations only consistent with existing ESA consultation documents that address SOD eradication activities in the decision area.
- Cut or tip individual green trees and move for fish habitat restoration.
- Cut or tip individual trees directly into the stream channel for fish habitat restoration.
- Tree tipping: When conducting commercial thinning[16] in any portion of the Outer Zone in a stand in all watershed classes, fall or tip from 0 to 15 square feet of basal area per acre of live trees, averaged across the Riparian Reserve portion of the treated stand. Leave felled or tipped trees on site or yard, deck, and make felled or tipped trees available for fish habitat restoration. The felled or tipped trees can be of any size and come from any zone.
- Promote beaver habitat restoration where the presence of beaver and their associated dams would improve fish and aquatic habitat.
- Along ponds and wetlands < 1 acre and constructed water impoundments of any size, treat vegetation as needed for habitat restoration, access, or safety.
- For constructed water impoundments and constructed ponds:
    - Follow inspection guidelines for BLM infrastructure (e.g., dams and spillway structures), and implement maintenance and repair as needed.
    - Dredge constructed water impoundments as necessary to maintain capacity.
    - Maintain vegetation, access, and plumbing associated with sources of water for fire management purposes for all types of firefighting equipment (e.g., engines, aircraft, and tenders).

[16] In the context of management direction for the Riparian Reserve, **commercial thinning** means stand thinning in which any of the cut trees are removed from the stand for timber volume. Commercial thinning in this context does not include individual tree falling or tipping or stand thinning in which all of the cut trees are left in the stand for restoration purposes, or fuels reduction treatments in which cut trees are burned, chipped, or otherwise disposed of without removal from the stand for timber. Commercial thinning may be implemented through a variety of mechanisms, including timber sale contracts, stewardship agreements, or other types of contracts.

**Table B-5.** Riparian Reserve distance by water feature

| Feature | Riparian Reserve Distance* |
| --- | --- |
| Fish-bearing streams and perennial streams | One site-potential tree height distance from the ordinary high water line or from the outer edge of the channel migration zone for low-gradient alluvial shifting channels, whichever is greatest, on each side of a stream |
| Intermittent, non-fish-bearing streams | Class I and II subwatersheds: One site-potential tree height distance from the ordinary high water line on each side of a stream |
| | Class III subwatersheds: 50 feet from the ordinary high water line on each side of a stream |
| Unstable areas that are above or adjacent to stream channels and are likely to deliver material such as sediment and logs to the stream if the unstable area fails | The extent of the unstable area; where there is a stable area between such an unstable area and a stream, and the unstable area has the potential to deliver material such as sediment and logs to the stream, extend the Riparian Reserve from the stream to include the intervening stable area as well as the unstable area |
| Lakes, natural ponds > 1 acre, and wetlands > 1 acre | 100 feet extending from the ordinary high water line |
| Natural ponds < 1 acre and wetlands < 1 acre (including seeps and springs), and constructed water impoundments of any size | 25 feet extending from the ordinary high water line |

* Reported distances are measured as slope distance

**Table B-6.** Zone-specific management direction for streams in Class I subwatersheds

| **Fish-bearing streams and perennial streams** |
| --- |
| *Inner Zone (0–120 feet)* |
| Do not thin stands, except for—<br>• SOD treatments; and<br>• Individual tree falling or tipping for restoration or to meet the tree-tipping management direction associated with outer zone commercial thinning |
| *Outer Zone (120 feet to one site-potential tree height)* |
| Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation—<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.<br>• Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open |

after harvesting activities are complete.

**Intermittent, non-fish-bearing streams**

*Inner Zone (0–50 feet)*

Do not thin stands, except for—

- SOD treatments; and
- Individual tree falling or tipping for restoration or to meet the tree-tipping management direction associated with outer zone commercial thinning

*Middle Zone (50–120 feet)*

Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.

Remove cut trees only as needed for safety or operational reasons, or to meet the tree-tipping management direction described above.

*Outer Zone (120 feet to one site-potential tree height)*

Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the harvest unit within the Riparian Reserve.

Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation—

- Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
- Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.

Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete.

**Table B-7.** Zone-specific management direction for streams in Class II subwatersheds

| **Fish-bearing streams and perennial streams** |
|---|
| *Inner Zone (0–120 feet)* |
| Do not thin stands, except for—<br>• SOD treatments; and<br>• Individual tree falling or tipping for restoration or to meet the tree-tipping management direction associated with outer zone commercial thinning |
| *Outer Zone (120 feet to one site-potential tree height)* |
| Thin stands as needed to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Apply silvicultural treatments to increase diversity of riparian species and develop structurally-complex stands. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation:<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.<br>• Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete. |
| **Intermittent, non-fish-bearing streams** |
| *Inner Zone (0–50 feet)* |
| Do not thin stands, except for—<br>• SOD treatments; and<br>• Individual tree falling or tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning |
| *Outer Zone (50 feet to one site-potential tree height)* |
| Thin stands as needed to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Apply silvicultural treatments to increase diversity of riparian species and develop structurally-complex stands. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation:<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees. |

| |
|---|
| • Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete. |

**Table B-8.** Zone-specific management direction for streams in Class III subwatersheds

| **Fish-bearing streams and perennial streams** |
|---|
| *Inner Zone (0–120 feet)* |
| Do not thin stands, except for—<br>• SOD treatments; and<br>• Individual tree falling or tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning |
| *Outer Zone (120 feet to one site-potential tree height)* |
| Thin stands as needed to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Apply silvicultural treatments to increase diversity of riparian species and develop structurally-complex stands. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation:<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.<br>• Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete. |
| **Intermittent, non-fish-bearing streams (0–50 feet)** |
| Do not thin stands, except for—<br>• SOD treatments; and<br>• Individual tree falling or tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning |

## Riparian Reserve – Dry

### Management Objectives

- Contribute to the conservation and recovery of ESA-listed fish species and their habitats and provide for conservation of Bureau Special Status fish and other Bureau Special Status riparian-associated species.

- Maintain and restore natural channel dynamics and processes and the proper functioning condition of riparian areas, stream channels and wetlands by providing forest shade, sediment filtering, wood recruitment, stability of stream banks and channels, water storage and release, vegetation diversity, nutrient cycling and cool and moist microclimate.
- Maintain water quality and streamflows within the range of natural variability, to protect aquatic biodiversity, provide quality water for contact recreation and drinking water sources.
- Meet ODEQ water quality criteria.
- Maintain high quality water and contribute to the restoration of degraded water quality for 303(d)-listed streams.
- Maintain high quality waters within ODEQ-designated Source Water Protection watersheds.

## Management Direction

- Maintain access to roads and facilities by removing hazard trees and blowdown. Retain logs as down woody material, move for placement in streams for fish habitat restoration, or treat as necessary for fuels reduction, unless removal of logs, including through commercial harvest, is necessary to accomplish removal of hazard trees or blowdown to maintain access to roads and facilities.
- Allow yarding corridors, skid trails, road construction, stream crossings, and road maintenance and improvement where there is no operationally feasible and economically viable alternative to accomplish other resource management objectives.
- Use site-specific BMPs (**Appendix J**) to maintain water quality during land management actions, including discretionary actions of others crossing BLM-administered lands.
- In new recreational developments, install sanitation systems that maintain water quality (e.g., sealed vault or similar).
- Do not operate ground-based machinery within 50 feet of streams (slope distance), except where machinery is on improved roads, designated stream crossings, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream.
- Do not operate ground-based machinery on slopes > 35 percent. Mechanical equipment with tracks (e.g., excavators, loaders, forwarders, and harvesters) may be used on short pitch slopes of greater than 35 percent but less than 45 percent when necessary to access benches of lower gradient (length determined on a site-specific basis, generally less than 50 feet (slope distance)).
- During silvicultural treatment of stands, retain existing—
    - Snags ≥ 6" DBH
    - Down woody material ≥ 6" in diameter at the large end and > 20 feet in length except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6" DBH felled for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material.
- In all subwatershed classes:
    - Apply low or moderate-severity prescribed burns where needed to invigorate native deciduous tree species. Moderate severity prescribed burns will be limited to no more than 20 percent of area of Riparian Reserve subwatershed (HUC 12) each year.
    - Apply non-commercial tree thinning to adjust fuel loads as necessary to achieve desired fire effects prior to prescribed burning.
- When conducting fuels or prescribed fire treatments, retain down woody material at levels specified in **Table B-4**. Down woody material retention standards would be met as an average at the scale of the treatment area, and is not intended to be attained on every acre.
- Do not conduct timber salvage, except when necessary to protect public safety, or to keep roads and other infrastructure clear of debris.

- Cut or tip individual green trees and move as necessary for fish habitat restoration.
- Cut or tip individual green trees directly into the stream channel for fish habitat restoration.
- Tree tipping: When conducting commercial thinning[17] in any portion of the Outer Zone in a stand in all subwatershed classes, fall or tip from 0 to 15 square feet of basal area per acre of live trees, averaged across the Riparian Reserve portion of the treated stand. Leave felled or tipped trees on site or yard, deck, and make felled or tipped trees available for fish habitat restoration. The felled or tipped trees can be of any size and come from any zone within the Riparian Reserve.
- Promote beaver habitat restoration where the presence of beaver and their associated dams would improve fish and aquatic habitat.
- Along ponds and wetlands < 1 acre and constructed water impoundments of any size, treat vegetation as needed for habitat restoration, access, or safety.
- For constructed water impoundments and constructed ponds:
    - Follow inspection guidelines for BLM infrastructure (e.g., dams and spillway structures), implement maintenance, and repair as needed.
    - Dredge constructed water impoundments as necessary to maintain capacity.
    - Maintain vegetation, access, and plumbing associated with sources of water for fire management purposes for all types of firefighting equipment (e.g., engines, aircraft, and tenders).

[17] In the context of management direction for the Riparian Reserve, '**commercial thinning'** means stand thinning in which some or all of the cut trees are removed from the stand for timber. Commercial thinning in this context does not include individual tree falling or tipping or stand thinning in which all of the cut trees are left in the stand for restoration purposes, or fuels reduction treatments in which cut trees are burned, chipped, or otherwise disposed of without removal from the stand for timber. Commercial thinning may be implemented through a variety of mechanisms, including timber sale contracts, stewardship agreements, or other types of contracts.

**Table B-9.** Riparian Reserve distance by water feature

| Feature | Riparian Reserve Distance* |
|---|---|
| Fish-bearing streams and perennial streams | One site-potential tree height distance from the ordinary high water line or from the outer edge of the channel migration zone for low-gradient alluvial shifting channels, whichever is greatest, on each side of a stream |
| Intermittent, non-fish-bearing streams | Class I and II subwatersheds: One site-potential tree height distance from the ordinary high water line on each side of a stream |
| | Class III subwatersheds: 50 feet from the ordinary high water line on each side of a stream |
| Unstable areas that are above or adjacent to stream channels and are likely to deliver material such as sediment and logs to the stream if the unstable area fails | The extent of the unstable area; where there is a stable area between such an unstable area and a stream, and the unstable area has the potential to deliver material such as sediment and logs to the stream, extend the Riparian Reserve from the stream to include the intervening stable area as well as the unstable area |
| Lakes, natural ponds > 1 acre, and wetlands > 1 acre | 100 feet extending from the ordinary high water line |
| Natural ponds < 1 acre and wetlands < 1 acre (including seeps and springs), and constructed water impoundments of any size | 25 feet extending from the ordinary high water line |

* Reported distances are measured as slope distance.

**Table B-10.** Zone-specific management direction for streams in Class I subwatersheds

| **Fish-bearing streams and perennial streams** |
|---|
| *Inner Zone (0–120 feet)* |
| Do not thin stands, except for—<br>• Fuels treatments as needed to reduce the risk of stand-replacing crown fires; do not conduct fuels treatments within 60 feet of fish-bearing or perennial streams. Retain at least 50 percent canopy cover per acre. Do not cut trees > 12" DBH.<br>• As described above in management direction for prescribed burns, individual tree falling/tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning |
| *Outer Zone (120 feet to one site-potential tree height)* |
| Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Apply fuels reduction treatments, including prescribed fire, as needed to reduce the risk of stand-replacing crown fires. Retain at least 30 percent canopy cover and 60 trees per acre, expressed as an average across the treated portion of the Riparian Reserve.<br><br>Make available for sale the merchantable timber from thinning and other silvicultural treatments. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Meet the snag creation amounts as an average at |

the scale of the portion of the harvest unit within the Riparian Reserve, but may not be attained on every acre. For implementation:

- Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
- Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Use trees from any species to meet snag creation levels.

Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete.

**Intermittent, non-fish-bearing streams**

*Inner Zone (0–50 feet)*

Do not thin stands, except as described above in management direction for prescribed burns, individual tree falling/tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning.

*Middle Zone (50–120 feet)*

Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.

Apply fuels reduction treatments, including prescribed fire, as needed to reduce the risk of stand-replacing, crown fires. Retain at least 30 percent canopy cover and 60 trees per acre expressed as an average across the treated portion of the Riparian Reserve.

Remove cut trees as needed for safety or operational reasons, to reduce the risk of stand-replacing, crown fires, or to meet the tree-tipping management direction described above. Merchantable timber from thinning, fuels reduction, and other silvicultural treatments that must be removed for safety or operational reasons, to reduce the risk of stand-replacing, crown fires, or to meet the tree-tipping management direction described above may be made available for sale.

*Outer Zone (120 feet to one site-potential tree height)*

Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.

Apply fuels reduction treatments, including prescribed fire, as needed to reduce the risk of stand-replacing, crown fires. Retain at least 30 percent canopy cover and 60 trees per acre expressed as an average across the treated portion of the Riparian Reserve.

Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation—

- Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.
- Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.

Do not create snags within falling distance of power lines, structures, or roads that will remain open

| |
|---|
| after harvesting activities are complete. |

**Table B-11.** Zone-specific management direction for streams in Class II subwatersheds

| **Fish-bearing streams and perennial streams** |
|---|
| *Inner Zone (0–120 feet)* |
| Do not thin stands, except for—<br>• Fuels treatments as needed to reduce the risk of stand-replacing crown fires; do not conduct fuels treatments within 60 feet of fish-bearing or perennial streams. Retain at least 50 percent canopy cover per acre. Do not cut trees > 12" DBH.<br>• As described above in management direction for prescribed burns, individual tree falling/tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning |
| *Outer Zone (120 feet to one site-potential tree height)* |
| Thin stands as needed to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Apply silvicultural treatments to increase diversity of riparian species and develop structurally complex stands. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Apply fuels reduction treatments, including prescribed fire, as needed to reduce the risk of stand-replacing, crown fires. Retain at least 30 percent canopy cover and 60 trees per acre expressed as an average across the treated portion of the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation:<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.<br>• Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete. |
| **Intermittent, non-fish-bearing streams** |
| *Inner Zone (0–50 feet)* |
| Do not thin stands, except for—<br>• Fuels treatments as needed to reduce the risk of stand-replacing crown fires; do not conduct fuels treatments within 60 feet of fish-bearing or perennial streams. Retain at least 50 percent canopy cover per acre. Do not cut trees > 12" DBH.<br>• As described above in management direction for prescribed burns, individual tree falling/tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning |

| *Outer Zone (50 feet to one site-potential tree height)* |
|---|
| Thin stands as needed to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Apply silvicultural treatments to increase diversity of riparian species and develop structurally complex stands. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Apply fuels reduction treatments, including prescribed fire, as needed to reduce the risk of stand-replacing, crown fires. Retain at least 30 percent canopy cover and 60 trees per acre expressed as an average across the treated portion of the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation:<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual trees.<br>• Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete. |

**Table B-12.** Zone-specific management direction for streams in Class III subwatersheds

| **Fish-bearing streams and perennial streams** |
|---|
| *Inner Zone (0–120 feet)* |
| Do not thin stands, except as described above in management direction for prescribed burns, individual tree falling/tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning. |
| *Outer Zone (120 feet to one site-potential tree height)* |
| Thin stands as needed to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Apply silvicultural treatments to increase diversity of riparian species and develop structurally complex stands. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.<br><br>Apply fuels reduction treatments, including prescribed fire, as needed to reduce the risk of stand-replacing, crown fires. Retain at least 30 percent canopy cover and 60 trees per acre expressed as an average across the treated portion of the Riparian Reserve.<br><br>Merchantable timber from thinning and other silvicultural treatments may be made available for sale. When conducting commercial thinning, create new snags in the amounts and sizes specified in **Table B-3** within one year of completion of yarding the timber in the timber sale. If trees are not available in the size class specified, use trees from the largest size class available. Snag creation amounts would be met as an average at the scale of the portion of the harvest unit within the Riparian Reserve, and need not be attained on every acre. For implementation—<br>• Create snags in a variety of spatial patterns, including aggregated groups, stringers, and individual |

| |
|---|
| trees.<br>• Concentrate created snags in areas of the stand where the BLM does not anticipate skidding or yarding will occur within 20 years. Snag creation levels can be met with trees from any species.<br>Do not create snags within falling distance of power lines, structures, or roads that will remain open after harvesting activities are complete. |
| **Intermittent, non-fish-bearing streams (0–50 feet)** |
| Do not thin stands, except as described above in management direction for prescribed burns, individual tree falling/tipping for restoration, or to meet the tree-tipping management direction associated with outer zone commercial thinning. |

# Administrative Actions

## Management Objective

- Provide for the orderly and efficient management of resources.

## Management Direction

- Implement administrative actions in any land use allocation to the extent consistent with land use allocation management direction. Administrative actions include but are not limited to the following actions:
  - Competitive and commercial recreation activities
  - Special forest product collection permit issuance
  - Lands and realty actions (e.g., the issuance of grants, leases, and permits)
  - Trespass resolution
  - Facility maintenance
  - Facility improvements
  - Road maintenance
  - Hauling permit issuance
  - Recreation site maintenance
  - Recreation site improvement
  - Hazardous materials removal
  - Abandoned Mine Land physical closure or removal and environmental remedial actions
  - Law enforcement
  - Legal land or mineral estate ownership surveys
  - Cadastral and engineering surveys
  - Field visits for the design of projects (including clearance inventories) and contract administration
  - Tree sampling (including using the 3P fall, buck, and scale sampling method)
  - Project implementation monitoring and plan effectiveness monitoring
  - Incidental live or dead tree removal for safety or operational reasons
  - Wildlife, fisheries, or plant community and population survey or monitoring

# Resource Programs

## Air Quality

### Management Objectives

- Protect air quality related values in Federal mandatory Class I areas.
- Prevent exceedances of national, State, or local ambient air quality standards.

### Management Direction

- Comply with the Oregon Smoke Management Plan when implementing prescribed burning activities.
- Use BMPs (**Appendix J**) to reduce dust from unpaved road surfaces during extended management operations, such as timber sales and wildfire management actions/activities. Example practices include applying dust suppressants.
- Follow State Implementation Plan requirements for activities that could negatively affect the status of air quality non-attainment or maintenance areas.

## Areas of Critical Environmental Concern

### Management Objective

- Maintain or restore relevant and important values in Areas of Critical Environmental Concern, including Research Natural Areas and Outstanding Natural Areas.

### Management Direction

- Implement activities as necessary to maintain, enhance, or restore relevant and important values (**Appendix F**).
- Do not use ground-disturbing equipment or aerial application of non-fugitive retardant that would compromise important and relevant values during wildfire management operations, except where the wildfire is deemed a threat to human safety or private property, or where use is essential for wildfire control.

## Cultural Resources

### Management Objectives

- Preserve and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations.
- Reduce imminent threats and resolve potential conflicts from natural or human-caused deterioration or potential conflict with other resources by ensuring that all authorizations for land and resource use will comply with Section 106 of the National Historic Preservation Act.

### Management Direction

- Evaluate all documented cultural resources for National Register of Historic Places eligibility. For all sites that are listed or eligible for listing on the National Register of Historic Places, protect sites through avoidance or other protection measures.
- Conduct public education and outreach activities, and develop materials in order to educate and interpret for the public the cultural and historic resources within the decision area.
- Assign all cultural resources into one of the use allocations in **Table B-13**.

**Table B-13.** Cultural use allocations with desired outcomes and management actions

| Use Allocation | Desired Outcome | Management Action |
|---|---|---|
| Scientific use | Preserved until research potential is realized | Permit appropriate research including data recovery |
| Conservation for future use | Preserved until conditions for use are met | Propose protection measures/designations |
| Traditional use | Long-term preservation | Consult with Tribes; determine limitations |
| Public use | Long-term preservation, on-site interpretation | Determine limitations, permitted uses |
| Experimental use | Protected until used | Determine nature of experiments |
| Discharged from management | No use after recordation, not preserved | Remove protective measures |

## Fire, Fuels, and Wildfire Response

### Management Objectives

- Respond to wildfires in a manner that provides for public and firefighter safety while meeting land management objectives by utilizing the full range of fire management options.
- Fire management strategies would be risk-based decisions that consider firefighter and public safety, values at risk, management objectives, and costs that are commensurate with the identified risk.
- Actively manage the land to restore and maintain resilience of ecosystems to wildfire and decrease the risk of uncharacteristic, large, high-intensity/high-severity wildfires.
- Manage fuels to reduce wildfire hazard, risk, and negative impacts to communities and infrastructure, landscapes, ecosystems, and highly valued resources.
- Manage fire, fuels, and wildfire response consistent with the National Cohesive Wildland Fire Management Strategy.
- Participate with communities bordering Federal lands in partnership with local, State, and Federal stakeholders to reduce the risks and threats from wildland fire.

### Management Direction

- Take immediate action to suppress all human-caused ignitions at the lowest cost commensurate with the protection of firefighter and public safety and welfare, and resulting in the fewest negative consequences to natural and cultural resources.
- Apply the full range of fire management options in responding to natural ignitions or escaped prescribed fires. These fires may be used to achieve management objectives when expected fire behavior and potential effects of a fire, or a part of a fire, are aligned with the management objectives and direction of the underlying land use allocation and affected resources.

- Conduct wildfire rehabilitation and restoration efforts to protect and sustain ecosystems, ecosystem services, public health and safety, and infrastructure adversely affected by fire management operations or direct fire effects.
- Treat both management activity fuels and natural hazardous fuels for any of the following reasons:
  - Modify the fuel profile (e.g., raise canopy base heights or reduce surface and ladder fuels and crown bulk density)
  - Reduce potential fire behavior (e.g., crown fire activity, wildfire spread, and intensity)
  - Reduce potential fire severity
  - Improve effective fire management opportunities within the Wildland Urban Interface[18] or in close proximity to other highly valued resources
- Treat fuels in a way that increase intervals between future maintenance treatments.
- Create fuel beds or fuel breaks that reduce the potential for high-intensity fire spread within the wildland urban interface and in close proximity to other highly valued resources.
- Prior to applying prescribed fire, take necessary mitigation actions to reduce impacts to Bureau Special Status Species wildlife and plants and their habitats.
- Conduct necessary vegetation maintenance treatments to ensure that fire management operations are able to access existing natural and human-made strategic infrastructure (e.g., communication sites, pump chances and other wildfire management actions/activities water sources, key road systems, containment lines, fuel breaks, and helispots).

## Fisheries

### Management Objectives

- Improve the distribution and quantity of high-quality fish habitat across the landscape for all life stages of ESA-listed, Bureau Special Status Species, and other fish species.
- Maintain and restore access to stream channels for all life stages of aquatic species.

### Management Direction

- Restore degraded spawning, rearing, and holding habitat for fish using a combination of accepted techniques including but not limited to log and boulder placement in stream channels, tree tipping, and gravel enhancement.
- Remove or modify human-caused fish passage barrier to restore access to stream channels for all life stages for aquatic species.

## Forest Management

### Management Objectives

- Enhance the health, stability, growth, and vigor of forest stands.
- In harvested or disturbed areas, ensure the establishment and survival of desirable vegetation appropriate to the site.
- Facilitate safe and efficient forestry operations for the BLM, reciprocal right-of-way agreement holders, and permittees.

[18] The Wildland Urban Interface includes wildland developed areas.

### Management Direction

- Promote the establishment and survival of desirable vegetation through stand maintenance treatments.
- Apply thinning or prescribed fire to forest stands to achieve appropriate stocking and density levels.
- Use genetically improved native trees for reforestation when available.
- Fall and move live or dead trees as needed for safety or operational reasons, including, but not limited to, the creation of yarding corridors or skid trails adjacent to nearby harvest units, hazard tree removal, and road construction, improvement, or maintenance.
- Allow road construction, maintenance, improvement, and decommissioning as well as construction of skid trails and yarding corridors based on operational needs and consistent with valid existing rights.
- Allow management activities in density management study sites (Cissel *et al.* 2006) that are compatible with study objectives.

## Hydrology

### Management Objective

- Maintain water quality within the range of natural variability that meets ODEQ water quality standards for drinking water, contact recreation, and aquatic biodiversity.

### Management Direction

- Select and implement site-level BMPs (**Appendix J**) to maintain water quality for BLM actions (including, but not limited to, road construction, road maintenance, silvicultural treatments, recreation management, prescribed burning, and wildfire management actions/activities) and discretionary actions of others crossing BLM-administered lands.
- Design culverts, bridges, and other stream crossings for the 100-year flood event, including allowance for bed load and anticipated floatable debris. Culverts will be of adequate width to preclude ponding of water higher than the top of the culvert. Design stream crossings with ESA-listed fish to meet design standards consistent with existing ESA consultation documents that address stream crossings in the decision area.
- Implement road improvements, storm proofing, maintenance, or decommissioning to reduce or eliminate chronic sediment inputs to stream channels and waterbodies. This could include maintaining vegetated ditch lines, improving road surfaces, and installing cross drains at appropriate spacing.
- Suspend commercial road use where the road surface is deteriorating due to vehicular rutting or standing water, or where turbid runoff is likely to reach stream channels.
- Decommission roads no longer needed for resource management and are at risk of failure or are contributing sediment to streams, consistent with valid existing rights.

## Invasive Species

### Management Objectives

- Prevent the introduction of invasive species and the spread of existing invasive species infestations.
- Prevent the introduction and spread of sudden oak death (*Phytophthora ramorum*) infections.

### Management Direction

- Implement measures to prevent, detect, and rapidly control new invasive species infestations.
- Use manual, mechanical, cultural, chemical, and biological treatments to manage invasive species infestations.
- Treat invasive plants and host species for invasive forest pathogens in accordance with the Records of Decision (RODs) for the Northwest Area Noxious Weed Control Program Environmental Impact Statement and the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in Oregon Environmental Impact Statement (USDI BLM 2010).
- Apply state-of-the art, integrated pest management prescriptions for the treatment of all identified sudden oak death (*Phytophthora ramorum*) infection sites.

## Lands, Realty, and Roads

### Management Objectives

- Make land tenure adjustments to facilitate the management of resources and enhance public resource values.
- 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.
- 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.
- Provide a road transportation system that serves resource management needs (administrative/commercial) and casual use needs (recreational/domestic) for both BLM-administered lands and adjacent privately owned lands.

### Management Direction

- Retain lands in Land Tenure Zone 1 (Zone 1) under BLM administration. Lands in Zone 1 include existing and future—
    - Designated and suitable Wild and Scenic River corridors;
    - Wilderness Areas;
    - Wilderness Study Areas;
    - National Trail management corridors;
    - District-Designated Reserve – Lands managed for their Wilderness Characteristics
    - Areas of Critical Environmental Concern (including Research Natural Areas and Outstanding Natural Areas);
    - Congressionally designated Outstanding Natural Areas; and
    - Lands acquired with Land and Water Conservation Funds.
- Make lands in Land Tenure Zone 2 (Zone 2) 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 the other two Land Tenure Zones.
- Make lands in Land Tenure Zone 3 (Zone 3) available for disposal (identified in **Appendix K**) using appropriate disposal mechanisms. These lands include—
    - Lands that are either not practical to manage, or are uneconomical to manage (because of their intermingled location and non-suitability for management by another Federal agency);
    - Survey hiatuses; and
    - Unintentional encroachments.

- Assign to Zone 3 survey hiatuses and unintentional encroachments discovered in the future.
- Assign to Zone 3 patented lands with reversionary interests reserved by the United States that are relinquished back to Federal ownership.
- Assign to Zone 3 land boundary adjustments due to river movement discovered in the future, which meets the disposal criteria defined in **Appendix K**.
- The BLM may dispose of lands designated in Zones 2 and 3 that provide habitat for ESA-listed species, including critical habitat, only following consultation with the U.S. Fish and Wildlife Service or National Marine Fisheries Service and upon a determination that such action is consistent with relevant law and maximizes public resource values.
- As required by the Oregon Public Lands Transfer and Protection Act (Pub. L. 105-321), do not reduce through disposal, exchange, or sale the acres of O&C lands of all classifications, and the acres of O&C and public domain lands that are available for harvesting.
- Acquire or dispose of lands to facilitate resource management objectives as opportunities occur. See the Land Tenure Adjustment Criteria section in **Appendix K**.
- Make available for disposal the public domain lands in Zones 2 and 3 that have been classified under Section 7 of the Taylor Grazing Act.
- Manage newly acquired lands 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. See Acquisition Criteria section in **Appendix K**.
- Where the BLM has administrative responsibility on lands managed by other agencies, the BLM will administer those lands in accordance with interagency agreements.
- Issue permits, as identified under the FLPMA (Section 302), 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.
- Do not issue land use authorizations for landfills or other waste disposal facilities.
- Use land-use authorizations to resolve agricultural or occupancy trespasses, where appropriate.
- Recognize existing rights-of-way, permits, leases, and easements as valid uses.
- Limit withdrawals to the area needed and restrict only those activities needed to accomplish the purposes of the withdrawal.
- Process formal land withdrawals being relinquished by the BLM or other Federal agency according to the procedures stated under 43 CFR 2372. If the lands are found suitable for return to the public domain, the revocation order will recommend the management prescriptions developed in the environmental review. Manage the lands according to management prescriptions for those lands having the same or similar resource values in the same general area of the land withdrawal.
- Designate Right-Of-Way Exclusion Areas in—
  - Lands designated as Wilderness;
  - District-Designated Reserve – Lands Managed for their Wilderness Characteristics;
  - Wilderness Study Areas;
  - Designated and suitable Wild and Scenic Rivers classified as Wild; and
  - Visual Resource Management Class I areas.

  In right-of-way exclusion areas, do not grant rights-of-way, except when mandated by law.
- Designate right-of-way avoidance areas in—
  - Areas of Critical Environmental Concern (including Research Natural Areas and Outstanding Natural Areas);
  - Recreation Management Areas (Special and Extensive);
  - Designated and suitable Wild and Scenic Rivers classified as Scenic and Recreational; and
  - Visual Resource Management Class II areas not included in right-of-way exclusion areas.

  In right-of-way avoidance areas, grant rights-of-way only if the BLM determines that the right-of-way proposals are compatible with the protection of the values for which the land use was designated, or when no feasible alternative route or designated right-of-way corridor is available as applicable with BLM laws and policy.

- Grant rights-of-way in utility corridors as the preferred location for energy transmission or distribution facilities. Corridors would generally be 1,000 feet on each side of the centerline. Grant the rights-of-way as the minimum necessary to accommodate a specific request. Do not permit development or management activities that would conflict with the construction, operation, or maintenance of facilities corresponding to the purpose of the utility corridor.
- Construct communication facilities on existing developed communication sites where they do not conflict with other management objectives. Require a site plan for applications for communication facilities on undeveloped communication sites (**Appendix K**, **Table K-14** through **Table K-19**).
- Expand existing communication sites and develop new sites. Prioritize the use of existing sites and facilities for accommodating the need for additional capacity.
- Construct new permanent or temporary roads, which may include major culverts and bridges, where needed to meet resource management objectives, to established BLM engineering design standards. Apply road location, design, and construction BMPs as needed (**Appendix J**).
- Maintain existing roads, including major culverts and bridges, to provide access for both resource management and casual use activities while protecting water quality and facility investments, and providing user safety, to established BLM maintenance standards. Apply road maintenance, road stormproofmg, and wet-season road use BMPs as needed (**Appendix J**).
- Remove hazard and downed trees along roads for safety or operational reasons.
- Fully decommission or obliterate (permanent closure) roads with no future resource management need. Decommission (long-term closure) roads not currently needed for resource management but that will be used and maintained again in the future. Apply road closure BMPs as needed (**Appendix J**). Close roads only with the approval of affected permittees consistent with valid existing rights.

## Livestock Grazing

### Management Objectives

- Provide for livestock grazing consistent with other resource objectives while maintaining or improving the health of public rangelands.
- Prevent livestock from causing trampling disturbance to fish spawning beds where ESA-listed or Bureau Sensitive species occur.

### Management Direction (All Districts)

- Authorize livestock grazing through management agreements, non-renewable grazing permits or leases, or special use permits on lands not available for livestock grazing through the issuance of a grazing lease or permit to control invasive plants, reduce fire danger, or accomplish other management objectives.
- Restrict livestock from streams with ESA-listed or Bureau Sensitive fish species during spawning, incubation, and until 30 days following the emergence of juveniles from spawning areas.

### Management Direction (Coos Bay District)

- Lands within the grazing allotments identified on **Table B-14** will not be available for livestock grazing through the issuance of a grazing lease. The BLM will not authorize grazing under Section 15 of the Taylor Grazing Act (**Appendix A**). The BLM may authorize grazing through management agreements, nonrenewable grazing permits or leases, or special use permits consistent with the grazing regulations.

**Table B-14.** Allotments unavailable for livestock grazing, Coos Bay District

| Allotment Name | Allotment Number | Public Land (Acres) | Forage Allocation (AUMs) |
|---|---|---|---|
| Bullock | 20006 | 6 | 12 |
| Kellogg | 20007 | 2 | 6 |
| Middle Creek | 20001 | 5 | 5 |
| New River | 30001 | 530 | 97 |
| | **Totals** | **543** | **120** |

## Management Direction (Klamath Falls Field Office)

- Manage livestock grazing in accordance with the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington (USDI BLM 1997). **Figure 3-108** shows lands available for livestock grazing. **Appendix L** lists allotments available for livestock grazing.
- Maintain current livestock grazing levels and management practices for the allotments shown in **Appendix L**. Make adjustments when rangeland health assessments and evaluations of monitoring data identify that livestock grazing is a contributing factor toward not meeting one or more of the Standards for Rangeland Health and Guidelines for Grazing Management for Public Lands in Oregon and Washington.
- Develop range improvements when needed to achieve the Standards for Rangeland Health and Guidelines for Grazing Management for Public Lands in Oregon and Washington, RMP objectives, or other allotment-specific objectives.
- Implement range improvement projects in adherence with the following:
  - Conduct inventories and surveys for cultural resources, ESA-listed species, and Bureau Special Status Species prior to authorization of any project construction. Implement appropriate mitigations to reduce or eliminate potential effects to these resources.
  - Design projects to minimize surface disturbance at all project sites.
  - Rehabilitate disturbed soil to blend into the surrounding soil surface. Re-vegetate using seeds and plant materials that are genetically appropriate and native to the plant community or region, to the extent practicable, to replace ground cover, reduce soil loss from wind and water erosion, and discourage the potential establishment of any invasive plant species.
  - Use existing roads and trails to access areas for range improvement construction to the extent practicable. If needed, create unimproved trails and tracks to reach construction sites and provide access for future maintenance of the improvements. Locate unimproved trails or tracks outside riparian management areas where workable.
  - Limit brushing and tree limb removal to only that necessary for surveying, placement, and construction of improvements.
- Design livestock fencing to prevent the passage of livestock without stopping the movement of wildlife. Wire and post spacing would follow these specifications where practicable:
  - Construct 4-wire fences, with the bottom wire 16–18” off the ground with the sequence of the remaining 3-wires above this being 6”, 6”, and 12.” Do not exceed 42” total height (ground to top wire).
  - Install 2-strand smooth wire, not barbed, for the bottom wire to facilitate antelope crossings.
  - Install steel ‘t-posts’ no less than 16 feet and no more than 24 feet apart, depending on local conditions.

  - Construct a brace post, tree scab, or rock jack (rock crib) at least every 0.25 mile to enhance fence integrity.
- Do not construct woven wire 'sheep' livestock fences on public lands.
- Install gates or cattle guards where livestock fences cross over existing roads.
- Construct livestock fences outside of perennially or seasonally saturated soils, such as occur in wet meadows and alongside stream banks, to provide fence longevity and stability, where practicable.
- Fence spring sources to prevent livestock grazing and trampling, when necessary.
- Install escape ramps in all livestock water troughs to allow wildlife to escape.
- Install piping to divert overflow from livestock troughs away from the developed source area.
- Construct pit or dam livestock reservoirs to impound water for livestock and wildlife use in adherence with the following:
  - Do not exceed water storage capacity of 3.0 acre-feet.
  - Construct pits in dry lakebeds or other natural depressions. Pile excavated material from pits adjacent to the pit in a manner that eliminates potential for erosion of the excavated material into the pit. Stockpile topsoil to use to rehabilitate the borrow areas.
  - Construct dams in drainages or to one side of a drainage, with a diversion ditch constructed into the impoundment area. Locate dams, when possible, to take advantage of natural spillway sites. When a natural spillway is not available, construct a spillway around the dam for the reservoir. Design spillway to withstand the 50-year flood flow without overtopping the dam and to direct the pass flow downstream to prevent erosion of the embankment.
  - Construct dams a minimum ratio of 3:1 on the upstream face and minimum ratio of 2:1 on the downstream face. Minimum width of the top of all dams would be 12 feet.
  - Clear all brush, stumps, roots, and organic matter from borrow areas and beneath dams.
  - Use material from dam impoundment areas or borrow areas as fill material. Use only fill materials consisting of non-organic and cohesive soils adjusted in moisture to optimum water content for dam construction.
  - Place fill material in thin layers parallel with the long axis of the dam. Do not exceed individual layer thickness of 8". Compact layers with a sheepsfoot roller or similar equipment.
- Obtain necessary water right permits from the Oregon Water Resources Department prior to construction. Coordinate water right applications with applicable agencies, irrigation districts, and interested parties.
- Rest from livestock grazing those areas disturbed by natural and human-induced events (e.g., wildland fire, prescribed burns, timber management treatments, juniper cuts, and rehabilitation projects). Resume livestock grazing after determining that soil and vegetation have recovered from the initial disturbance to support livestock grazing and maintain recovery from the initial disturbance. Exceptions would be for cases where such grazing would not impede site recovery, or where livestock are used as a tool to aid in achieving certain recovery objectives.
- Lands within the grazing allotments identified in **Table B-15** will not be available for livestock grazing through the issuance of a grazing lease or permit. The BLM will not authorize grazing under Section 3 permits or Section 15 leases under the Taylor Grazing Act. The BLM may authorize grazing through management agreements, nonrenewable grazing permits or leases, or special use permits consistent with the grazing regulations.

**Table B-15.** Allotments unavailable for livestock grazing, Klamath Falls Field Office

| Allotment Name | Allotment Number | Public Land (Acres) | Forage Allocation (AUMs) |
|---|---|---|---|
| Edge Creek* | 00102 | 42 | - |
| Klamath River ACEC† | 00102 | 5,908 | - |
| Plum Hills | 00813 | 160 | 20 |
| | **Totals** | 6,110 | **20** |

* This portion of the Upper Klamath Wild and Scenic River corridor within the Edge Creek Allotment will be made unavailable to livestock grazing. This portion of the allotment is not allocated any AUMs. The remainder of the allotment will be available for livestock grazing.
† These portions of the Upper Klamath Wild and Scenic River corridor/ACEC, historically included in the Edge Creek, Chicken Hills, and Chase Mountain allotments, are unavailable to livestock grazing. There are no allocated AUMs associated with these acres.

- Close exclosures and other areas identified on **Table B-16** to livestock grazing.

**Table B-16.** Exclosures or other areas previously closed to livestock grazing, Klamath Falls Field Office

| Allotment Name | Allotment Number | Area Closed |
|---|---|---|
| Edge Creek | 00102 | Hayden Creek Exclosures (2)<br>Fox Lake Exclosure |
| Buck Lake | 00104 | Tunnel Creek Exclosure<br>Surveyor Campground Exclosure |
| Dixie | 00107 | Dixie (Long Prairie Creek) Exclosure |
| Jeld-Wen | 00822 | Aspen Exclosure |
| Rodgers | 00852 | Van Meter Flat Reservoir Exclosure |
| Yainax | 00861 | Bull Spring Exclosure<br>Timothy Spring Exclosure |
| Bear Valley | 00876 | Holbrook Spring Exclosure |
| Bumpheads | 00877 | Bumpheads Reservoir Outlet Exclosure<br>Antelope Creek Exclosure |
| Horsefly | 00882 | Long Branch Exclosure<br>Caseview Spring Exclosure<br>Norcross Spring Exclosure<br>Boundary Spring Exclosure |
| Pankey Basin | 00884 | Pankey Creek Riparian Exclosure |
| Horse Camp Rim | 00886 | 21 Reservoir Exclosure |
| Pitchlog | 00887 | Pitchlog Creek Exclosure<br>Willow Spring Exclosure<br>CCC Spring Exclosure |
| Willow Valley | 00890 | Duncan Spring Exclosure<br>Antelope Creek Exclosure<br>East Fork Lost River Exclosure |

## Management Direction (Medford)

- Manage livestock grazing in accordance with the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington (USDI BLM 1997). **Figure 3-108** shows lands available for livestock grazing. **Appendix L** lists allotments available for livestock grazing.
- Maintain current livestock grazing levels and management practices for the allotments shown in **Appendix L**. Make adjustments when rangeland health assessments and evaluations of monitoring data identify that livestock grazing is a contributing factor toward not meeting one or more of the Standards for Rangeland Health and Guidelines for Grazing Management for Public Lands in Oregon and Washington.
- Develop range improvements when needed to achieve the Standards for Rangeland Health and Guidelines for Grazing Management for Public Lands in Oregon and Washington, RMP objectives, or other allotment-specific objectives.
- Implement range improvement projects in adherence with the following:
    - Conduct inventories and surveys for cultural resources, ESA-listed species, and Bureau Special Status Species prior to authorization of any project construction. Implement appropriate mitigations to reduce or eliminate potential effects to these resources.
    - Design projects to minimize surface disturbance at all project sites.
    - Rehabilitate disturbed soil to blend into the surrounding soil surface. Re-vegetate using seeds and plant materials that are genetically appropriate and native to the plant community or region, to the extent practicable, to replace ground cover, reduce soil loss from wind and water erosion, and discourage the potential establishment of any invasive plant species.
    - Use existing roads and trails to access areas for range improvement construction to the extent practicable. If needed, create unimproved trails and tracks to reach construction sites and provide access for future maintenance of the improvements. Locate unimproved trails or tracks outside riparian management areas where workable.
    - Limit brushing and tree limb removal to only that necessary for surveying, placement, and construction of improvements.
- Design livestock fencing to prevent the passage of livestock without stopping the movement of wildlife. Wire and post spacing would follow these specifications where practicable:
    - Construct 4-wire fences, with the bottom wire 16-18" off the ground with the sequence of the remaining 3-wires above this being 6", 6", and 12." Do not exceed 42" total height (ground to top wire).
    - Install 2-strand smooth wire, not barbed, for the bottom wire to facilitate antelope crossings.
    - Install steel 't-posts' no less than 16 feet and no more than 24 feet apart, depending on local conditions.
    - Construct a brace post, tree scab, or rock jack (rock crib) at least every 0.25 mile to enhance fence integrity.
- Do not construct woven wire 'sheep' livestock fences on public lands.
- Install gates or cattle guards where livestock fences cross over existing roads.
- Construct livestock fences outside of perennially or seasonally saturated soils, such as occur in wet meadows and alongside stream banks, to provide fence longevity and stability, where practicable.
- Fence spring sources to prevent livestock grazing and trampling, when necessary.
- Install escape ramps in all livestock water troughs to allow wildlife to escape.
- Install piping to divert overflow from livestock troughs away from the developed source area.
- Construct pit or dam livestock reservoirs to impound water for livestock and wildlife use in adherence with the following:
    - Do not exceed water storage capacity of 3.0 acre-feet.

- Construct pits in dry lakebeds or other natural depressions. Pile excavated material from pits adjacent to the pit in a manner that eliminates potential for erosion of the excavated material into the pit. Stockpile topsoil to use to rehabilitate the borrow areas.
- Construct dams in drainages or to one side of a drainage, with a diversion ditch constructed into the impoundment area. Locate dams, when possible, to take advantage of natural spillway sites. When a natural spillway is not available, construct a spillway around the dam for the reservoir. Design spillway to withstand the 50-year flood flow without overtopping the dam and to direct the pass flow downstream to prevent erosion of the embankment.
- Construct dams a minimum ratio of 3:1 on the upstream face and minimum ratio of 2:1 on the downstream face. Minimum width of the top of all dams would be 12 feet.
- Clear all brush, stumps, roots, and organic matter from borrow areas and beneath dams.
- Use material from dam impoundment areas or borrow areas as fill material. Use only fill materials consisting of non-organic and cohesive soils adjusted in moisture to optimum water content for dam construction.
- Place fill material in thin layers parallel with the long axis of the dam. Do not exceed individual layer thickness of 8". Compact layers with a sheepsfoot roller or similar equipment.

- Obtain necessary water right permits from the Oregon Water Resources Department prior to construction. Coordinate water right applications with applicable agencies, irrigation districts, and interested parties.
- Rest from livestock grazing those areas disturbed by natural and human-induced events (e.g., wildland fire, prescribed burns, timber management treatments, juniper cuts, and rehabilitation projects). Resume livestock grazing after determining that soil and vegetation have recovered from the initial disturbance to support livestock grazing and maintain recovery from the initial disturbance. Exceptions would be for cases where such grazing would not impede site recovery, or where livestock are used as a tool to aid in achieving certain recovery objectives.
- Lands with grazing allotments identified in **Table B-17** will not be available for livestock grazing through the issuance of a grazing lease. The BLM will not authorize grazing under Section 15 of the Taylor Grazing Act. The BLM may authorize grazing through management agreements, nonrenewable grazing permits or leases, or special use permits consistent with the grazing regulations.

**Table B-17.** Allotments unavailable for livestock grazing, Medford District

| Allotment Name | Allotment Number | Public Land (Acres) | Forage Allocation (AUMs) |
|---|---|---|---|
| Pickett Mountain | 00302 | 802 | 30 |
| Glade Creek | 00315 | 564 | 17 |
| Cherry Gulch | 00316 | 40 | 6 |
| Trail Creek | 10003 | 3,211 | 113 |
| Longbranch | 10004* | 11,124 | 71 |
| Antioch Road | 10005 | 40 | 4 |
| Roundtop Evans | 10006 | 26,204 | 110 |
| West Perry Road | 10010 | 40 | 10 |
| East Perry Road | 10011 | 80 | 7 |
| Upper Table Rock | 10012 | 714 | 66 |
| Clear Creek | 10013 | 3,794 | 45 |
| Obenchain Mountain | 10014 | 121 | 12 |
| Nichols Gap | 10018 | 283 | 18 |
| Eagle Point Canal | 10020 | 443 | 55 |

| Allotment Name | Allotment Number | Public Land (Acres) | Forage Allocation (AUMs) |
|---|---|---|---|
| Shady Branch | 10025 | 321 | 32 |
| Stiehl | 10026 | 277 | 18 |
| Fielder Creek | 10028 | 83 | 5 |
| Derby Station | 10030 | 516 | 36 |
| West Derby | 10034 | 1,125 | 89 |
| Emigrant Creek | 10111 | 40 | 7 |
| Baldy | 10120 | 201 | 87 |
| Lost Creek | 10123 | 78 | 6 |
| Cartwright | 10127 | 40 | 4 |
| Bybee Peak | 10144 | 322 | 36 |
| Sugarloaf/Greensprings | 10158 | 3,008 | 210 |
| Sterling Spring | 10207 | 27,179 | 190 |
| Del Rio | 10216 | 42 | 5 |
| Jump Off Joe | 10303 | 55 | 8 |
| Deer Creek | 10308 | 1,172 | 77 |
| Q Bar X | 10310 | 13 | 3 |
| Applegate | 20201 | 25,415 | 294 |
| Tunnel Ridge | 20202 | 2,177 | 14 |
| Billy Mountain | 20203 | 4,977 | 175 |
| Timber Mountain | 20204 | 3,202 | 70 |
| Sardine and Galls Creek | 20205 | 3,323 | 158 |
| Spencer Gulch | 20208 | 2,109 | 150 |
| Quartz Gulch | 20209 | 670 | 9 |
| Burton Butte | 20212 | 10 | 2 |
| Chapman Creek | 20213 | 3,758 | 81 |
| Ecker | 20217 | 40 | 6 |
| Stage Road | 20218 | 40 | 4 |
| Lomas Road | 20222 | 643 | 50 |
| Star | 20223 | 121 | 24 |
| Ferns Lease | 20224 | 249 | 28 |
| Reeves Creek | 20309 | 1,665 | 95 |
| Esterly Creek | 20312 | 3,641 | 152 |
| | **Totals** | **133,971** | **2,689** |

* These portions of the Longbranch Allotment will be made unavailable to livestock grazing. The remainder of the allotment will be available for livestock grazing (**Appendix L**).

- All areas that are currently without allotments will remain closed to livestock grazing through the issuance of a grazing lease.

## Minerals

### Management Objectives

- Manage the development of leasable (including conventional and non-conventional hydrocarbon resources) minerals, locatable mineral entry, and salable mineral material disposal in an orderly and efficient manner.
- Maintain availability of mineral material sites needed for development and maintenance of access roads for forest management, timber harvest, local communities, rights-of-way for energy production and transmission, and other uses.

### Management Direction

- Pursuant to 43 CFR 3809.11(c)(6), the BLM is creating two exceptions to the requirement that a Plan of Operations is required for any mining activities that are greater than casual use (such as notice-level operations) when the activities are located within lands or waters known to contain federally proposed or listed threatened or endangered species or their proposed or designated critical habitat. An operator is not required to submit a Plan of Operations for notice-level activities in the following two situations:
    - When pursuant to Section 7 of the ESA, the BLM determines that the notice-level activity will have no effect on federally proposed or listed threatened or endangered species or their proposed or designated critical habitat.
    - When the BLM has completed consultation to the extent required under section 7(a)(2) of the ESA and the U.S. Fish and Wildlife Service or National Marine Fisheries Service has concurred with the BLM's finding that the notice-level activity is not likely to adversely affect federally proposed or listed threatened or endangered species or their proposed or designated critical habitat.
- A Plan of Operations will be required for mining proposals that the BLM determines would be likely to adversely affect federally proposed or listed threatened or endangered species or their proposed or designated critical habitat.
- Proposals that require a Plan of Operations and are located within lands or waters known to contain federally proposed or listed threatened or endangered species or their proposed or designated critical habitat continue to be governed by the standards in 43 CFR 3809 *et seq*.
- Pursuant to 43 CFR 3809.31(b)(2), the operator must contact the BLM before beginning operations that involve the use of a suction dredge to determine whether the operator needs to submit a notice or a plan to BLM, or whether the activities constitute casual use. It is the operator's burden to determine the location of their activity relative to the location of lands or waters that contain federally proposed or listed threatened or endangered species or their proposed or designated critical habitat, in light of the operator's potential liability under Section 9 of the ESA.
    - Suction dredging activity proposed within lands or waters that contain federally proposed or listed threatened or endangered species or their proposed or designated critical habitat, regardless of the level of disturbance, must not begin until the BLM has completed consultation to the extent required under section 7(a)(2) of the ESA.
- Energy and mineral development can occur concurrently with some resource uses.

### Leasable Minerals: Oil, Gas, or Coalbed Natural Gas Resources[19]

- Maintain all lands as open to leasable mineral development except where closed by legislation.

[19] The Sustainable Energy section addresses Geothermal Resources.

- Apply site-specific stipulations, such as no surface occupancy or conditional surface uses, based on resource protection needs in—
  - Designated and suitable Wild and Scenic River segments (where not already closed by legislation);
  - National Trail management corridors;
  - District-Designated Reserve – Lands Managed for their Wilderness Characteristics;
  - Areas of Critical Environmental Concern (including Research Natural Areas and Outstanding Natural Areas where not already closed by legislation); and
  - Recreation Management Areas (Special Recreation Management Areas/Extensive Recreation Management Areas).
- Apply site-specific stipulations as needed to protect ESA-listed species and their critical habitats.

### Locatable Minerals

- Recommend for withdrawal from locatable mineral entry—
  - Designated and suitable Wild and Scenic River segments (where not already closed by legislation);
  - National Trail management corridors; and
  - District-Designated Reserve – Lands Managed for their Wilderness Characteristics.
- Recommend for withdrawal from locatable mineral entry Special Recreation Management Areas and Extensive Recreation Management Areas when mineral entry is not compatible with meeting recreation objectives or maintaining recreation setting characteristics.
- Recommend for withdrawal from locatable mineral entry Areas of Critical Environmental Concern with identified special management needs associated with locatable mineral entry **(Appendix F)**.
- Retain all other areas not congressionally or secretarially withdrawn as open for locatable mineral entry.

### Salable Minerals

- Close to salable mineral material disposal—
  - Designated and suitable Wild and Scenic River segments (where not already closed by legislation);
  - National Trail management corridors; and
  - District-Designated Reserve – Lands Managed for their Wilderness Characteristics.
- Close Special Recreation Management Areas and Extensive Recreation Management Areas to salable mineral material disposal when not compatible with meeting recreation objectives or maintaining recreation setting characteristics.
- Close Areas of Critical Environmental Concern with identified special management needs to salable mineral material disposal **(Appendix F)**.
- Maintain all other areas not closed through legislation as open to salable mineral material disposal.
- **Appendix M** provides a trends analysis that will be applied to disposals.

## Paleontological Resources

### Management Objectives

- Protect and preserve significant localities from natural or human-caused deterioration or potential conflict with other resources.

- Provide appropriate scientific, educational, and recreational uses, such as research and interpretive opportunities, for paleontological resources.

### Management Direction

- Protect all paleontological resources through avoidance or other protection measures, consistent with BLM Handbook 8270-1 – General Procedural Guidance for Paleontological Resource Management (USDI BLM 1998, pp. Chapter III).
- Conduct public education, outreach activities, and develop materials to educate the public on paleontological resources existing within the decision area.

## Rare Plants and Fungi

### Management Objectives

- Provide for conservation and contribute toward the recovery of plant species that are ESA-listed or candidates.
- Support the persistence and resilience of natural communities, including those associated with forests, oak woodlands, shrublands, grasslands, cliffs, rock outcrops, talus slopes, meadows, and wetlands. Support ecological processes and disturbance mechanisms to allow for a range of seral conditions.
- Provide for the conservation of Bureau Special Status plant and fungi species.
- Support the persistence and resilience of oak species within oak woodlands and within mixed hardwood/conifer communities.

### Management Direction

- Manage ESA-listed species consistent with recovery plans, conservation agreements, species management plans, and designated critical habitat, and species-specific or project-specific conservation measured developed with the U.S. Fish and Wildlife Service, including the protection and restoration of habitat, altering the type, timing, and intensity of actions, and implementing other strategies designed to recover populations of species.
- Manage ESA candidate and Bureau Sensitive species consistent with any conservation agreements or strategies including the protection and restoration of habitat, alteration of the type, timing, and intensity of actions, and other strategies designed to conserve populations of the species.
- Manage habitat to maintain populations of ESA-listed, proposed, and candidate plant species.
- Prior to implementing actions (other than fire management operations in response to unplanned ignitions or escaped prescribed fires) that could result in habitat modification or species disturbance in the suitable habitat of any ESA-listed, proposed, or candidate plant species, or Bureau Sensitive plant species, conduct surveys to determine species presence. Utilize information on known sites of ESA-listed plants and wildlife when conducting fire management operations that could result in habitat modification or species disturbance. In addition to pre-project surveys, conduct additional surveys on BLM-administered lands for ESA-listed, proposed, and candidate plant species within suitable habitat as needed to find new populations.
- Maintain or restore natural processes, native species composition, and vegetation structure in natural communities through actions such as applying prescribed fire, thinning, removing encroaching vegetation, treating non-native invasive species, retaining legacy components (e.g., large trees, snags, and down logs), maintaining water flow to wetlands, and planting or seeding native species.
- When re-vegetating degraded or disturbed areas, utilize locally adapted seeds and native plant materials appropriate to the location and site-specific conditions, and meeting management objectives

for vegetation management and restoration activities. Use seeds and plant materials that are genetically appropriate and native to the plant community or region, to the extent practicable.

- Manage mixed hardwood/conifer communities to maintain and enhance oak (*Quercus* spp.) persistence and structure by removing competing conifers, thinning, and prescribed fire, to the extent consistent with management direction for the land use allocation.
- Manage mixed conifer communities to maintain and enhance ponderosa, Jeffrey, and sugar pine persistence and structure by removing competing conifers, thinning, and applying prescribed fire, to the extent consistent with management direction for the land use allocation.
- Create new and augment existing populations of ESA-listed, proposed, and candidate plant species and Bureau Sensitive plant and fungi species to meet recovery plan or conservation strategy objectives.

## Recreation and Visitor Services

### Management Objectives

- Provide a diversity of quality recreational opportunities.
- Meet legal requirements for visitor health and safety and mitigate resource user conflicts.
- Mitigate recreational impacts on natural and cultural resources. In land use allocations where management of other resources is dominant, provide recreational opportunities where they can be managed consistent with the management of these other resources.
- Develop new recreation opportunities to address recreation activity demand created by growing communities, activity groups, or recreation-tourism if—
  - Recreation development is consistent with interdisciplinary land use plan objectives; and
  - The BLM has secured commitments from partners (e.g., a cooperative management agreement, adopt-a-trail agreement, and memorandum of understanding).

### Management Direction

- Manage Special Recreation Management Areas and Extensive Recreation Management Areas, identified in **Appendix O**, in accordance with their planning frameworks.
- Protect recreation setting characteristics within Special Recreation Management Areas to prohibit activities that would degrade identified characteristics.
- Pursue and prioritize public access to BLM-administered lands that have high recreational potential consistent with BLM designations and allocations.
- Allow the discharge of firearms for recreational target shooting on BLM-administered lands, outside areas with firearm use restrictions described in the RMA frameworks, if the firearm is discharged toward a proper backstop sufficient to stop the projectile's forward progress.
- Issue discretionary Special Recreation Permits for a variety of uses that are consistent with resource and program objectives.
- Issue vending permits that complement visitor use or contribute to resource protection.
- Monitor activity participation and recreation setting characteristics annually during the primary use season of June through October.
- Use recreation management tools such as establishing an allocation system, applying group size limits for private and commercial recreation use, or implementing seasonal closures, if monitoring indicates that social recreation setting characteristics are not being protected, resource damage is occurring, or user conflicts need to be addressed.

- Develop and maintain partnerships with recreation-based organizations and service providers. These partnerships should engage partners in the planning, implementation and monitoring of recreation opportunities and facilities on BLM-administered public lands.

## Recreation and Visitor Services – Significant Caves[20]

### Management Objective

- Manage significant caves to allow for appropriate access while protecting pristine and fragile resources, wildlife values, scientific and research values, and visitor safety.

### Management Direction

- Manage significant caves to maintain the current level of remoteness from motorized and mechanized vehicles and to preserve the natural appearance of the cave. Prohibit construction of new facilities, roads, or trails to access the caves. Allow minor modifications (e.g., use of tape and signage and placing rescue caches) only for scientific purposes and to accommodate safe use. Maintain low evidence of use and other people.
- Manage visitor frequency, visitor numbers, and season of use through monitoring and subsequent implementation decisions described through cave management plans for each significant cave, group of caves, or complex of caves.
- Focus all management actions on specific activity outcomes for caving and research. Outcomes will be for participants to enjoy and learn about cave and karst resources. Specific benefit outcomes will be for environmental benefits, such as increased environmental stewardship, and the preservation and protection of unique biological, paleontological, archaeological, and mineralogical aspects. Social benefits will be to provide environmental education and appreciation of cave and karst systems.
- Provide appropriate access while addressing issues and concerns relating to visitor safety and preservation of the caves' values. If issues or concerns arise, apply necessary managerial controls, such as closures, permits, trip requirements, and gating. Administer and authorize research, inventory, work projects, and digging trips. Provide informational and educational materials to authorized visitors. Do not market or promote cave and karst resources.

## Recreation and Visitor Services – Formerly Used Defense Sites

### Management Objective

- Prevent and reduce risks to public health and the environment where hazards may exist resulting from military defense activities.

### Management Direction

- Manage the portion of the Modoc Aerial Gunnery and Bombing Range located within the Klamath Falls Field Office to avoid or limit exposure to areas that may contain hazards associated with munitions and explosives of concern. Munitions and explosives of concern may include unexploded ordnance, discarded military munitions, and munitions constituents when munitions constituents are present in high enough concentrations to pose an explosive hazard. The site may also be contaminated with munitions constituents that are not present in high enough concentrations to represent an explosive hazard, but in high enough concentrations to be a toxicity hazard in soil, groundwater, surface water, or air.

[20] The Federal Cave Resources Protection Act of 1988 describes significant caves.

- Coordinate uses on BLM-administered lands within formerly used defense sites with State and Federal military agencies to prevent and reduce risks to public health and the environment. Develop, as needed, cooperative agreements or Memorandums of Understanding to ensure communication, coordination, and safe use of public lands within formerly used defense sites.
- Take appropriate measures, such as signing, fencing, removal, and remediation, to protect the public from known unexploded ordnance locations on BLM-administered lands.

## Soil Resources

### Management Objectives

- Maintain or enhance the inherent soil functions (e.g., ability of soil to take in water, store water, regulate outputs for vegetative growth and stream flow, and resist erosion or compaction) of managed ecosystems.
- Provide landscapes that stay within natural soil stability failure rates during and after management activities.

### Management Direction

- Apply BMPs (**Appendix J**) as needed to maintain or restore soil functions and soil quality, and limit detrimental soil disturbance.
- Limit detrimental soil disturbance from forest management operations to a total of < 20 percent of the harvest unit area. Where the combined detrimental soil disturbance from implementation of current forest management operations and detrimental soil disturbance from past management operations exceeds 20 percent of the unit area, apply mitigation or amelioration to reduce the total detrimental soil disturbance to < 20 percent of the harvest unit area. Detrimental soil disturbance can occur from erosion, loss of organic matter, severe heating to seeds or microbes, soil displacement, or compaction.
- Avoid road construction and timber harvest on unstable slopes where there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety.
- Do not till soils where tillage will cause soils to become unstable due to increasing the soil moisture content.

## Sustainable Energy

### Management Objectives

- Develop sustainable energy resources to the maximum extent possible without precluding other land uses.

### Management Direction

- Exclude from sustainable energy development areas that are part of the National Landscape Conservation System (e.g., Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, and National Historic and Scenic Trails), Areas of Critical Environmental Concern, and District-Designated Reserve – Lands Managed for their Wilderness Characteristics.

- Site development will include practices as needed to reduce or avoid impacts to other resource uses. Appropriate practices will be applied based on site-specific conditions and include, but are not limited to, the following:
  - Control outdoor lighting with motion or heat sensors to the maximum extent practicable.
  - Use hooded outdoor lighting directed downward to minimize horizontal and skyward illumination to the maximum extent practicable.
  - Minimize the use of high-intensity lighting.
  - Establish non-disturbance buffer zones to protect sensitive habitats or areas of high risk for species of concern.
  - Control any pets of operations staff kept on-site to avoid harassment and disturbance of wildlife.
  - Use existing roads and utility corridors to the maximum extent feasible; minimize the number and length/size of new roads, lay-down areas, and borrow areas.
  - Minimize traffic volumes to the maximum extent practicable; maintain roads adequately to minimize associated impacts.
  - Install and maintain permanent fencing around electrical substations, emergency generators, and other areas potentially hazardous to human health.
  - Consolidate necessary infrastructure requirements wherever possible, including electric power transmission lines, pipelines and market access corridors, and support utility infrastructure.
  - Keep energy conversion sites clean of debris, garbage, fugitive trash or waste, and graffiti; minimize the accumulation of scrap heaps, dumps, and storage yards.
  - Design facilities used for sustainable energy harvesting, conversion, and transmission to discourage the perching or nesting by birds.
  - Integrate facilities used for sustainable energy harvesting, conversion and transmission with the surrounding landscape including minimizing the profile of ancillary structures, burial of cables, prohibition of commercial symbols, and lighting.
  - Provide secondary containment for all on-site hazardous materials and waste storage, including fuel.

## Sustainable Energy – Biomass Energy Development

### Management Objectives

- *See Sustainable Energy management objectives.*

### Management Direction

- Offer slash in excess of soil stabilization needs as biomass energy feedstock.

## Sustainable Energy – Wind Energy Development

### Management Objectives

- *See Sustainable Energy management objectives*

### Management Direction

- Site development will include practices as needed to reduce or avoid impacts to other resource uses. Appropriate practices will be applied based on site-specific conditions and include, but are not limited to, the following:
  - Lock turbine tower access doors to limit public access.
  - Locate turbines away from landscape features known to attract raptors.

- Locate turbines away from colonies where bats hibernate, breed, and raise their young; locate turbines outside of bat migration corridors or flight paths between colonies and feeding areas
- Encompass specific design elements for turbine arrays and turbine design including visual uniformity, use of tubular towers, proportion and color of turbines, non-reflective paints, and prohibition of commercial messages on turbines.
- Repair, replace, or remove inoperative turbines in a timely manner.
- Exclude designated areas that are part of the National Landscape Conservation System (e.g., Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, and National Historic and Scenic Trails) and Areas of Critical Environmental Concern from wind energy site monitoring and testing and development.
- Incorporate wildlife-compatible design standards when fencing is necessary.
- Avoid the use of guy wires on communication towers and meteorological towers at wind energy project sites.
- Keep the installation of meteorological towers on a project site to a minimum; do not locate these towers in sensitive habitats or in areas where ecological resources known to be sensitive to human are present.
- Light only a portion of the turbines within a wind project; fix all pilot warning lights to fire synchronously.
- Do not add any wildlife habitat enhancements or improvements (e.g., ponds, guzzlers, rock piles, brush piles, bird nest boxes, nesting platforms, wildlife food plots) that would attract small mammals to wind energy facilities.
- Use only shielded, separated, or insulated electrical conductors that minimize electrocution risk to avian wildlife.

## Sustainable Energy – Geothermal Energy Development

### Management Objectives

- *See Sustainable Energy management objectives.*

### Management Direction

- Site development will include practices as needed to reduce or avoid impacts to other resource uses. Appropriate practices will be applied based on site-specific conditions and include, but are not limited to, the following:
  - Minimize impacts to livestock operations from geothermal energy drilling and development.
  - Incorporate certified weed-free mulch into the reclamation of the land disturbed during the development of geothermal resources.
  - Raise above-ground piping on-site for sufficient wildlife passage.
  - Isolate any liquid that is at elevated temperatures or contains contaminants that are toxic or harmful to fur or feathers from wildlife access with fencing, netting or complete enclosure.

## Sustainable Energy – Sustainable Energy Transmission Corridors

### Management Objectives

- *See Sustainable Energy management objectives.*

### Management Direction

- Site development will include practices as needed to reduce or avoid impacts to other resource uses. Appropriate practices will be applied based on site-specific conditions and include, but are not limited to, the following:
  - Site overhead lines away from areas where bird crossings are frequent.
  - Mark overhead lines in accordance with Avian Power Line Interaction Committee collision guidelines.
  - Install overhead lines such that the conductors parallel tree lines, employ bird flight diverters, or are otherwise screened so that bat and bird collision risk is reduced.
  - Where pipeline right-of-way clearings can be incorporated into a strategic system of fire breaks, make clearings sufficiently wide to be effective as fire breaks.
  - Raise pipelines constructed above ground sufficiently high enough to allow wildlife passage where needed and avoid potential alterations to predator/prey dynamics.

## Trails and Travel Management

### Management Objectives

- Maintain a comprehensive travel network that best meets the full range of public use, resource management, and administrative access needs.
- Protect fragile and unique resource values from damage by public motorized vehicle use.
- Provide public motorized vehicle use opportunities where appropriate.

### Management Direction

- Develop public motorized and non-motorized travel routes and trails in a manner designed to minimize conflicts between public motorized vehicle use and other existing (or proposed) recreational uses of the same, or neighboring, public lands. Design in a manner to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.
- Manage public motorized vehicle use in Recreation Management Areas (Special Recreation Management Area/Extensive Recreation Management Area) according to interim management guidelines until subsequent comprehensive implementation-level travel management plans are completed.
- Develop closed or abandoned roads to provide additional public motorized and non-motorized trail opportunities, where feasible and compatible with other resource objectives.
- Prohibit public motor vehicle travel within areas designated as *closed* for public motorized access. Where the BLM has public access, allow public access by means other than motorized vehicle, such as mechanized or non-motorized use. Allow travel required for valid existing rights.
- Restrict public motorized vehicle travel within areas designated as *limited* for public motorized access. Until completion of implementation-level travel management planning, limit public motorized vehicle travel to existing routes where the BLM has public access. After completion of implementation-level travel management planning, limit public motorized vehicle travel in conformance with the resultant Travel Management Plan. Allow travel required for valid existing rights.

## Visual Resource Management

### Management Objectives

- Protect scenic values on public lands where visual resources are an issue or where high-value visual resources exist.
- Prohibit activities that would disrupt the existing character of the landscape in Visual Resource Management Class I areas.
- Retain the existing character of the landscape in Visual Resource Management Class II areas.
- Partially retain the existing character of the landscape in Visual Resource Management Class III areas.
- Allow for major modification of the existing character of the landscape in Visual Resource Management Class IV areas.

### Management Direction

- Only allow activities that are found to meet visual management objectives using the Visual Resource Contrast Rating system.
- Visual Resource Management Class I includes—
  - Wilderness Areas;
  - Wilderness Study Areas; and
  - Designated and suitable Wild and Scenic Rivers that are classified as Wild.

  Manage Visual Resource Management Class I areas in accordance with natural ecological changes. Prohibit activities that would lower the Visual Resources Inventory class of Visual Resource Management Class I areas. The level of change to the characteristic landscape will be very low and will not attract attention. Changes will repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.
- Visual Resource Management Class II includes—
  - Designated and suitable Wild and Scenic Rivers that are classified as Scenic;
  - Eligible Wild and Scenic Rivers that are classified as Scenic outside of the Harvest Land Base;
  - National Trail management corridors;
  - District-Designated Reserve – Lands Managed for their Wilderness Characteristics;
  - Special Recreation Management Areas that fall within the Primitive and Backcountry category of the Recreation Opportunity Spectrum; and
  - Areas of Critical Environmental Concern in Visual Resource Inventory Class II outside of the Harvest Land Base.

  Manage Visual Resource Management Class II areas for low levels of change to the characteristic landscape. Management activities will be seen but will not attract the attention of the casual observer. Changes will repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.
- Visual Resource Management Class III includes—
  - Designated, suitable, and eligible Wild and Scenic Rivers that are classified as Recreational;
  - Eligible Wild and Scenic Rivers that are classified as Scenic within the Harvest Land Base;
  - Special Recreation Management Areas and Extensive Recreation Management Areas that fall within the Middle country category of the Recreation Opportunity Spectrum; and
  - Areas of Critical Environmental Concern in Visual Resource Inventory Class III, and in Visual Resource Inventory Class II inside the Harvest Land Base.

  Manage Visual Resource Management Class III areas for moderate levels of change to the characteristic landscape. Management activities will attract attention but will not dominate the view of the casual observer. Changes will repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

- Visual Resource Management Class IV includes all lands that are not designated as Visual Resource Management Classes I, II, or III. Manage Visual Resource Management Class IV areas for high levels of change to the characteristic landscape. Management activities may dominate the view and will be the major focus of viewer attention.

## Wildlife

### Management Objectives

- Conserve and recover species that are ESA-listed, proposed, or candidates, and the ecosystems on which they depend.
- Implement conservation measures that reduce or eliminate threats to Bureau Sensitive species to minimize the likelihood of and need for the ESA-listing of these species.
- Conserve or create habitat for species addressed by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act and the ecosystems on which they depend.

### Management Direction

- Manage habitat for species that are ESA-listed, or are candidates for listing, consistent with recovery plans, conservation agreements, and designated critical habitat.
  - Existing conservation agreements include:
    - Conservation Agreement for the Oregon Spotted Frog (*Rana pretiosa*) in the Klamath Basin of Oregon (May 7, 2010)
- Implement conservation measures to mitigate specific threats to Bureau Sensitive species during the planning of activities and projects. Conservation measures include altering the type, timing, location, and intensity of management actions.
- Manage naturally occurring special habitats to maintain their ecological function including seeps, springs, wetlands, natural ponds, vernal pools/ponds, natural meadows, rock outcrops, caves, cliffs, talus slopes, mineral licks, oak savannah/woodlands, sand dunes, and marine habitats.
- Manage human-made special habitats as wildlife habitat when compatible with their engineered function, including bridges, buildings, quarries, pump chances/helipond, abandoned mines, and reservoirs, to the extent possible consistent with safety and legal requirements.
- Klamath Falls Field Office and Medford District: maintain or enhance Bureau Special Status Species wildlife habitat on rangelands.
- Prior to implementing actions that could result in habitat modification or species disturbance in habitat for the Fender's blue butterfly, Oregon silverspot butterfly, Taylor's checkerspot butterfly, streaked horned lark, vernal pool fairy shrimp, Oregon spotted frog, Lower Columbia River distinct population segment of Columbian white-tailed deer, or western snowy plover, conduct surveys to determine species presence.
- Do not approve, fund, or implement actions that would adversely affect the Fender's blue butterfly, Oregon silverspot butterfly, Taylor's checkerspot butterfly, streaked horned lark, vernal pool fairy shrimp, Oregon spotted frog, Lower Columbia River distinct population segment of Columbian white-tailed deer, or western snowy plover, except when done in accordance with an approved recovery plan, conservation agreement, species management plan, survey and monitoring protocol, or critical habitat rule, and when the action is necessary for the conservation of the species.
- Do not approve, fund, or implement actions that would adversely affect the designated critical habitats of the vernal pool fairy shrimp, Oregon spotted frog, or western snowy plover, except when done in accordance with an approved recovery plan, conservation agreement, species management

plan, survey and monitoring protocol, or critical habitat rule, and when the action is necessary for the conservation of the species.

## Wildlife – Bald and Golden Eagles

- Protect known bald eagle or golden eagle nests (including active nests and alternate nests) and bald eagle winter roosting areas. Prohibit activities that will disrupt bald eagles or golden eagles that are actively nesting.
  - Continue routine use and maintenance of existing roads and other facilities to where such use pre-dates the eagles' successful nesting activity.
  - Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests.
  - Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season within 660 feet of bald eagle or golden eagle nests. Decrease the distance to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, or after eggs laid in another nest within the territory have hatched.
  - Prohibit operation of off-highway vehicles within 330 feet of bald eagle or golden eagle nests during the breeding season. In areas without forest cover or topographic relief to provide visual and auditory screening, prohibit operation of off-highway vehicles within 660 feet of bald eagle or golden eagle nests during the breeding season.
  - Prohibit activities that will disrupt roosting bald eagles or golden eagles at communal winter roosts.

## Wildlife – Bats

- Protect known maternity colonies and hibernacula for Bureau Sensitive bat species within caves, abandoned mines, bridges, and buildings with a 250-foot buffer:
  - Maintain existing habitat conditions and protect the site from destruction or species disturbance, to the extent possible consistent with safety and legal requirements.
  - Prohibit blasting
  - Implement hazard fuel reduction treatments to protect the site from wildfire or to maintain site conditions conducive to the colony.
- Prohibit blasting during periods of reproduction and hibernation within 1 mile of known maternity colonies and hibernacula for Bureau Sensitive bat species within caves, abandoned mines, bridges, and buildings.
- Where white-nose syndrome is found in the bats residing within caves and abandoned mines, bridges, and buildings, prohibit human access except for monitoring, education, or research purposes.

## Wildlife – Deer or Elk Management Areas (Klamath Falls Field Office, Medford District, and Salem District)

- For the Medford and Salem Districts, restrict motor vehicle use within designated deer or elk management areas between November 1 and April 15. For the Klamath Falls Field Office, restrict motor vehicle use within the Pokegama management area between November 20 and April 1. Use techniques such as gating or signing to impose the restrictions. Allow administrative use of roads, as needed, on a year-round basis.
- Plant native forage species along roadsides, skid trails, and on disturbed areas, or create forage plots where forage for deer or elk is limited within designated deer or elk management areas.
- For designated deer or elk management areas in the Klamath Falls Field Office and Medford District:

- Cut encroaching juniper that hinders attainment of desired forage conditions to maintain and improve forage for big game. Remove, utilize, or pile and burn cut juniper.
- Retain old-growth 'legacy' juniper when the BLM determines it meets the following definition: Individual trees that likely originated in the pre-settlement period, before 1870. These trees are commonly found in rocky areas where vegetation is sparse and fire frequency is naturally low. The BLM will evaluate trees based on the following characteristics of old-growth juniper:
  - Crown is flat, rounded, broad at top, or irregular crown (as opposed to the more pointed tops of younger trees) or dead "spike" top
  - Numerous dead branches
  - Branches covered with coarse, bright yellow-green lichen (*Letharia* or wolf lichen)
  - Large diameter lower branches
  - Large diameter trunk relative to height
  - Spirally twisted bark and deep furrows on the trunk
  - Hollow trunk

  Trees need not have all of these characteristics for the BLM to determine that the trees are old-growth juniper.

## Wildlife – Fisher

- Do not approve, fund, or carry out actions that would disrupt normal fisher behaviors (e.g., foraging, resting, or denning) associated with known natal or maternal denning sites, except when done in accordance with an approved recovery plan, conservation agreement, species management plan, survey and monitoring protocol, or critical habitat rule, and when the action is necessary for the conservation of the species.
- Within stands where fisher natal or maternal denning or dens are documented, do the following:
  - Maintain ≥ 80 percent canopy cover within at least 50 feet of documented fisher natal and maternal dens.
  - Maintain sufficient canopy cover on the remainder of the stand to support fisher denning post-project.
  - Protect fisher denning structures ≥ 24" diameter (snags, down woody material, and live trees with cavities) within the stand. In this context, **protect fisher denning structure**s means to retain the structure in the stand and if, for safety concerns, it is necessary to fall snags or live trees with cavities then those structures would remain on-site as additional down woody material.
  - Retain untreated portions within the stand.
- Within 5$^{th}$ field-watersheds (HUC 10) where fisher are documented to occur, favor retaining trees that have structures (e.g., cavities, mistletoe, and rust brooms) that are typically used as denning or resting sites by fisher.
- The above management direction may be modified in conference or consultation with the U.S. Fish and Wildlife Service based on new information.

## Wildlife – Gray Wolf

- Restrict activities that create noise or visual disturbance(s) above ambient conditions within one mile of known active gray wolf dens from April 1 to July 15.
- In accordance with 43 CFR 4110, modify grazing leases, as appropriate, to include the following measures when the U.S. Fish and Wildlife Service (1) determines gray wolf occupancy of a BLM grazing allotment, and (2) recommends the implementation of these measures as part of its wolf conservation strategy:

- Remove, bury, or otherwise dispose of livestock carcasses found on areas of the allotment where they would attract wolves to a potential conflict situation with other livestock (such as a salting ground, water source, or holding corral) such that the carcass will not attract wolves.
- Move sick or injured livestock from the allotment so wolves do not target them.
- Limit allotment management activities by humans near active wolf den sites during the denning period (April 1 to July 15) to avoid human disturbance of the site. Determine the distance on a site-specific basis, depending primarily on topography around the den site.
- Do not place salt or other livestock attractants near known wolf dens or rendezvous sites to minimize livestock use of these sites. If a new den or rendezvous site is discovered, relocate any previously established salt or attractant location as necessary to minimize livestock use of these sites.

### Wildlife – Marbled Murrelet

- Except as stated under Option 3, below, and except when needed to protect human safety and property, prohibit activities that disrupt[21] marbled murrelet nesting at occupied sites within 35 miles of the Pacific Coast within all land use allocations and between 35–50 miles of the Pacific Coast within reserved land use allocations.
- Before modifying nesting habitat or removing nesting structure in (1) all land use allocations within 35 miles of the Pacific Coast, and (2) Late-Successional Reserve and Riparian Reserve between 35–50 miles from the Pacific Coast and outside of exclusion Areas C and D (shown in **Figure 3-166**),—
    - Assess the analysis area for **marbled murrelet nesting structure.**[22] The analysis area consists of the proposed project and lands within 726 feet of the project boundary. This area includes all habitat that would be examined by a 5-acre moving circle (526 feet in diameter) whose inner edge (i.e., the edge closest to the center of the project area) is within 200 feet of the project area boundary. The analysis area includes all nesting structures that could be affected by habitat modification.
  - If the analysis area contains no nesting structure, no further consideration of marbled murrelet habitat is required.

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[21] Disruption is a type of disturbance that that creates the likelihood of injury to ESA-listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (see 50 CFR 17.3). An action that would disrupt the normal behavior of an ESA-listed species may affect, and would be likely to adversely affect, the species and would cause the taking of affected individual(s). In contrast, disturbance is a human action that may affect an ESA-listed animal species by the addition, above ambient condition, of noise or human intrusion, or the mechanical movement of habitat (e.g., the shaking of the forest canopy from helicopter rotor wash). Disturbance is temporary/short term (minutes to days) and does not modify habitat structure, or water/air flow or quality. (Disturbance should not be confused with "surface disturbance," which refers to an action that modifies soil, water, or vegetation). Disturbance requires the presence of an ESA-listed animal. Disruption is a subset of disturbance.

[22] **Marbled murrelet nesting structure** is a conifer tree with all of the following characteristics (which are not always visible from the ground):

- A DBH of at least 19.1" and a height greater than 107 feet
- A nest platform at least 32.5 feet above the ground (a nest platform is a relatively flat surface at least 4" wide, with nesting substrate (e.g., moss, epiphytes, duff), and an access route through the canopy that a murrelet could use to approach and land on that platform)
- A tree branch or foliage, either on the tree with potential structure or on an adjacent tree, which provides protective cover over the platform

Note: Nesting structure does not have to be occupied by nesting marbled murrelets.

- Before modifying forest stands in any 5-acre portion of the analysis area that contains at least 6 trees with nesting structure, implement Option 1, 2, or 3.

  **Option 1.** Survey for the marbled murrelet using a protocol with a defined methodology and a resultant probability of detection:
  - If no occupancy is determined, no further consideration of marbled murrelet habitat is required.
  - If occupancy is determined, do not conduct activities within the **occupied stand**[23] and all forest within 300 feet of the occupied stand.
  - The following are exceptions that may be implemented as long as the stand continues to support nesting:
    - Felling of hazard trees and trees for instream restoration projects
    - Construction of linear and nonlinear rights-of-way, spur roads, yarding corridors, or other facilities
  - As needed to protect the overall health of the **occupied stand**, the following activities would be implemented as long as the stand continues to support nesting:
    - Wildfire suppression
    - Fuels reduction
    - Insect and disease control
    - Other activities to improve the health of the stand or adjacent stands

  **Option 2.** Exclude nesting structure from the project area by doing all of the following:
  - Do not remove or damage nesting structure. This includes trees with nesting structure and adjacent trees with branches that interlock the branches of any tree with nesting structure.
  - Do not conduct timber harvest and associated ground disturbing activities during the murrelet nesting period (April 1 – September 15) unless the U.S. Fish and Wildlife Service concurs that disturbances would not adversely affect nesting marbled murrelets.
  - Maintain a 150-foot un-thinned buffer around all trees with nesting structure. Within this buffer, do not remove trees for any reason associated with timber harvest, including the placement of roads, landings, or yarding corridors. Other activities are permitted if the U.S. Fish and Wildlife Service concurs that such activities would not adversely affect nesting marbled murrelets.
  - Maintain an average canopy cover of at least 60 percent post-project (averaged over each 40-acre area) in the zone between 150 feet and 300 feet of all trees with nesting structure.
  - Include additional, site-specific prescriptive measures to maintain or enhance habitat conditions, as needed, in the zone between 150 feet and 300 feet from all trees with nesting structure. In this context, **maintain marbled murrelet habitat** means to maintain stand structural characteristics such that, following habitat modification, the stand could support marbled murrelet nesting.
  - Maintain an average canopy cover of at least 40 percent post-project (averaged over each 40-acre area) within the project area beyond 300 feet from all trees with nesting structure.

[23] Marbled murrelet occupied stand refers to all forest stands, regardless of age or structure, within 1/4 mile (1,320 feet) of the location of marbled murrelet behavior indicating occupancy and not separated from the location of marbled murrelet behavior indicating occupancy by more than 328 feet of non-forest.

**<u>Option 3</u>.** With concurrence from the U.S. Fish and Wildlife Service, manage nesting structure in a manner that would not adversely affect nesting marbled murrelets, except when taking actions that are necessary to treat or protect stands from sudden oak death. Take actions necessary to treat or protect stands from sudden oak death, including actions that may adversely affect nesting marbled murrelets.

- Before modifying forest stands in any 5-acre portion of the analysis area that contain <u>1–5</u> trees with nesting structure, implement Options 1, 2, 3, or 4.

**<u>Option 4</u>.** Protect nesting structure within the project area by doing all of the following:

- If the nesting structure is within 20 miles of the coast—
  - Between April 1 and August 5, stand modification would not occur;
  - Between August 6 and September 15, stand modification activities would not begin until 2 hours after sunrise and would conclude 2 hours before sunset.
- Design projects in accordance with Late-Successional Reserve management direction.
- Do not remove or damage nesting structure.
- Design habitat modifications that occur within one site-potential tree height of nesting structure to protect and improve future habitat conditions. Examples include—
  - Protecting the roots of trees with nesting structure
  - Removing suppressed trees
  - Removing trees that might damage nesting structure during wind storms
  - Removing trees that compete with key adjacent trees that are, or will be, providing cover to potential nest platforms
- Implement management actions that aid development of limbs and adjacent cover.
- Prohibit the creation of any opening (i.e., a gap ≥ 0.25 acre in size) within a distance equal to one site-potential tree height of nesting structure.

## <u>Wildlife – Northern Spotted Owl</u>

- Manage habitat conditions for northern spotted owl movement and survival between and through large blocks of northern spotted owl nesting-roosting habitat.
- Do not authorize timber sales that would cause the incidental take of northern spotted owl territorial pairs or resident singles from timber harvest until implementation of a barred owl management program consistent with the assumptions contained in the Biological Opinion on the RMP has begun.

## <u>Wildlife – North Oregon Coast Distinct Population Segment of the Red Tree Vole</u>

- Survey proposed projects within the range of the North Oregon Coast Distinct Population Segment of the red tree vole north of Highway 20 that could degrade or remove habitat using a protocol with a defined methodology that includes detection probabilities. Habitat that requires surveys prior to modification includes stands containing Douglas-fir, grand fir, Sitka spruce, or western hemlock and meet the following:
  - Stands with a QMD ≥ 16” based on the Survey Protocol for the Red Tree Vole, Version 3.0 (Huff *et al.* 2012, p. 9) and

- **Either** (a) conifer-dominated stands that are ≥ 80 years old **or** (b) conifer-dominated stands that have ≥ 60 percent canopy cover and have ≥ 2 **superdominant** conifer trees[24] per acre

- The following types of projects are exempt from the above direction to survey for red tree voles prior to project implementation:
  - Projects in stands < 80 years old
  - Culvert replacements on roads that are in use and part of the road system; culvert removals if the road is temporary or to be decommissioned
  - Riparian and stream improvement projects where the work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and flood plain reconstruction, or removal of channel diversions
  - Portions of hazardous fuels treatments where prescribed fire is applied. Any portion of a hazardous fuels treatment project involving commercial logging will remain subject to survey requirements except for projects in stands < 80 years old
- If surveys north of Highway 20 indicate red tree voles from the North Oregon Coast Distinct Population Segment occupy that habitat, establish a 'habitat area' for each cluster of nests that are not isolated from one another by more than 330 feet and include at least one active nest.
  - Establish habitat areas at least 10 acres in size and include 1.0 acre per nest if there are more than 10 red tree vole nests (e.g., establish a 15-acre habitat area for a cluster with 15 red tree vole nests).
  - Within habitat areas, do not remove or modify nest trees.
  - Within habitat areas, do not create barriers or strong filters to red tree vole movement through the canopy by—
    - Maintaining at least 75 percent canopy cover within habitat areas;
    - Retaining all nest trees (including active and inactive nest trees); and
    - Retaining trees with crowns directly interlocking the crowns of nest trees.

    Allow routine maintenance of existing infrastructure and facilities in habitat areas (including the felling of hazard trees) that does not meet the above criteria.
- South of Highway 20 within the North Oregon Coast Distinct Population Segment, establish and manage habitat areas as described above for known sites of red tree voles in the Late-Successional Reserve and Riparian Reserve.

## Wildlife – Oregon Spotted Frog

- Manage livestock grazing at sites occupied by Oregon spotted frogs to prevent direct impacts to eggs, tadpoles, or adults.

## Wildlife – Siskiyou Mountains Salamander

- Manage the Siskiyou Mountains salamander consistent with the Conservation Agreement for the Siskiyou Mountains Salamander (*Plethodon stormi*) in Jackson and Josephine Counties of Southwest Oregon; and in Siskiyou County of Northern California (August 17, 2007), as amended and as long as in effect.

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[24] **Superdominant conifer trees** typically have crowns that extend above the general stand canopy and have large branches in the upper canopy of the dominant trees in the stand. Superdominant trees may be remnant trees from an earlier cohort, or they may be trees from the dominant cohort that were more open grown and have become much larger than the rest of the trees in the stand.

### Wildlife – Vernal Pool Fairy Shrimp

- Do not authorize or construct additional discretionary roads and trails within designated critical habitat for the vernal pool fairy shrimp or within vernal pool fairy shrimp habitat.

### Wildlife – Pacific Coast Distinct Population Segment of the Western Snowy Plover

- Do not authorize or construct additional discretionary roads and trails within designated critical habitat or within western snowy plover habitat.
- Restore snowy plover nesting habitat.
- Restrict the timing and location of beach access or activities to avoid disruption of normal snowy plover nesting and nesting behaviors.

## Wild Horses

### Management Objective

- Manage and maintain a healthy population of wild and free-roaming horses in the Pokegama Herd Management Area of the Klamath Falls Field Office.

### Management Direction

- Gather horses to maintain the appropriate management level of 30–50 head. During gathers, the number of horses will 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 occurs. The BLM will remove horses from private land per private landowner request. Horses straying outside the herd management area will be removed or returned to the herd management area.
- Maintain existing water developments to provide season-long water for wild horses within the herd management area. Consider new developments to assist in meeting the herd management objectives.
- Provide periodic repair and maintenance of fences to protect riparian areas from concentrated use by wild horses.
- Protect Bureau Sensitive plant habitat from concentrated use by wild horses, including constructing and maintaining fences as necessary.
- Adjust the appropriate management level if monitoring data identifies a change in long-term forage availability or rangeland 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 Standards for Rangeland Health and Guidelines for Grazing Management for Public Lands in Oregon and Washington.
- Introduce wild horses from other herd areas periodically to maintain the viable genetic diversity of the herd.

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# Appendix C – Vegetation Modeling

## Introduction

The BLM contracted with the forestry consulting firm of Mason, Bruce & Girard, Inc. of Portland, Oregon, to jointly develop and build the model described in this appendix. Personnel from both of these entities constituted the Modeling Team, and they are listed at the end of this appendix.

The BLM considered alternatives in this Proposed RMP/Final EIS that encompassed a range of approaches for managing BLM-administered forestlands to respond to the purpose and need for the action. The BLM did this by varying the land allocations and intensity with which the BLM would manage these forests. These different management approaches would result in a range of outcomes in terms of the forest structural stages and types of habitat over time and the sustained-yield timber harvest levels. The Modeling Team used models in this analysis to simulate the application of the land use allocations, management action, and forest development assumptions to characterize forest conditions 10, 20, 30, 40, 50, and 100+ years into the future. The Modeling Team also used models to determine the timber harvest level that the BLM would be able to sustain over time. The BLM used the outputs from modeling to provide a relative basis for comparing and evaluating these different land management strategies.

The vegetation modeling in this analysis is composed of three primary vegetation models:

- ORGANON version 9.1 – an individual tree growth model that the BLM used for the development of growth and yield projections for the major species groups on BLM-administered lands; Oregon State University developed ORGANON (http://www.cof.orst.edu/cof/fr/research/ORGANON/). In this appendix, ORGANON refers to the generic model available in the public domain.
- Forest Vegetation Simulator (FVS) (Dixon 2002, revised 2014) – an individual tree, distance-independent growth model that the BLM used for projections of northern spotted owl habitat and marbled murrelet habitat variables
- Remsoft Spatial Planning System (Woodstock) (version 2012.12.0) – a forest management model that the BLM used to project the forest conditions over time by simulating the land allocations and management action of the alternatives; Woodstock is proprietary software created by Remsoft Corp. http://www.remsoft.com.

All three of these models have been in use and under continued development for at least 20 years. These models provide a framework to bring the data and assumptions together to simulate these management scenarios.

This appendix provides an overview of the following key components used in formulating the models:

- BLM Forest Inventory
- Use of inventory data in modeling
- GIS – defining the land base and spatial projections
- Moist versus dry delineation
- Forest growth and yield modeling
- Forest
- Woodstock modeling
- Woodstock products

# BLM Forest Inventory

The Modeling Team used three inventories in the vegetation modeling for this analysis:

- GIS vegetation mapping with stand level attributes
- Timber Production Capability Classification (TPCC)
- Current Vegetation Survey (CVS) – measured permanent plot data

## GIS Vegetation Mapping – Forest Operations Inventory and Micro*Storms

The Forest Operations Inventory (FOI) is a GIS layer that delineates vegetation polygons across BLM-administered lands within the planning area. There are approximately 77,000 identified stands that average 32 acres in size. The BLM has set the minimum mapping feature size at 5 acres, but some finer scale non-forest vegetation and harvest features are identified. The BLM delineated polygons based on the vegetation attributes of cover condition, size class, density of trees, and age.

The Micro*Storms database contains the attributes for the FOI polygons. The vegetation classification represents stand average characteristics, which include:

- Cover condition – conifer, hardwood, mixed, or non-forest
- Single or multi-canopy layer stands
- Species – top five tree species with percent occupancy within a stand layer and listing of other species present
- Stocking class
- Size class – diameter of the tree species by stand layer in 10" groupings
- Diameter class
- Birthdate of the stand layer
- Ten-year age class of the managed stand layer

The BLM records land management treatment history in Micro*Storms for the FOI polygons. These treatments include timber harvest, site preparation, planting, stand maintenance/protection, pre-commercial thinning, fertilization, pruning, and a variety of other treatments.

The BLM updates data on stand characteristics on a regular basis as the BLM implements treatments and as conditions change. The FOI and its companion database, Micro*Storms, are operational datasets that are in daily use by the BLM offices for planning and tracking purposes.

The FOI and Micro*Storms data, as used in this analysis, reflects the conditions of the BLM-administered lands as of January 2013. The FOI data is the spatial representation of the forest conditions, while the Micro*Storms database provides a complete listing of treatments, conditions, and surveys that have occurred on that stand. The Modeling Team used these data to develop logical groupings called 'strata' that were the building blocks for the growth and yield curves. The Modeling Team stratified the Micro*Storms data by existing stand condition, modeling group, site productivity, age, and species groups.

## Timber Production Capability Classification

The Timber Production Capability Classification (TPCC) is a classification of BLM-administered lands based on the physical and biological capability of the site to support and produce commercial forest products on a sustained-yield basis. The BLM classifies each TPCC unit based on four assessments:

- Forest/Non-forest
    - Forest – capable of 10 percent tree stocking

  - Non-forest
- Commercial Forestlands
  - Commercial forestlands – capable of producing 20 cubic feet of wood per year of commercial species
  - Non-commercial forestlands – not capable of producing 20 cubic feet of wood per year of commercial species
  - Suitable Woodland – Non-commercial species or low site
- Fragile Conditions
  - Non-fragile – forest yield productivity is not expected to be reduced due to soil erosion, mass wasting, reduction in nutrient levels, reduction in moisture supplying capacity, and or the rise of ground water
  - Fragile – forest yield productivity may be expected to be reduced by soil erosion, mass wasting, reduction in nutrient levels, reduction in moisture supplying capacity, and or the rise of ground water table
  - Fragile sites are classified as:
    - Restricted – Special harvest and or restricted measures are required.
    - Non-suitable Woodland – Future production will be reduced even if special harvest and or restricted measures are applied due to the inherent site factors. These lands are not biologically and or environmentally capable of supporting a sustained yield of forest products.
- Reforestation
  - Problem – Sites where environmental, physical, and biological factors have the potential to reduce the survival and or growth of commercial tree seedlings. These factors include light, temperature, moisture, frost, surface rock, animals, and disease
  - Non-Problem – Sites that can be stocked to meet or exceed target stocking levels, of commercial species, within 5 years of harvest, using standard practices
  - Restricted – Commercial forestland where operational reforestation practices in addition to standard practices are necessary to meet or exceed the minimum stocking levels of commercial species within 5 years of harvest
  - Suitable Woodland – Operational practices will not meet or exceed minimum stocking levels of commercial species within 5 years of harvest. These sites are biologically capable of producing a sustained yield of timber products

The TPCC Handbook (BLM Manual 5251 – Timber Production Capability Classification; USDI BLM 1984) provides the standards for the TPCC Classification.

There are approximately 66,000 TPCC units mapped in GIS on the BLM-administered lands within the planning area. The minimum mapping feature is generally 5 acres, but the BLM identifies some finer scale non-forest features in the data. The BLM did the initial classification of all BLM-administered lands in the planning area in the late 1980s. The BLM updates the data as needed when new lands are acquired, or new information is obtained through field examination.

The data, as used in this analysis, reflects the classification of the BLM-administered lands as of January 2013. For this analysis, the Modeling Team used TPCC data to identify what portions of the BLM-administered lands would contribute to the Allowable Sale Quantity under each alternative and the Proposed RMP. The BLM does not include non-forest, suitable woodlands, and non-suitable woodland categories in the lands contributing to the Allowable Sale Quantity under the current plan.

## Current Vegetation Survey – Measured Plot Inventory

The Current Vegetation Survey (CVS, Max *et al.* 1996) provides comprehensive information on vegetative resources on BLM-administered lands within western Oregon. The BLM did the initial data collection during the years 1997–2001. The BLM then did a complete re-measurement from 2001 to 2011. This analysis utilizes the re-measurement data. The CVS plot design consists of four 3.4-mile grids of field plots that are offset from one another to produce a single 1.7-mile grid across BLM-administered lands for 1,376 plots. The primary sampling unit is 1 hectare (approximately 2.5 acres) with 5, fixed-radius sets of nested subplots for measuring trees by size class:

- 0 to 2.9" DBH on the 11.8 feet radius subplot
- 3.0 to 12.9" DBH on a 24.0 feet radius subplot
- 13.0 to 47.9" DBH on a 51.1 feet radius subplot
- 48.0" DBH and larger on the 1/5-hectare (approximately 0.5-acre) nested subplots

There is one subplot located at the plot center and four subplots each in a cardinal direction and 133.9 feet from the center of the plot **(Figure C-1)**. In addition, the BLM determines potential natural vegetation at each subplot using plant indicator keys, and the BLM measures down woody material along two transects. For specific information on the attributes that the BLM collects, refer to USDI BLM (2010).

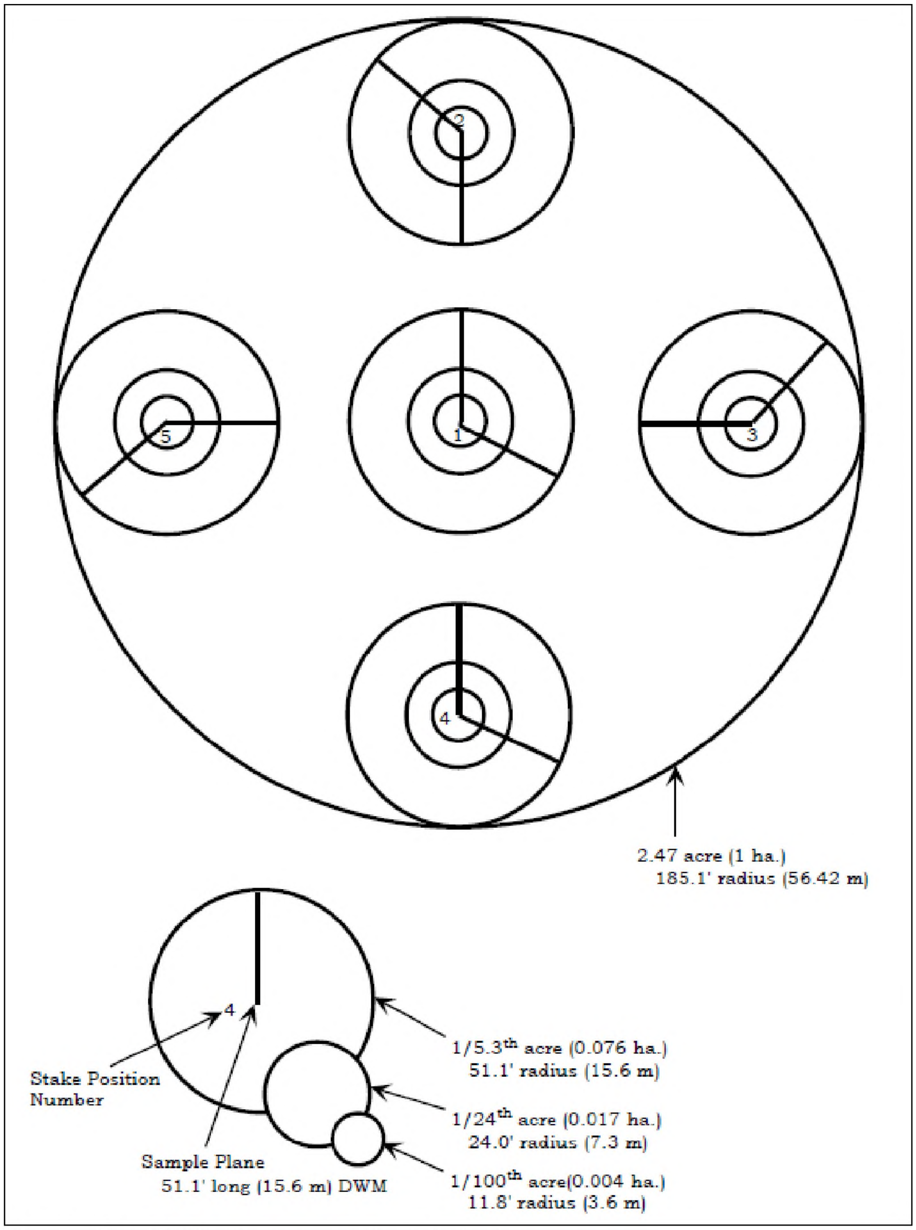


**Figure C-1.** CVS primary sample unit design

The location of the plot centers have differentially corrected GPS coordinates. Because the BLM located each subplot center at a precise distance from the plot center, the BLM calculated the coordinates for the subplot centers and included them in a GIS layer. The CVS inventory provides an independent, unbiased estimate of the forested BLM-administered lands in the planning area. In the graphic below (**Figure C-2**), the crosshair dot symbols are examples of CVS plot center locations on a 1.7-mile grid on top of the FOI units.

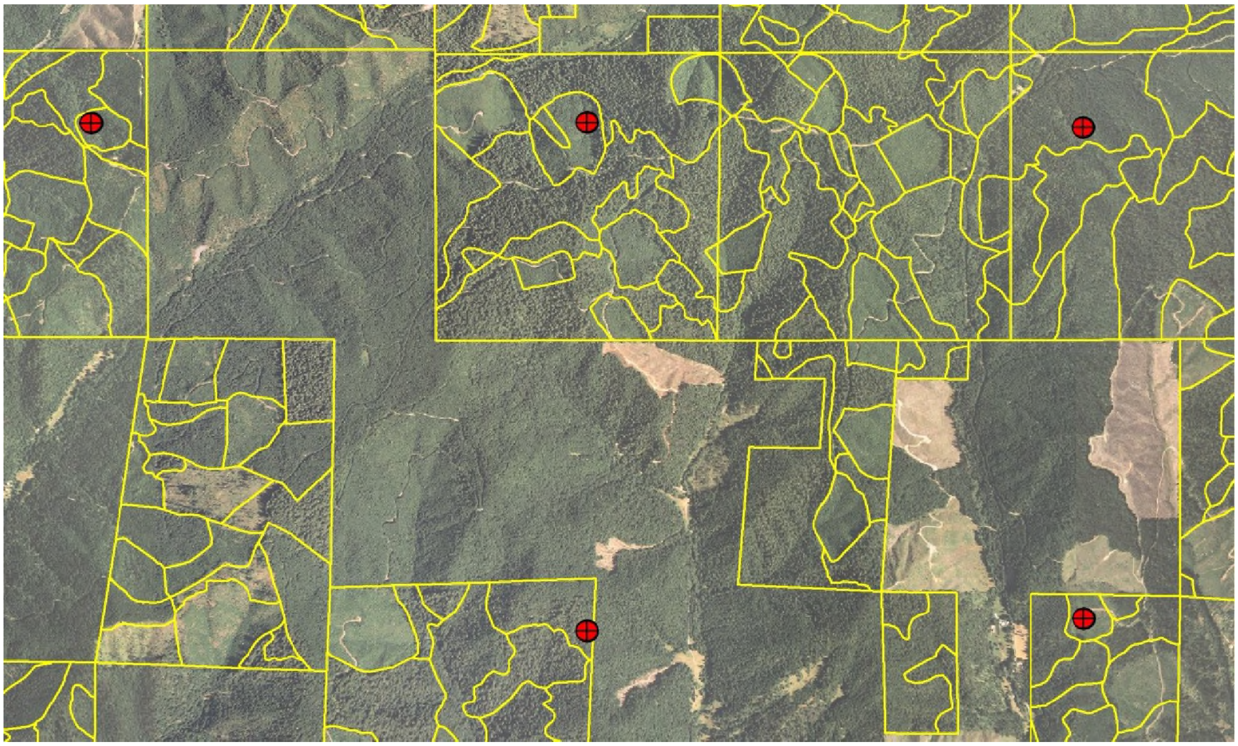

**Figure C-2.** CVS plot locations and FOI units

## Use of the Inventory Data in the Modeling

### Introduction

The Modeling Team divided the FOI and the Current Vegetation Survey (CVS) data into 1,582 unique categories, called 'strata,' and classified each stand (FOI unit) by the characteristics listed below. The CVS plots that overlay an FOI represent that FOI and all the FOI found in that stratum. The Modeling Team averaged the CVS tree lists for each stratum and developed a stand table from these average tree lists. The Modeling Team used four components to derive each of the stratums: modeling group, species group, ten-year age class, and site productivity class.

### 1) Modeling Groups

The purpose of these groups is to identify broad classes of stands that are sufficiently similar for growth and yield modeling (**Table C-1**). The Modeling Team placed each of the existing stands in to 79 different categories, based on their 'existing condition' **(Table C-2)**. The existing stand condition (ESC) describes the type of harvest, the tree density, and other silvicultural information. The Modeling Team then further collapsed the existing stand condition categories into 16 different modeling groups that are shown in **Table C-1**.

**Table C-1.** Modeling groups used to develop strata.

| 2013 Modeling Group | Modeling Group–Definition and Description |
|---|---|
| MG_A | Pre-Northwest Forest Plan regeneration harvest units with target or greater level of stocking. Also includes age class 30 stands with past thinning (CT or DM), and unmanaged, well-stocked stands, age class < 50 (< 70) without legacy. |
| MG_B | Pre-Northwest Forest Plan regeneration harvest units with below target level of stocking. Also includes age class < 50 (< 70) stands from ESC 52 (no past management) categorized as having as low density and without legacy trees. |
| MG_C | Northwest Forest Plan regeneration harvest units with the full range of retention tree levels. Stand data merged across stock types (genetic vs. non-improved), stocking levels, and retention levels. Also includes age class < 50 stands with no past management and with a legacy tree component, similar to Northwest Forest Plan regeneration harvest structure. |
| MG_D1 | DM and CT stands in age classes 40–90. Stands treated age 80+, now age class > 100 (mostly Salem), merged with no past management stands (MG_E) |
| MG_D2 | DF species group only, DM and CT units (Roseburg and Medford), age class 40–90. Stands treated age 80+, now age class > 100, merged with no past management (MG_E). |
| MG_D3 | Primarily Klamath Falls DM stands. Model all species groups together, and use age bands for low acreage age classes above 120 and below 50 |
| MG_E1 | No past management, limited mortality salvage, or conifer non-suitable woodlands; Non-conifer (hardwood) stands were merged with (red alder) stand conversions units in Northwest Oregon (MG_F) or with hardwood suitable woodlands in Southwest Oregon (MG_G). |
| MG_E2 | Northwest Oregon stands with no past management, mature single story. |
| MG_E3 | Southwest Oregon stands with no past management, mature single story. |
| MG_E4 | Northwest Oregon stands with no past management, mature multi-story. |
| MG_E5 | Southwest Oregon stands with no past management, mature multi-story. |
| MG_F | Northwest Oregon stand conversion opportunities or stands extracted from ESC 51 (no past management and essentially all red alder species group). |
| MG_G | Hardwood woodlands for all Southwest Oregon species groups; includes woodlands categorized as suitable, non-suitable, and non-commercial forest land. Also includes stands from ESC 51 (no past management) with hardwood species group or hardwood cover condition. The 6 FOIs from Northwest Oregon may be best modeled using Southwest Oregon growth curves. |
| MG_H | Conifer suitable woodlands; includes stands from ESCs 68 and 70 (hardwood suitable woodlands) identified with a conifer species group designation. |
| MG_J | Non-commercial forest land conifer suitable woodlands; conifer species groups only, including stands extracted from ESCs 68 and 70 (hardwood suitable woodlands), and stands with a juniper species group stands from any ESC code. |
| MG_X | Non-forest; Also includes stands from other ESCs with inconsistent cover condition or species group data, which denotes a non-forest unit. |

CT = Commercial thinning
DM = Density management
ESC = Existing stand condition
DF = Douglas-fir
FOI = Forest Operations Inventory

**Table C-2.** Existing stand condition coding

| Category | Description of Existing Stand Condition | Total Category Area (GIS Acres) |
|---|---|---|
| - | No category | 8 |
| 1 | GFMA target stocking (≥ 80%) and 250–400 TPA density (unimproved TI) | 361,885 |
| 2 | GFMA target stocking (≥ 80%) and 250–400 TPA density (unimproved TI); fertilized | 98,712 |
| 3 | GFMA minimum stocking (60–79%) and 150–249 TPA density (unimproved TI) | 118,539 |
| 4 | GFMA minimum stocking (60–79%) and 150–249 TPA density (unimproved TI); fertilized | 25,021 |
| 5 | GFMA below minimum stocking (< 60%) and 50–149 TPA density (unimproved TI) | 18,846 |
| 6 | GFMA overstocked/over-dense and> 400 TPA density (unimproved TI) | 31,492 |
| 7 | GFMA target stocking (≥ 80%) and 250–400 TPA density (TI genetic stock) | 22,543 |
| 8 | GFMA target stocking (≥ 80%) and 250–400 TPA density (TI genetic stock); fertilized | 3,005 |
| 9 | GFMA minimum stocking (60–79%) and 150–250 TPA density (TI genetic stock) | 8,368 |
| 10 | GFMA minimum stocking (60–79%) and 150–250 TPA density (TI genetic stock); fertilized | 443 |
| 11 | GFMA below minimum stocking (< 60%) and 50–149 TPA density (TI genetic stock) | 1,457 |
| 12 | GFMA overstocked/over-dense and > 400 TPA density (TI genetic stock) | 3,634 |
| 13 | 6–8 retention trees - at GFMA target stocking and density (TI genetic stock) | 2,594 |
| 14 | 6–8 retention trees - at GFMA minimum stocking and density (TI genetic stock) | 242 |
| 15 | 6–8 retention trees - below GFMA minimum stocking and density (TI genetic stock) | 662 |
| 16 | 6–8 retention trees - overstocked GFMA standard, needs PCT (TI genetic stock) | 845 |
| 17 | 6–8 retention trees - at GFMA target stocking and density (unimproved stock TI) | 19,188 |
| 18 | 6–8 retention trees - at GFMA minimum stocking and density (unimproved stock TI) | 6,497 |
| 19 | 6–8 retention trees - below GFMA minimum stocking and density (unimproved stock TI) | 2,312 |
| 20 | 6–8 retention trees - overstocked GFMA standard, needs PCT (unimproved stock) | 2,451 |
| 21 | 12–18 retention trees - at GFMA target stocking and density (TI genetic stock) | 480 |
| 22 | 12–18 retention trees - at GFMA minimum stocking and density (TI genetic stock) | 358 |
| 23 | 12–18 retention trees - below GFMA minimum stocking and density (TI genetic stock) | 130 |
| 24 | 12–18 retention trees - overstocked GFMA standard, needs PCT (TI genetic stock) | 8 |
| 25 | 12–18 retention trees - at GFMA target stocking and density (unimproved stock TI) | 1,091 |
| 26 | 12–18 retention trees - at GFMA minimum stocking and density (unimproved stock TI) | 189 |
| 27 | 12–18 retention trees - below GFMA minimum stocking and density (unimproved stock TI) | 108 |
| 28 | 12–18 retention trees - overstocked GFMA standard, needs PCT (unimproved stock TI) | 518 |
| 30 | Density Management at age class 30 | 1,310 |
| 31 | Density Management at age class 40 | 7,251 |
| 32 | Density Management at age class 50 | 12,964 |
| 33 | Density Management at age class 60 | 14,625 |
| 34 | Density Management at age class 70 | 8,562 |
| 35 | Density Management at age class 80 | 6,594 |
| 36 | Density Management at age class 90 Plus | 49,611 |
| 37 | Commercially thinned at age class 30 | 1,415 |
| 38 | Commercially thinned and fertilized at age class 30 | 132 |
| 39 | Commercially thinned at age class 40 | 11,323 |
| 40 | Commercially thinned and fertilized at age class 40 | 689 |

| Category | Description of Existing Stand Condition | Total Category Area (GIS Acres) |
|---|---|---|
| 41 | Commercially thinned at age class 50 | 33,402 |
| 42 | Commercially thinned and fertilized at age class 50 | 4,644 |
| 43 | Commercially thinned at age class 60 | 29,265 |
| 44 | Commercially thinned and fertilized at age class 60 | 3,000 |
| 45 | Commercially thinned at age class 70 | 21,726 |
| 46 | Commercially thinned and fertilized at age class 70 | 505 |
| 47 | Commercially thinned at age class 80 | 14,883 |
| 48 | Commercially thinned at age class 90 | 8,541 |
| 49 | Commercially thinned at age class 100 | 3,605 |
| 50 | Commercially thinned at age class 110 | 9,928 |
| 51 | Mortality Salvaged or Sanitation Cut | 40,280 |
| 52 | 56–500 years old, no past silvicultural treatment | 974,320 |
| 53 | Brush field, hardwood, non-commercial conifer or backlog conversion opportunity | 22,871 |
| 55 | Cut, needs site preparation | 139 |
| 57 | Non-forest | 126,922 |
| 58 | > 18 (Southwest Oregon) or > 15 (Northwest Oregon) retention trees/acre - at GFMA target stocking and density (TI genetic stock) | 149 |
| 62 | > 18 (Southwest Oregon) or > 15 (Northwest Oregon) retention trees/acre - at GFMA target stocking and density (unimproved stock TI) | 496 |
| 63 | > 18 (Southwest Oregon) or > 15 (Northwest Oregon) retention trees/acre - at GFMA minimum stocking and density (unimproved stock TI) | 31 |
| 64 | > 18 (Southwest Oregon) or > 15 (Northwest Oregon) retention trees/acre - below GFMA minimum stocking and density (unimproved stock TI) | 78 |
| 66 | Hardwood-suitable woodland commercial forest land | 2,642 |
| 67 | Conifer-suitable woodland commercial forest land | 78,034 |
| 68 | Hardwood-non-suitable woodland commercial forest land | 3,628 |
| 69 | Conifer-non-suitable woodland commercial forest land | 45,148 |
| 70 | Hardwood-suitable woodland non-commercial forest land | 34,426 |
| 71 | Conifer-suitable woodland non-commercial forest land | 152,345 |
| 72 | GFMA target stocking (≥ 80%) and 250–400 TPA density (unimproved TI); pruned | 8,887 |
| 73 | GFMA target stocking (≥ 80%) and 250–400 TPA density (unimproved TI); fertilized; pruned | 3,333 |
| 74 | GFMA minimum stocking (60–79%) – 150–249 TPA density (unimproved TI) ; pruned | 3,353 |
| 75 | GFMA minimum stocking (60–79%) – 150 –249 TPA density (unimproved TI); fertilized; pruned | 3,719 |
| 76 | GFMA target stocking (≥ 80%) and 250–400 TPA density (TI genetic stock) ; pruned | 1,372 |
| 77 | GFMA target stocking (≥ 80%) and 250–400 TPA density (TI genetic stock); fertilized; pruned | 47 |
| 78 | GFMA minimum stocking (60–79%) – 150–250 TPA density (TI genetic stock) ; pruned | 946 |
| 79 | GFMA minimum stocking (60–79%) – 150–250 TPA density (TI genetic stock); fertilized; pruned | 96 |
| | **Totals** | **2,478,864** |

GFMA = General Forest Management Area

TPA = Trees per acre

PCT = Pre-commercial thinning

## 2) Species Groups for RMP Modeling

The Micro*Storms database has a listing of the top five species within each stand layer, with a ranking of relative abundance. The Modeling Team utilized this data to classify each FOI into five broad groups—Douglas-fir, true fir, mixed conifer, conifer/hardwood mix, and hardwood—attributed by north or south within the planning area. In this context north includes the Coos Bay, Eugene, and Salem Districts, and the Roseburg District's Swiftwater Field Office. South includes the Klamath Falls Field Office, the Medford District, and Roseburg District's South River Field Office. The Modeling Team applied the northwest Oregon version of ORGANON to the northern species groups, and the southwest Oregon version of ORGANON to model the southern species groups. The Modeling Team modeled ponderosa pine and juniper species groups in southern Oregon only.

**Douglas-fir (DF)** – Stands with single species Douglas-fir and stands with minor quantities of other conifers or hardwoods. They would typically be 'FCO' stands (forest conifer), and have either single or multiple sizes and ages indicated.

**Northern true fir (N_TF)** – Noble or Silver fir are dominant, but other species are mixed in, such as Douglas-fir, western hemlock, or western red cedar.

**Northern mixed conifer (N_MX_CON)** – Stands with single species of western hemlock, western red cedar, Sitka spruce, or mixed conifer stands where Douglas-fir is not dominant. They would typically be 'FCO' stands (forest conifer).

**Northern conifer/hardwood mix (N_CON_HWD)** – These stands have both conifer and hardwood species listed, but they are dominated by neither. Conifers or hardwoods could be indicated in the dominant or secondary position. Hardwoods would include big leaf maple and red alder mixed with conifer species. Many FMX stands (forest conifer and hardwoods) would be located here.

**Northern hardwood (N_HWD)** – Maple/alder mixes and pure alder are here. Pure or nearly-pure alder stands, with limited maple fractions. FHD stand (forest-hardwoods) descriptions are here.

**Southern mixed conifer (S_MX_CON)** – Stands containing incense cedar, sugar pine, ponderosa pine, Douglas-fir and white fir in varying fractions, but not including pure types without any secondary species indicated; may include some hardwood, but less than the southern conifer/hardwood mix.

**Southern conifer/hardwood mix (S_CON_HWD)** – Stands with mixed conifer species and a component of southern hardwoods such as oak, madrone, tanoak, and myrtle that may be in the majority or minority. FMX types (forest-conifer and hardwoods) are here.

**Southern hardwood (S_HWD)** – Southern hardwood species are dominant with limited mixed conifer component. Hardwoods are the dominant species, possibly FHD types (forest conifer and hardwoods).

**Southern true fir (S_TF)** – This type includes Shasta red fir and white fir types. White fir types could have other secondary species such as Douglas-fir.

**Ponderosa pine (PP)** – Ponderosa pine is dominant; may include Douglas-fir, juniper or other species, but not as the dominant species.

**Juniper (J)** – This type is juniper dominant, but contains limited pine, occurs on dry, low site lands.

Depending on the district and the ORGANON variant used, lodgepole pine and knobcone pine types would go into northern mixed conifer or southern mixed conifer. Jeffery pine would go into a low site Ponderosa pine type. Mountain hemlock would go into northern true fir. Port-Orford-cedar would go into southern mixed conifer.

## 3) Ten-year Age Classes

**Table C-3** displays forest stand ten-year age classes from Micro*Storms database as of January 1, 2013. Stand age is derived from the birth year of a stand, and uses the most recent source stand layer that is designated for management. If the stand has multiple tree layers, an assignment is made of the stand layer designated for management. These stand ages reflect the conditions of the forest at the beginning of the analysis period and were used for the modeling of the No Timber Harvest reference analysis, No Action alternative, Alternatives A–D, and Sub-alternatives B and C. The Modeling Team did not assign stand ages to the Eastside Management lands in the Klamath Falls Field Office for vegetation modeling purposes.

**Table C-3.** BLM western Oregon acreage by age class distribution and sustained yield unit as of January 1, 2013

| 10-year Age | Coos Bay (Acres) | Eugene (Acres) | Klamath Falls (Acres) | Medford (Acres) | Roseburg (Acres) | Salem (Acres) | Total Area (GIS Acres) |
|---|---|---|---|---|---|---|---|
| Non-forest | 20,206 | 13,841 | 167,312 | 66,556 | 24,477 | 24,765 | 317,157 |
| ≤ 10 | 3,288 | 2,669 | 4,656 | 17,555 | 3,187 | 2,406 | 33,762 |
| 20 | 24,281 | 18,455 | 1,159 | 37,409 | 35,366 | 20,426 | 137,097 |
| 30 | 27,727 | 27,480 | 2,025 | 46,037 | 33,084 | 32,210 | 168,562 |
| 40 | 39,740 | 32,952 | 451 | 22,672 | 38,470 | 36,446 | 170,731 |
| 50 | 36,309 | 38,225 | 1,896 | 42,766 | 44,666 | 45,334 | 209,196 |
| 60 | 25,366 | 32,545 | 3,301 | 23,975 | 20,410 | 44,157 | 149,754 |
| 70 | 17,852 | 41,702 | 3,124 | 25,965 | 9,084 | 33,833 | 131,560 |
| 80 | 9,007 | 22,302 | 3,693 | 21,373 | 7,276 | 24,002 | 87,654 |
| 90 | 3,884 | 8,026 | 5,304 | 29,789 | 6,284 | 14,335 | 67,622 |
| 100 | 4,395 | 5,057 | 5,182 | 32,715 | 5,758 | 13,233 | 66,340 |
| 110 | 4,083 | 6,171 | 3,927 | 55,621 | 15,789 | 13,181 | 98,773 |
| 120 | 9,318 | 8,004 | 1,519 | 33,784 | 6,335 | 21,855 | 80,814 |
| 130 | 10,406 | 6,219 | 1,477 | 44,408 | 8,041 | 21,080 | 91,632 |
| 140 | 6,967 | 1,597 | 2,905 | 48,694 | 10,584 | 9,358 | 80,105 |
| 150 | 8,287 | 1,201 | 1,064 | 39,172 | 25,877 | 7,349 | 82,950 |
| 160 | 8,138 | 2,083 | 1,297 | 35,847 | 1,723 | 1,867 | 50,956 |
| 170 | 2,523 | 404 | 525 | 24,123 | 8,098 | 2,787 | 38,460 |
| 180 | 2,190 | 433 | 235 | 42,019 | 788 | 454 | 46,119 |
| 190 | 1,769 | 3,989 | 375 | 14,781 | 1,908 | 156 | 22,978 |
| 200+ | 58,499 | 37,707 | 2,657 | 101,414 | 116,433 | 29,923 | 346,634 |
| **Totals** | **324,236** | **311,063** | **214,084** | **806,675** | **423,640** | **399,157** | **2,478,856** |

During the summer of 2013, several large fires burned within the Klamath Falls Field Office and the Medford and Roseburg Districts, within the planning area and changed the stand conditions. These changes were incorporated into the stand ages for the Proposed RMP, reflecting the conditions of the forest at the beginning of the analysis as used for modeling of the Proposed RMP. In total, 22,712 acres were burned in either medium-, or high-severity fire, resulting in changes to acres in varying stand age classes on these districts.

**Table C-4** shows the forest stand ten-year age classes used for the Proposed RMP.

**Table C-4.** BLM western Oregon acreage by age class distribution and sustained yield unit after 2013 large fire data adjustment

| 10-year Age | Coos Bay (Acres) | Eugene (Acres) | Klamath Falls (Acres) | Medford (Acres) | Roseburg (Acres) | Salem (Acres) | Total Area (GIS Acres) |
|---|---|---|---|---|---|---|---|
| Non-forest | 20,206 | 13,841 | 167,312 | 66,556 | 24,477 | 24,765 | 317,157 |
| 10 | 3,288 | 2,669 | 5,442 | 22,889 | 4,490 | 2,406 | 41,184 |
| 20 | 24,281 | 18,455 | 1,179 | 36,885 | 35,153 | 20,426 | 136,380 |

| 10-year Age | Coos Bay (Acres) | Eugene (Acres) | Klamath Falls (Acres) | Medford (Acres) | Roseburg (Acres) | Salem (Acres) | Total Area (GIS Acres) |
|---|---|---|---|---|---|---|---|
| 30 | 27,727 | 27,480 | 2,469 | 46,242 | 32,932 | 32,210 | 169,060 |
| 40 | 39,740 | 32,952 | 451 | 22,002 | 38,444 | 36,446 | 170,035 |
| 50 | 36,309 | 38,225 | 1,701 | 42,110 | 44,635 | 45,334 | 208,313 |
| 60 | 25,366 | 32,545 | 2,999 | 23,795 | 20,402 | 44,157 | 149,264 |
| 70 | 17,852 | 41,702 | 2,944 | 25,625 | 9,084 | 33,833 | 131,040 |
| 80 | 9,007 | 22,302 | 3,387 | 20,808 | 7,268 | 24,002 | 86,775 |
| 90 | 3,884 | 8,026 | 5,920 | 33,319 | 6,658 | 14,335 | 72,141 |
| 100 | 4,395 | 5,057 | 4,868 | 32,446 | 5,280 | 13,233 | 65,280 |
| 110 | 4,083 | 6,171 | 3,645 | 55,429 | 15,774 | 13,181 | 98,283 |
| 120 | 9,318 | 8,004 | 1,500 | 33,515 | 6,261 | 21,855 | 80,452 |
| 130 | 10,406 | 6,219 | 1,417 | 44,340 | 8,041 | 21,080 | 91,504 |
| 140 | 6,967 | 1,597 | 2,759 | 48,104 | 10,461 | 9,358 | 79,247 |
| 150 | 8,287 | 1,201 | 1,014 | 38,597 | 25,877 | 7,349 | 82,325 |
| 160 | 8,138 | 2,083 | 1,297 | 35,452 | 1,723 | 1,867 | 50,561 |
| 170 | 2,523 | 404 | 525 | 23,464 | 8,091 | 2,787 | 37,794 |
| 180 | 2,190 | 433 | 235 | 40,915 | 788 | 454 | 45,016 |
| 190 | 1,769 | 3,989 | 363 | 14,407 | 1,908 | 156 | 22,591 |
| 200+ | 58,499 | 37,707 | 2,657 | 99,776 | 115,893 | 29,923 | 344,456 |
| **Totals** | **324,236** | **311,063** | **214,084** | **806,675** | **423,640** | **399,157** | **2,478,856** |

### 4) Site Productivity Classes

The distribution of site class on each sustained-yield unit came directly from the measured site index trees on the Current Vegetation Survey (CVS) subplots. The Modeling Team assigned five site classes from highly productive (Site Class 1) to low productivity (Site Class 5). The Modeling Team used King (1966) Douglas-fir site index for the geographic area where the Northwest Oregon version of ORGANON was applicable, and the Hann and Scrivani (1987) Douglas-fir site index for areas where the Southwest Oregon version of ORGANON was appropriate. **Table C-5** shows the distribution of productivity classes within each sustained yield unit. The Modeling Team assigned a site class to each FOI based on the following order of priority:

1. Measured tree data from the CVS inventory associated with a FOI
2. Continuous forest inventory (CFI) data associated with a FOI
3. EcoSurvey (stand exam) data with site index averages associated with a FOI
4. Soil-type based classification from Natural Resources Conservation Service mapping or imputation based on climate variables (Latta *et al*. 2009)

The Modeling Team held the FOI unit-level productivity assignments constant for the Woodstock modeling under the Proposed RMP, and all alternatives and sub-alternatives.

**Table C-5.** Percentage of site productivity classes within each sustained-yield unit

| Site Productivity Class | Coos Bay (Percent) | Eugene (Percent) | Klamath Falls (Percent) | Medford (Percent) | Roseburg (Percent) | Salem (Percent) |
|---|---|---|---|---|---|---|
| Site Class 1 | 20% | 28% | - | - | 7% | 15% |

| Site Productivity Class | Coos Bay (Percent) | Eugene (Percent) | Klamath Falls (Percent) | Medford (Percent) | Roseburg (Percent) | Salem (Percent) |
|---|---|---|---|---|---|---|
| Site Class 2 | 42% | 56% | - | 6% | 23% | 48% |
| Site Class 3 | 25% | 13% | 22% | 20% | 32% | 27% |
| Site Class 4 | 10% | 2% | 46% | 43% | 25% | 6% |
| Site Class 5 | 1% | - | 32% | 30% | 11% | 3% |

Note: Numbers have been rounded

## Strata to Stand Table

Of the 1,582 unique strata that include all FOI polygons, 601 strata had at least 1 overlaying CVS plot (**Table C-6**). These strata represent 83 percent of the forested BLM-administered acres. The Modeling Team modeled the remaining 981 strata, 17 percent of the forested BLM-administered acreage, using the 'most similar' CVS tree list. By broadening FOI site class, species groups, or stand age classes, the Modeling Team developed a decision matrix to determine which tree list was most similar for unmatched strata. Each stratum has a stand table that the Modeling Team developed from at least one CVS subplot tree lists. Each stratum represented by more than one tree list had an average tree list developed to represent that stratum. The Modeling Team modeled all of the FOIs in a particular stratum using the same stand table.

**Table C-6.** Strata representation with CVS subplots

| Current Vegetation Survey Subplot Coverage | Strata (Count) | Forested BLM-administered Land (Acres) |
|---|---|---|
| Stratum with CVS subplots | 601 | 1,775,011 |
| Stratum with no CVS subplots | 981 | 353,671 |
| **Totals** | **1,582** | **2,128,682** |

## Application of the Stratification in Growth and Yield Modeling

The consulting firm Mason, Bruce & Girard, Inc. (MBG) projected the stand table for each stratum in the ORGANON growth and yield model utilizing a software program called YTGTools, which is MBG's proprietary software. MBG used YTGTools to batch multiple ORGANON runs and convert the outputs into Woodstock-compatible yield tables. MBG modeled each stand table's growth for a 200-year planning horizon to simulate future development with and without future silvicultural treatments.

### *ORGANON Comparison to Measured CVS Growth*

In an effort to understand how comparable the tree growth on BLM stands was with the ORGANON model, the first step was to test actual tree growth with the projected growth from ORGANON. The Modeling Team did this by comparing projected tree growth on 2,609 CVS subplots with the actual growth recorded on those subplots, between their first and second measurements. The Modeling Team compared two metrics: stand basal area and volume (Scribner Mbf) per acre. On average, the model predicted 95 percent of the basal area actual growth, and 102 percent of the actual Mbf per acre. The results of the basal area projection reflect the ability of the model to predict tree mortality and diameter growth. The volume growth projection reflects mortality rates and growth in both height and diameter. The Modeling Team did not make any adjustments to the ORGANON model, as the Modeling Team considered these differences to be minor, and the time frames used to make the estimates fairly short.

### *Comparison of Stratified Inventory to Regional Permanent Plot Inventories*

The Modeling Team compared the net and gross total volume estimates from the stratified inventory data with the unbiased total inventory estimate from both the Forest Inventory and Analysis (FIA) plots and the CVS plots within that are located on BLM-administered lands within the planning area (**Table C-7**). The stratified total and net volume estimate, as represented by the No Timber Harvest modeling run (explained later in this appendix), was within one 95 percent confidence interval of both estimates, from both regional inventories.

**Table C-7.** Results from net inventory comparison (MMbf volume)

| Inventory Comparison | CVS Plot Calculations (MMbf) | FIA Plot Calculations (MMbf) | No Timber Harvest Run (MMbf) |
|---|---|---|---|
| Net volume 2013 | 76,766 | 79,100 | 73,961 |
| 95% CI Upper | 80,698 | 87,100 | |
| 95% CI Lower | 72,833 | 71,100 | |

CVS = Current Vegetation Survey
FIA = Forest Inventory and Analysis
MMbf = million board feet

# GIS – Defining the Land Base and Spatial Projections

## Introduction

The Modeling Team used the Geographic Information System (GIS) data to develop a set of polygons with unique identifiers (RMPWO_ID), which cover the BLM-administered lands in the planning area. The Modeling Team defined the attribute data for each these polygons as well as the land base for application of modeling rules for simulation of the Proposed RMP, and alternatives and sub-alternatives. The Modeling Team used GIS data for mapping the Woodstock projections' results of forest conditions over time. This section provides an overview of the GIS process and the data the Modeling Team used for analyzing the Proposed RMP and alternatives. The BLM recorded the details of the GIS processing and datasets with GIS metadata.

### *Defining BLM-administered Lands*

The Land Lines Information theme (LLI) is the BLM corporate GIS layer for land status – O&C lands, public domain, acquired, and Coos Bay Wagon Road lands. The FOI is the spatial vegetation layer used for the Woodstock modeling. The FOI and LLI themes are not vertically integrated in GIS, which results in slivering in the areas of misalignment. For analytical purposes, BLM-administered lands are defined by the area in which the FOI and LLI overlap. This FOI and LLI mask was subsequently used to minimize the slivers from all GIS layers used in the analysis.

### *Intersection vs. Majority Rules*

Where the subdivision of the FOI was important for simulating different modeling rules within each stand (e.g., the Riparian Reserve and roads), the BLM intersected the data layers in GIS to create unique areas. Some data layers came from external sources that were captured at coarser scales than the FOI mapping and do not align well with BLM checkerboard ownership (e.g., northern spotted owl critical habitat units). In these situations, the BLM performed a majority rules analysis, where 50 percent or more of the FOI unit would need to coincide with the data theme, such as critical habitat, to receive the designation. The

BLM applied this majority rules process to themes where spatial subdivision of FOI polygons was unnecessary and stand level designation was sufficient for the analysis.

### *Rasterizing and Unique ID Assignment*

To facilitate GIS processing, the BLM converted all vector GIS data layers to 10 × 10 m raster cells (1 cell = 0.025 acres – UTM zone 10, NAD83) and partitioned the data into tiles, which were based on 1:24,000 U.S. Geological Survey quadrangle grids (approximately 35,000 acres, 6 miles east/west by 8.5 miles north/south). Within each tile, the BLM intersected every unique combination of GIS data layers with the FOI. The BLM gave each resulting polygon a unique identifier (RMPWO_ID). The example in **Table C-8** illustrates one FOI unit (840369) being subdivided into four unique areas based on how the Riparian Reserve and roads intersected the forest stand. This GIS subdivision of the forest stands allows the Woodstock model to simulate how each portion of the stand would develop.

**Table C-8.** Example of one FOI unit subdivided into four unique areas

| RMPWO_ID | FOI # | GIS Acres | Riparian Reserve | Road Buffer | Description |
|---|---|---|---|---|---|
| 124000005 | 840369 | 28.84 | N | N | Outside Riparian Reserve; outside of road buffer |
| 124000008 | 840369 | 0.99 | N | Y | Outside Riparian Reserve; within road buffer |
| 124000004 | 840369 | 10.90 | Y | N | Inside Riparian Reserve; outside of road buffer |
| 124000013 | 840369 | 0.49 | Y | Y | Inside Riparian Reserve; within road buffer |

The unique ID (RMPWO_ID) carries through the Woodstock modeling projections for tracking each spatial entity. The Modeling Team stored the resultant information in 10 × 10 m pixels. The Modeling Team combined those pixels with the same information to form polygons. The Modeling Team returned Woodstock classification of allocations or projections of forest conditions to GIS as attributes with the unique IDs, which were linked back to the original grid to produce spatial products.

### *Data Vintage*

The Modeling Team captured a snapshot of the Forest Operations Inventory (FOI), land use allocation (LUA), Timber Production Capability Classification (TPCC), occupied marbled murrelet sites (OMMS), and the Land Lines Information (LLI) data for this analysis. Many data layers were 'frozen' at the beginning of the analysis in 2013. **Table C-9** displays the GIS data themes that the Modeling Team used in the analysis for the Proposed RMP. Those data layers that have been updated to reflect changed conditions since 2013 are displayed in italics.

**Table C-9.** GIS data themes used in the analysis for the Proposed RMP

| Source Data (Vector and Raster) | GIS Data Theme Description |
|---|---|
| pol_dob_a_v2_poly | BLM District |
| fst_foi_a_v3_poly | Forest Operation Inventory coincident with BLM ownership |
| trn_highways_aoi_a_v1_arc , trn_roads_aoi_a_v1_arc | Roads buffered 22.5 feet per side |
| hyd_waterbody_aoi_a_v1_poly , hyd_areas_aoi_a_v1_poly | Surface water (no buffers) |
| fst_tpc_a_v2_poly | No Timber Harvest-Harvest Land Base (N,X,Y) |
| fst_foi_a_v3_poly | Unique FOI identification |
| Microstorms (flat file) | Yield Strata identification |
| Microstorms (flat file) | Model Group by OI unit |
| Microstorms (flat file) | Species Group by OI unit |
| Microstorms (flat file) | Site Class by OI unit |
| Microstorms (flat file) | Ten-year Age Class by OI unit |
| Microstorms (flat file) | BLM District name by OI unit |
| Microstorms (flat file) | AgeInPeriods_TS (Starting Age by OI unit) |
| Microstorms (flat file) | Township/Range/Section by OI unit |
| Microstorms (flat file) | ORGANON variant by OI unit |
| lch_MoistDry_a_aoi_v2_poly | Moist/Dry by OI unit |
| fir_Predicted_FireSeverity_10m_a_v1_rst | Predicted fire severity decade 1, 2, 3, 4, 5 |
| fst_tpc_a_v2_poly | TPCC primary management |
| fst_tpc_a_v2_poly | TPCC primary class |
| hyd_wbd_hu10_a_v2_poly | HUC 10 watersheds |
| hyd_wbd_hu12_a_v2_poly | HUC 12 watersheds |
| smg_ond_a_v2_poly | Other national designations |
| trn_pacificcresttrail_a_v1_arc | Pacific Crest Trail (25 feet buffer per side) |
| lsc_provphys_a_v2_poly | Physiographic Provinces |
| smg_wilderness_a_v2_poly | Wilderness |
| smg_wsrcorr_a_v2_poly | Wild and Scenic River corridors, designated |
| pol_cob_a_v2_poly | County Name |
| smg_wsa_a_v1_poly | Wilderness Study Areas |
| *Rr_SR2* | *Inner, Middle, Outer Riparian Reserve SR2 (1, 2, 3)* |
| EML_ripres_dis | Eastside Riparian Reserve |
| RR_Lakwet | Riparian Reserve areas from lakes and wetlands |
| smg_WildernessCharacteristics_a_aoi_v1_poly | Wilderness Characteristics |
| smg_wsrcorr_a_v2_poly | Wild and Scenic River corridors, designated, type |
| pol_ownership_blm_aoi_a_v3_poly | Land Status (OC, PD, CBWR, AQ) |
| FLORA_CHUs | Flora Critical Habitat Areas |
| *Wld_FaunaCHUs_a_v2_polys* | *Fauna Critical Habitat Areas* |
| wld_mmz_5mi_a_v1_poly | Marbled Murrelet zones w/ 5-mile bands |
| GB_FLORA_SITES | Flora Survey and Manage species 2001 list, buffered |
| GB_FAUNA_SITES | Fauna species group report units |
| *lup_MAMU_predicted_SR2_a_v1_poly* | *Predicted Marbled Murrelet* |
| *lup_rtv_predicted_a_SR2_v1_poly* | *Predicted Red Tree Voles* |
| GB_FAUNA_SITES | Fauna special status T&E species, buffered |

| Source Data (Vector and Raster) | GIS Data Theme Description |
|---|---|
| lup_ueamgt_a_altc_v1_poly | Uneven-aged Management, Alt. C/D |
| MSTDRYVDRY | Moist/Dry/VeryDry |
| *wld_SR2_NSO_Large_Block_Reserves_poly* | *SR2 NSO large block reserves* |
| *lup_RA32_OldForest_a_SR2_v1_poly* | *RA32 old forest, SR2 version* |
| *smg_acec_aa_a_v1_poly* | *ACECs SR2, unique identifier per ACEC* |
| *Fir_2013_Fire_Severities_10m_a_v1_rst* | *Raster Fire Occurrence, 2013* |
| *SR3_RMAs_rst* | *Recreation Management Areas* |
| fst_swissneedlecast_a_v1_poly | Swiss Needle Cast |
| min_fragile_soils_a_v1_poly | Fragile soils action alternatives |
| atm_frost_prone_med_a_v1_poly | Frost prone areas |
| lup_Kfalls_EastsideLands_a_v1_poly | Eastside Management Lands |
| pol_rab_a_v3_poly | Resource Area Name and Code |
| lsc_NWFP_NSO_MRegions_aoi_a_v1_poly | Northern Spotted Owl Modeling Groups |
| *fir_2013_Fire_Severities_x_FOI* | *Moderate and Severe Fire Occurrence, 2013* |
| wld_marbledmurrelet_chu_a_2011_v1_poly | Marbled Murrelet critical habitat |
| wld_nsochu_a_2013_v1_poly | Northern Spotted Owl critical habitat |

Note: Italics indicate updated data layers.
FOI = Forest Operations Inventory
OI = operations inventory
TPCC = Timber Production Capability Classification
HUC = hydrologic unit code
SR = sensitivity run
OC = Oregon and California Railroad Act lands
PD = public domain lands
CBWR = Coos Bay Wagon Road lands
AQ = acquired lands
RA32 = Recovery Action 32 (northern spotted owl)

See the modeling rules section for further description of the GIS data themes used in the modeling.

## Moist vs. Dry Delineation of BLM-administered Lands in the Planning Area

### Moist vs. Dry Forests

The Modeling Team recognizes that forested lands fall within two broad categories—moist forests and dry forests—that are relevant to management decisions and analysis. The Modeling Team recognizes that the spectrum from moist to dry is more accurately described along a continuous gradient from moist to dry rather than a 'one or the other' binary classification. However, the Modeling Team has made these discrete classifications to facilitate specifying management objectives and direction based on mapped land use allocations. Recognizing and managing both moist and dry forests within the range of the northern spotted owl is a major underpinning in the Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011, pp. III-17 – III-41).

Moist forests are typically highly productive, often with deep, nutrient-rich soils, abundant precipitation, and relatively cool, temperate climates. Historically, these forests have experienced relatively infrequent, high- or mixed-severity fires. Moist forests are concentrated in the coastal/northern districts (the Coos Bay and Eugene Districts, the north half of the Roseburg District, and the Salem District). Moist forests also occur in the southern/interior districts (the Klamath Falls Field Office, the Medford District, and the southern half of the Roseburg District), but they are less abundant, often on northern aspects, in higher elevations, or in coastal influence zones.

Dry forests are typically lower productivity forests, occurring in warmer and drier environments, and often on shallower, nutrient-poor soils when compared to moist forests. Historically, these forests have experienced frequent, low- to mixed-severity fires. Dry forests are concentrated in southern/interior districts (the southern half of the Roseburg District, Medford District, and the Klamath Falls Field Office). Dry forests also occur in the coastal/northern districts, but they are less abundant, often on southern aspects, ridge tops, and low-elevation valley margins.

The distinction between moist forests and dry forests represents a complicated relationship between climate, species, topography, soils, and disturbance history. For this reason, a map based on any one of these factors would likely create an incorrect representation of the spatial arrangement of these forests. Fortunately, the BLM and the U.S. Forest Service has collected and compiled data on Plant Association Groups (PAG), which are also the product of climate, species, topography, soils, and disturbance history. Therefore, the Modeling Team can use PAG to determine whether a forest stand is moist or dry (Franklin *et al*. 2013, pp. 12–23). Trained professionals in the field can readily make Plant Association Group determinations, and large spatial mapping datasets are available for many parts of the planning area.

The following plant association series and groups are generally considered moist (Franklin and Johnson 2012): western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), western redcedar (*Thuja plicata*), Pacific silver fir (*Abies amabilis*), mountain hemlock (*Tsuga mertensiana*), subalpine fir-Engelmann spruce (*Abies lasiocarpa-Picea engelmanni*), moist grand fir (*Abies grandis*), and moist white fir (*Abies concolor*).

The following plant association series and groups are generally considered dry (Franklin and Johnson 2012): ponderosa pine (*Pinus ponderosa*), Oregon white oak (*Quercus garryana*), Douglas-fir (*Pseudotsuga menziesii*), Jeffrey pine (*Pinus jeffreyi*), dry grand fir (*Abies grandis*), and dry white fir (*Abies concolor*).

These very general categories provided the Modeling Team with a starting point for categorization of forested lands in the planning area. The Modeling Team produced a set of PAG moist/dry categorizations that were distributed to U.S. Forest Service regional ecologists and BLM experts for review. Based on this evaluation and review, the Modeling Team labeled each PAG in the planning area as either moist or dry.

The next challenge was to categorize forested stands in the decision area as either moist or dry. While PAG data is available for many regions, there is not a seamless coverage available for the entire decision area for this planning effort. However, the Integrated Landscape Assessment Project (ILAP) had derived a single, seamless coverage of Potential Vegetation Type (PVT) for the entire decision area. This PVT map consists of a raster grid to a 30-m pixel size derived from underlying PAG and necessary interpolation. The Modeling Team updated the southwest Oregon portion of the map to reflect the most up-to-date PAG information for the region. Then, the Modeling Team labeled each FOI unit (stand) in the database as either moist or dry based on the PVT map and a majority rules process. The Modeling Team labeled stands exactly split between moist and dry, an occurrence, which was very rare, as dry.

The Modeling Team sent these maps to BLM offices for review by experienced local experts. The BLM corrected mapping errors by location where the maps did not accurately reflect local knowledge of conditions on the ground. The accuracy of PVT for the Salem District was not satisfactory because they had very few dry forest acres. The Salem District BLM experts used a combination of biophysical setting data and local knowledge to select manually dry stands from their operational land base.

This mapping effectively produced a seamless, spatial moist/dry classification scheme for the entire decision area **(Table C-10)**. **Table C-11** is a representation of the final categories that the BLM offices selected, prior to area corrections being applied. Roseburg N refers to the Roseburg District outside of the Klamath East or Klamath West modeling region, while Roseburg S refers to the Roseburg District inside of those modeling regions. The Modeling Team customized these calls based on local knowledge and spatial coverage for each district by local BLM ecological vegetation experts. Very Dry forests are a subset of dry forests that the Modeling Team modeled as uneven-aged management where they reside in the Harvest Land Base in Alternatives C and D, and Sub-alternative C.

**Table C-10.** Moist vs. dry forested acres by district

| Forest Category | Coos Bay (Acres) | Eugene (Acres) | Klamath Falls (Acres) | Medford (Acres) | Roseburg (Acres) | Salem (Acres) | Totals (Acres) |
|---|---|---|---|---|---|---|---|
| Dry | 2,300 | 1,010 | 43,043 | 715,509 | 170,588 | 6,851 | **939,300** |
| Moist | 301,837 | 296,212 | 4,968 | 24,610 | 228,575 | 367,690 | **1,223,893** |
| **Totals** | **304,137** | **297,222** | **48,011** | **740,119** | **399,163** | **374,541** | **2,163,193** |

**Table C-11.** Moist/dry potential vegetation type categorization by district

| Plant Vegetation Type (PVT) | Coos Bay (Moist/Dry) | Eugene (Moist/Dry) | Klamath Falls (Moist/Dry) | Medford (Moist/Dry) | Roseburg N (Moist/Dry) | Roseburg S (Moist/Dry) | Salem (Moist/Dry) |
|---|---|---|---|---|---|---|---|
| Douglas-fir–Dry | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Douglas-fir–Moist | Moist | Dry | Dry | Dry | Dry | Dry | Moist |
| Douglas-fir–White oak | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Douglas-fir–Xeric | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Grand fir–Valley | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Grand fir–Warm/Dry | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Grand fir–Cool/Moist | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Mixed Conifer–Moist | Moist | Moist | Dry | Dry | Moist | Moist | Moist |
| Mixed Conifer–Dry | Moist | Dry | Very Dry | Very Dry | Dry | Dry | Moist |
| Mixed Conifer–Cold/Dry | Moist | Dry | Very Dry | Very Dry | Dry | Dry | Moist |
| Mixed Conifer–Dry (pumice soils) | Moist | Dry | Very Dry | Very Dry | Dry | Dry | Moist |
| Mountain hemlock–Cold/Dry | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Mountain hemlock–Cold/Dry (Coastal/W. Cascades) | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Mountain hemlock–Intermediate | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Mountain hemlock–Wet | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Oregon white oak | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Oregon white oak-Ponderosa pine | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Pacific silver fir–Intermediate | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Pacific silver fir–Warm | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Ponderosa pine–Dry | Moist | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Moist |
| Ponderosa pine–Xeric | Moist | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Moist |
| Shasta red fir–Dry | Moist | Moist | Moist | Moist | Moist | Moist | Moist |

| Plant Vegetation Type (PVT) | Coos Bay (Moist/Dry) | Eugene (Moist/Dry) | Klamath Falls (Moist/Dry) | Medford (Moist/Dry) | Roseburg N (Moist/Dry) | Roseburg S (Moist/Dry) | Salem (Moist/Dry) |
|---|---|---|---|---|---|---|---|
| Shasta red fir–Moist | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Sitka spruce | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Subalpine fir | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Subalpine fir–Cold/Dry | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Subalpine parkland | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Tan oak-Douglas-fir–Dry | Moist | Moist | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Tan oak-Douglas-fir–Moist | Moist | Moist | Moist | Moist | Dry | Dry | Moist |
| Tan oak–Moist | Moist | Moist | Moist | Moist | Dry | Dry | Moist |
| Western hemlock–Coastal | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western hemlock–Cold | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western hemlock–Hyperdry | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western hemlock–Intermediate | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western hemlock–Moist | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western hemlock–Moist (Coastal) | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western hemlock–Wet | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Western red cedar/Western hemlock–Moist | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| White fir–Cool | Moist | Moist | Very Dry | Very Dry | Moist | Moist | Moist |
| White fir–Intermediate | Moist | Moist | Dry | Dry | Dry | Dry | Moist |
| White fir–Moist | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| White fir–Warm Moist | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Lodgepole pine | Moist | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Moist |
| Ultramafic | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Moist |
| Other Non-forest | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Jeffrey Pine | Dry | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Dry |
| Lodgepole pine–Cold | Dry | Very Dry | Very Dry | Very Dry | Very Dry | Very Dry | Dry |
| Not Modeled | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Barren | Moist | Dry | Very Dry | Very Dry | Dry | Very Dry | Moist |
| Wetland | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Water or Ice | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Subalpine meadows-Green Fescue | Moist | Moist | Moist | | | | Moist |
| Bitterbrush–With Juniper | - | - | Very Dry | | | | - |
| Idaho fescue-Prairie junegrass | - | - | Very Dry | | | | - |
| Low Sage-Mesic–No juniper | - | - | Very Dry | | | | - |
| Low Sage-Mesic–With juniper | - | - | Very Dry | | | | - |
| Montane and canyon shrubland | - | - | Very Dry | | | | Dry |
| Mountain big sagebrush-With juniper | - | - | Very Dry | | | | - |
| Mountain Mahogany | - | - | Very Dry | | | | - |

| Plant Vegetation Type (PVT) | Coos Bay (Moist/Dry) | Eugene (Moist/Dry) | Klamath Falls (Moist/Dry) | Medford (Moist/Dry) | Roseburg N (Moist/Dry) | Roseburg S (Moist/Dry) | Salem (Moist/Dry) |
|---|---|---|---|---|---|---|---|
| Ponderosa Pine–Dry, with juniper | - | - | Very Dry | | | | - |
| Ponderosa pine-Lodgepole pine | - | - | Very Dry | | | | - |
| Salt desert shrub-lowland | - | - | Very Dry | | | | - |
| Western juniper woodland | - | - | Very Dry | | | | - |
| Wetland | Moist | Moist | Moist | Moist | Moist | Moist | Moist |
| Wyoming big sagebrush–No juniper | - | - | Very Dry | | | | - |
| Wyoming big sagebrush–With juniper | - | - | Very Dry | | | | - |

# Forest Growth and Yield Modeling

## Introduction

This section describes the silvicultural systems, practices, modeling tools, and modeling assumptions for forest growth simulations at the stand level. The purpose of simulating forest stand growth and development is to permit analysis of the effects of different silvicultural systems and silvicultural practices (e.g., on timber yield, stand structural class, wildlife habitat, hydrologic function, and carbon budgets). The Modeling Team used the simulated growth and yield output tables described in this section in the Woodstock model to help answer the analytical questions for different resources identified in this RMP for each of the alternatives and the Proposed RMP.

## Silvicultural Systems, Practices, and General Modeling Approaches

### *Silvicultural Systems and Associated Regeneration Harvest Types*

A silvicultural system is a planned series of treatments for tending, harvesting, and re-establishing a stand to meet specific management objectives (i.e., a set of treatments that could be repeated in perpetuity). The system name is commonly based on the number of age classes created within a stand (Tappeiner *et al.* 2007). The regeneration harvest method associated with a particular silvicultural system defined by age class has such a decisive influence on stand form and development that the harvest method name is also commonly applied to the silvicultural system (Smith 1962). For example, the terms uneven-aged and selection system are often used interchangeably to characterize the same silvicultural system.

Within a land use allocation being managed with a particular silvicultural system, the planned series of treatments are fine-tuned to meet the specific conditions and growth potential of individual stands or modeling group. These more specific combination and sequence of treatments is called a silvicultural prescription or management regime.

The Modeling Team used three recognized silvicultural systems in simulating forest stand development and timber harvest on lands identified as contributing to sustained-yield management. These are even-aged (clearcut and shelterwood), two-aged (variable retention), and uneven-aged (selection). Two-aged and uneven-aged systems are described collectively as multi-aged (O'Hara 2014). The systems analyzed for this analysis exhibit a gradient of timber harvest intensity (**Figure C-3**) and stand structural complexity (**Figure C-4**). The system used depends on the land use allocation's objectives of each alternative and the Proposed RMP (**Table C-12** and **Table C-13**).

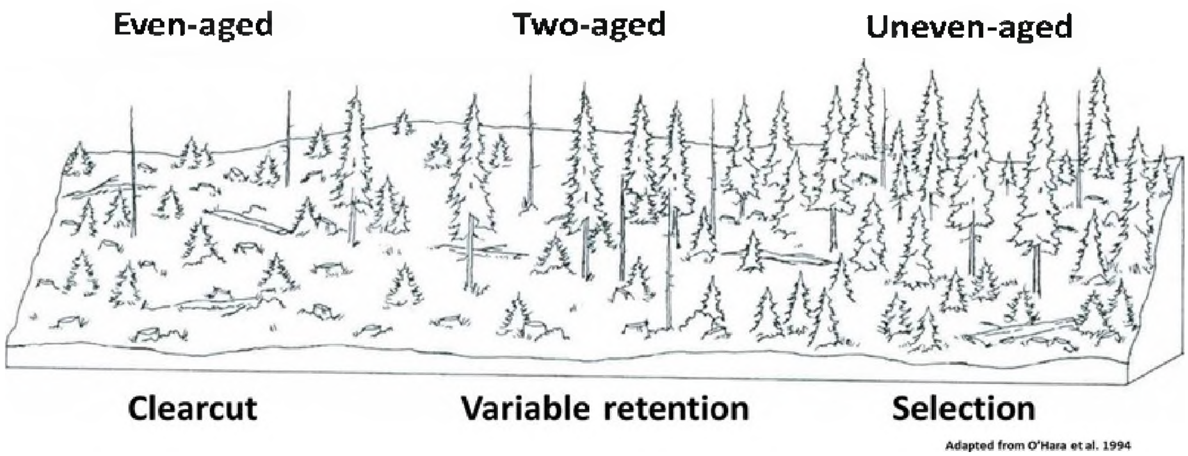


**Figure C-3.** Gradient of silvicultural systems and regeneration harvest methods

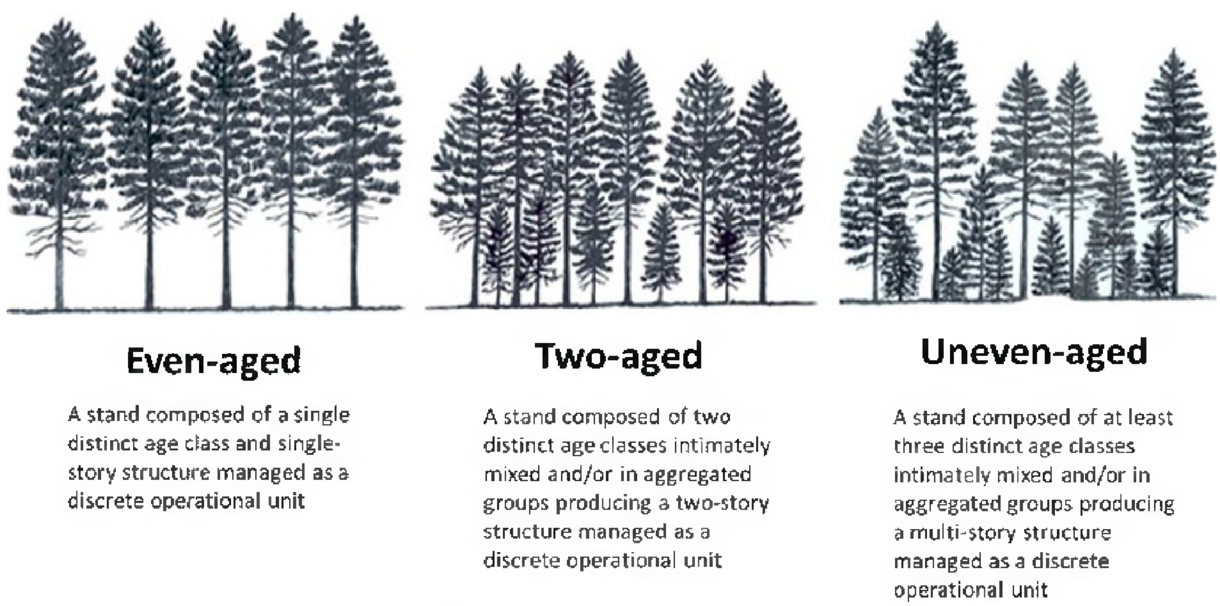


**Figure C-4.** Stand structural types produced by various silvicultural systems
Note: Figure adapted from USDA FS NCRS (no date).

**Table C-12.** Silvicultural systems/harvest method by land use allocation

| Land Use Allocation | LUA Abbreviation | No Action (Method) | Alt. A (Method) | Alt. B (Method) | Alt. C (Method) | Alt. D (Method) | PRMP (Method) |
|---|---|---|---|---|---|---|---|
| General Forest Management Area | GFMA | Two-aged | - | - | - | - | - |
| Adaptive Management Area* | AMA | Two-aged | - | - | - | - | - |
| Moderate Intensity Timber Area | MITA | - | - | Two-aged | - | Two-aged | Two-aged |
| Connectivity/Diversity Block | CONN | Two-aged | - | - | - | - | - |
| Low Intensity Timber Area | LITA | - | - | Two-aged | - | - | Two-aged |
| Southern General Forest Management Area | SGFMA | Two-aged | - | - | - | - | - |
| Uneven-aged Timber Area | UTA | - | Uneven-aged | Uneven-aged | Uneven-aged | Uneven-aged | Uneven-aged |
| Owl Habitat Timber Area | OHTA | - | - | - | - | Uneven-aged | - |
| High Intensity Timber Area | HITA | - | Even-aged | - | Even-aged | - | - |
| Late-Successional Reserve | LSR | Thinning | Thinning‡ | Thinning/ Uneven-aged§ | Thinning/ Uneven-aged§ | Thinning/ Uneven-aged§ | Thinning/ Uneven-aged§ |
| Adaptive Management Reserve† | AMR | Thinning | - | - | - | - | - |
| Riparian Reserve | RR | Thinning | Thinning‡ | Thinning | Thinning | Thinning | Thinning |

* Adaptive Management Area is represented by the General Forest Management Area in subsequent tables
† Adaptive Management Reserve is represented by the Late-Successional Reserve in subsequent tables
‡ No commercial harvest, cut trees are left on-site
§ Varies by moist forest (Thinning)–dry forest (Uneven-aged) classifications

**Table C-13.** Silvicultural systems selected modeling assumptions*

| Land Use Allocation | Regeneration Harvest Method† | Target Stand Structure Type | Alternative/ Proposed RMP | Primary Regeneration Method and Simulation Timing‡ | Pre-commercial Thinning Residual Density (Trees/Acre) | Genetic Improvement§ | Commercial Thinning | Fertilize |
|---|---|---|---|---|---|---|---|---|
| GFMA | VRH | Two-aged | No Action | Plant–15 | 200-260 | X | X | X |
| MITA | VRH | Two-aged | D | Plant–15 | 260 | X | X | X |
| MITA | VRH | Two-aged | PRMP | Plant–15 | 260 | X | X | X |
| MITA | VRH | Two-aged | B | Plant–30 | 260 | | | |
| CONN | VRH | Two-aged | No Action | Plant–15 | 150-220 | | X | |
| LITA | VRH | Two-aged | B | Natural–30 | 220 | | X | |
| LITA | VRH | Two-aged | B | Natural–30 | 100 | | | |
| LITA | VRH | Two-aged | B | None | 0 | | | |
| LITA | VRH | Two-aged | PRMP | Plant–15 | 260 | | X | |
| SGFMA | VRH | Two-aged | No Action | Plant–15 | 260 | | X | |
| UTA | Selection | Uneven-aged | A, B, C, D | Plant–15 | 260 | | X | |
| UTA | Selection | Uneven-aged | PRMP | Plant–15 | 260 | | X | |
| OHTA | Selection | Uneven-aged | D | Plant–15 | 260 | | X | |
| HITA | Clearcut | Even-aged | A, C | Plant–15 | 260 | X | X | X |
| LSR | *Variable by Alternative/Proposed RMP* | | | | | | | |
| RR | N/A | Multi-aged | All | Natural | 120 | | | |
| RR | N/A | Multi-aged | PRMP | Natural | 120 | | | |

* Actions that are applicable outside of fire scenario areas
† VRH = variable retention harvest
‡ 'Natural' indicates that no artificial regeneration (tree planting) is permitted; 'Plant' indicates a planting cost applies. The number following the primary regeneration method is the number of years post-harvest that a tree list representing 15-year-old trees is added to the growth simulation at a density reflecting post-pre-commercial thinning, or if less than 150 the assumed density reflecting stand density if below target density for that land use allocation.
§ Refer to use of genetically improved Douglas-fir seedlings for reforestation and use of growth modifiers in ORGANON simulations.

The even-aged system uses the clear-cutting or shelterwood harvest method to regenerate existing stands. Clear-cutting essentially removes all trees from an area in a single harvest operation (**Figure C-5**). Shelterwood harvest initially retains a number of 'shelter' trees to protect new tree regeneration by mitigation of detrimental on-site environmental conditions (e.g., heat or frost). Immediately post-harvest, a shelterwood has the appearance of a two-aged stand resulting from a variable retention harvest (**Figure C-3**). However, unlike the two-aged system, the shelter trees are only temporarily retained (approximately 10–20 years) and are harvested when they no longer required for protection of the new tree regeneration.

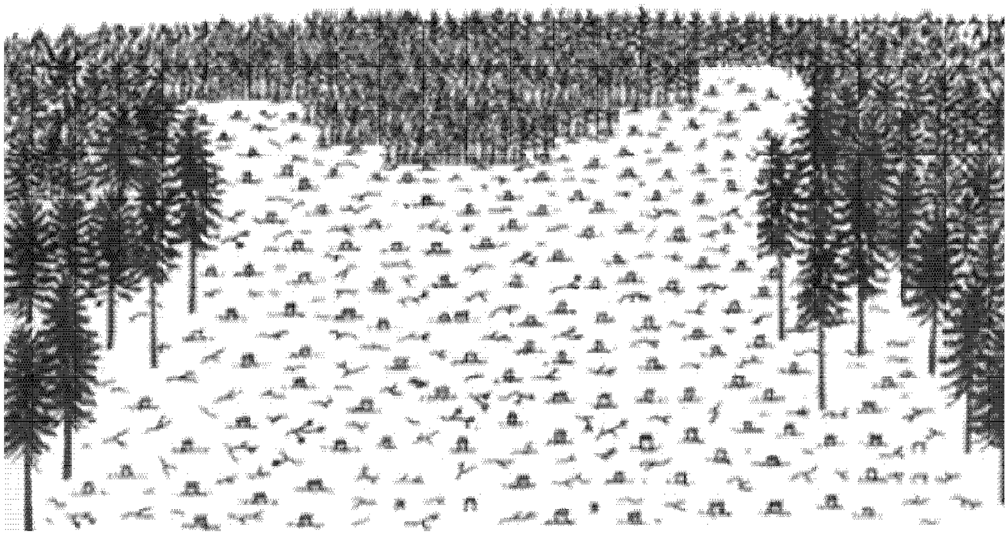

**Figure C-5.** Clearcut stand immediately post-harvest
Note: Figure adapted from USDA FS NCRS (no date).

The two-aged system uses a variable retention harvest method to achieve the goal of establishing new tree regeneration (**Figure C-3** and **Figure C-4**). At regeneration harvest, live trees are retained long-term (reserved from harvest) to facilitate the development of a two-aged stand structure. The retained trees may be left in a dispersed, aggregated, or mixed spatial pattern (**Figure C-6**). For modeling purposes, the Modeling Team assumed dispersed retention for variable retention harvests in the No Action alternative, Alternatives B and D, and the Proposed RMP.

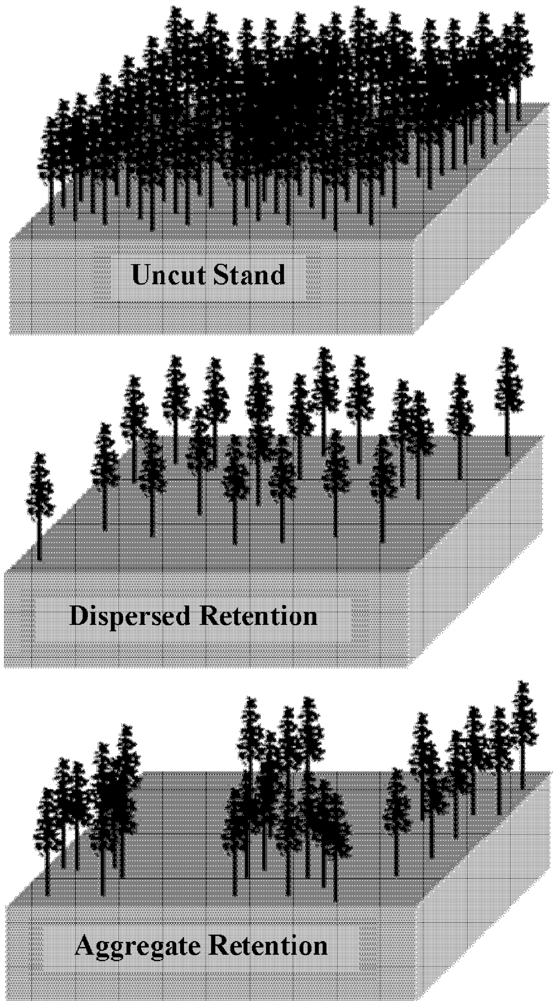


**Figure C-6.** Variable retention (regeneration) harvest-idealized retention patterns
Note: Figure adapted from USDA FS NCRS (no date).

The uneven-aged system uses selection harvests to establish new regeneration. Trees are harvested singly and/or in groups with the objective of creating an uneven-aged multi-story (canopy) stand structure (**Figure C-3**, **Figure C-4**, and **Figure C-7**). Classically defined uneven-aged management assumes that over time the entire area of the stand is harvested. A feature of the uneven-aged system in the action alternatives and the Proposed RMP is the long-term retention or reservation from harvest of a portion of each stand similar to retention concept of the two-aged system.

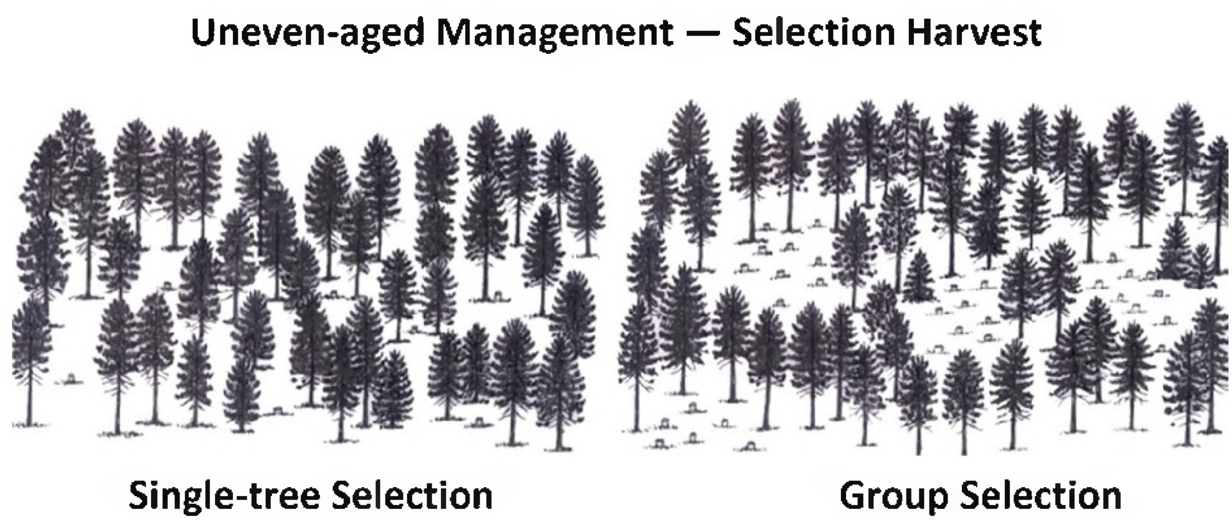


**Figure C-7.** Uneven-aged management/selection harvest – idealized harvest patterns
Note: Figure adapted from USDA FS NCRS (no date).

In addition to being used in simulating forest stand development and timber harvest on lands identified as contributing to sustained yield management, the Modeling Team modeled uneven-aged management in the 'dry forest' portions of the Late-Successional Reserve in the action alternatives and the Proposed RMP.

The Modeling Team modeled timber harvests on portions of land use allocations managed for emphases other than timber. For example, the Late-Successional Reserve would employ a harvest approach commonly referred to as variable-density thinning (Harrington *et al*. 2005). Variable-density thinning employs elements of commercial thinning and selection harvest of the uneven-aged system to promote stand heterogeneity through the development of a multi-story stand. Provision of conditions conducive to the initiation and growth of regeneration is an objective of variable-density thinning to encourage understory development to contribute to stand heterogeneity. Variable-density thinning in the context of the analyzed alternatives and the Proposed RMP is not a silvicultural system as such, since silvicultural treatments are assumed to end by a specified stand age (i.e., there is no assumption of a repeatable cycle of treatments in perpetuity). The Modeling Team modeled variable-density thinning as a series of proportional commercial thinnings with simulated tree regeneration following the thinning harvests in the Riparian Reserve in all alternatives and the Proposed RMP, Late-Successional Reserve in the No Action alternative, and 'moist forest' areas in the Late-Successional Reserve in the action alternatives and the Proposed RMP.

## Silvicultural Practices and Modeling Assumptions

For each modeling group, the Modeling Team may plan a variety of practices in addition to harvesting for specific periods in the life of the stand. These practices act to keep forest stands on desired developmental trajectories. The type and timing sequence of those practices vary by the current and the desired future condition of the stand or modeling stratum.

The other major silvicultural practices besides regeneration harvesting that affect forest stand growth, value and structure are site preparation, regeneration (reforestation), stand maintenance and protection, pre-commercial thinning, commercial thinning, fertilization, and pruning. The Modeling Team derived estimates of the proportion of future treatment needs from historical experience in individual BLM offices and the specifics of the Proposed RMP and various alternatives.

Of these practices, the Modeling Team simulated regeneration harvest, regeneration, pre-commercial thinning, commercial thinning, and fertilization implementation in the growth and yield projections.

## Site Preparation

The BLM conducts site preparation to prepare newly harvested or inadequately stocked areas for tree planting, artificial seeding, or natural regeneration. Objectives of site preparation are to provide physical access to planting sites, fuels management, influence the plant community that redevelops on the site, and influence or control animal populations. The types of site preparation techniques are prescribed burning, mechanical, and manual methods.

## Regeneration (Reforestation)

Following a regeneration harvest or wildfire, the BLM establishes tree regeneration by artificial and natural regeneration. Artificial regeneration includes tree planting or seeding (or a combination of both). Natural regeneration is obtained from natural seed fall from adjacent forest stands of seed-bearing age or retention trees reserved at the time of timber harvest. Where available, the BLM may emphasize the planting of genetically improved seedlings for even-aged and two-aged systems with low levels of green-tree retention. Genetic improvements include increased growth (e.g., Douglas-fir and western hemlock) or disease resistance (e.g., sugar pine, western white pine, and Port-Orford-cedar). The BLM would plant trees outside of the Harvest Land Base to supplement, or in lieu of natural regeneration to enhance development of complex stand structure.

The Modeling Team based tree lists representing the tree regeneration component of future stands following a major stand disturbing event, such as a timber harvest or wildfire on an analysis done for the 2008 FEIS of the Current Vegetation Survey (CVS) plots in the then 5- to 20-year-old age classes (USDI BLM 2008). The Modeling Team stratified plots by species group and site class where possible. The Modeling Team assumed that future young reforested stand species composition would be similar to that of current young stands.

The ORGANON model lacks a 'regeneration component' to generate small seedlings (< 4.5 feet tall) that simulates a reforestation action. However, an 'ingrowth' function in the model permits the insertion of a regeneration tree list into a simulation when trees are larger than the minimum. For modeling purposes, the Modeling Team developed tree lists of species mix and size range appropriate to the various modeling groups from the database described above for the 2008 FEIS. The Modeling Team considers that these same lists are still appropriate for use in this analysis. The Modeling Team simulated a reforestation event by adding the regeneration tree lists with an YTGTools procedure, 15–35 years after a regeneration harvest or wildfire in the modeling sequence. The wide range in timing reflects varying assumptions of the Proposed RMP and alternatives on the level of residual live overstory trees present following harvest or wildfire, site productivity differences, lag time for natural regeneration, administrative delays in salvage harvest situations, and intensity of stand maintenance actions.

Regeneration for the Low Intensity Timber Area and the Moderate Intensity Timber Area of Alternative B were special cases. Management direction for the Low Intensity Timber Area would allow only natural regeneration for reforestation purposes. Management direction for the Moderate Intensity Timber Area would require delayed reforestation to maintain open stand conditions (≤ 30 percent tree canopy cover) for thirty years after a regeneration harvest. The Modeling Team could not readily develop assumptions on reforestation success using natural regeneration from existing BLM data, so the Modeling Team used regionwide data instead.

Reliance on natural regeneration following regeneration harvests on BLM-administered lands in western Oregon was common until about 1960. Around 1960, the BLM shifted to a paradigm of prompt reforestation by artificial seeding and tree planting. The BLM reforestation records from the earlier era of natural regeneration emphasis are spotty. However, pre-1960 regional studies and reports are available for approximating potential levels of natural regeneration success. Data in the pre-1960 literature on post-harvest natural regeneration (Isaac 1943, Lavender *et al.* 1956, USDA FS 1958) characterizes reforestation success in categories, which correspond closely to BLM stocking groupings of target (260 trees per acre), minimum/understocked (100 trees per acre), and non-stocked (0 trees per acre). The Modeling Team assumed that reforestation outcomes in the Low Intensity Timber Area in Alternative B would approximate proportions of 60 percent of harvested acres would achieve target stocking, 30 percent minimum/understocked, and 10 percent non-stocked. After regeneration harvest, the Modeling Team apportioned acres harvested as stated above and simulated further stand development. The Modeling Team doubled the lag time before inserting a regeneration tree list into the ORGANON growth simulations for natural regeneration, compared to prompt planting. This doubled lag time represented an extended seed-in period.

In the Moderate Intensity Timber Area in Alternative B, the Modeling Team assumed target stocking levels for all acres harvested but doubled the lag time before inserting a regeneration tree list in the growth simulations.

Newer literature on natural regeneration following wildfire was considered for evaluating reforestation success, but was rejected for this analysis. The reason is that un-salvaged wildfire stands, by virtue of fire effects and the generally high number of residual dead standing trees, create different microclimate conditions for natural regeneration than a harvested area.

## Stand Maintenance and Protection

The BLM conducts stand maintenance and protection treatments after planting or seeding to promote the survival and establishment of trees and other vegetation by reducing competition from undesired plant species. Maintenance and protection techniques include mulching, cutting, or pulling of unwanted vegetation species, placing plastic tubes or netting over seedlings to protect from animal damage, and animal trapping.

The effects of past maintenance and protection treatments are reflected in the current condition of existing young forest stands. The Modeling Team assumed in the simulation of future regenerated stands that the same types and level of treatments would occur as in the current young existing stands that were used to derive the initial regeneration tree lists. Herbicides for stand maintenance were not available to the BLM during the time in which the current young stands developed, and the Modeling Team did not model herbicide use for stand maintenance in the Proposed RMP or any of the action alternatives. Therefore, the initial conditions of the future tree lists derived from current stands attributes should exhibit the effects of non-herbicide stand maintenance treatment methods only.

## Pre-commercial Thinning

The BLM conducts pre-commercial thinning to reduce the densities of tree and shrubs, manipulate species composition, and promote dominance and growth of selected species. The BLM usually implements treatments during the mid-range of the stand establishment structural stage. For modeling purposes, the Modeling Team assumed pre-commercial thinning would occur at the time a regeneration tree list is inserted into the ORGANON simulation. Pre-commercial thinning enhances the growth and vigor of the residual trees by reducing inter-tree and shrub competition. The average number of trees remaining following treatment can vary by land use allocation and modeling group.

## Commercial Thinning

Commercial thinnings are intermediate harvests implemented to recover anticipated mortality, control stand density for maintenance of stand vigor, provide revenue, and to alter or maintain stands on developmental paths so that desired stand characteristics result in the future. The BLM schedules commercial thinnings when stands reach a combination of relative density stem diameter and timber volume to permit an economical harvest entry.

The Modeling Team used the same basic silvicultural prescriptions developed for the 2008 FEIS for all silvicultural systems (USDI BLM 2008). The BLM formulated these prescriptions from iterative ORGANON simulations with four evaluation criteria:

1. Stand relative density (Curtis 1982)
2. Attainment of minimum average stand diameter
3. Minimum harvest volumes
4. Residual canopy cover (Late-Successional Reserve and Riparian Reserve only)

The Modeling Team based relative density (RD) thresholds on published recommendations, including Curtis and Marshall (1986), Hayes *et al.* (1997), Chan *et al.* (2006), and professional judgment. The Modeling Team scheduled thinning when relative density met or exceeded a minimum of 45–55, depending on the land use allocation objectives.

The Modeling Team based minimum diameter and volume thresholds for economically viable thinning sales on historical BLM timber sales experience. The Modeling Team assumed the minimum diameter to be 12”, measured at breast height, and minimum volume thresholds of 8,000 board feet per acre on the Coos Bay, Eugene, Roseburg, and Salem Districts, and 5,000 board feet per acre on the Klamath Falls Field Office and the Medford District.

Relative density rules can vary by land use allocation within alternatives and the Proposed RMP. For example, the Modeling Team modeled commercial thinning prescriptions for land use allocations with higher timber production emphasis goals—Northern General Forest Management Area (No Action alternative), High Intensity Timber Area (Alternatives A and C), and Moderate Intensity Timber Area (Alternatives B and D and the Proposed RMP)—to maintain relative densities between approximately 35 and 55. The Modeling Team designed the timing and degree of the final thinning so that relative density would recover to a minimum of 55 at the long-term rotation age. The Modeling Team modeled thinnings for late-successional habitat development objectives within a lower range of relative density thresholds of 25–50 RD.

Commercial thinnings promote the establishment of conifer regeneration in the understory of thinned stands (Bailey and Tappeiner 1998). The Modeling Team simulated the recruitment of this regeneration in the growth simulations to reflect expected stand dynamics following commercial thinning harvests. The ORGANON growth and yield model (Hann 2011) uses ‘diameters at breast height’, which is the tree’s diameter at 4.5 feet from the ground, to measure and calculate tree growth. As such, ORGANON does not recognize trees with heights less than 4.5 feet as part of forest stand calculations. Therefore, the Modeling Team developed regeneration tree lists using existing CVS data and growth relationships from current published and unpublished studies. The Modeling Team added regeneration trees to ORGANON simulations 20–25 years after any commercial thinning. The time lag represents the estimated time for all trees in the regeneration tree list to reach a minimum height of at least 4.5 feet where then they are recognized by ORGANON.

## Fertilization

Stand growth in western Oregon is often limited by the supply of available nutrients, particularly nitrogen. The supply of soil nutrients can be augmented through fertilization (Miller *et al.* 1988). The Modeling Team modeled fertilization assuming the application of 200 pounds of fertilizer in the form of urea-based prill (46 percent available nitrogen). Occasionally, fertilizer may be applied in a liquid urea-ammonia form or with a mixture of other nutrient elements in addition to nitrogen. The Modeling Team simulated fertilization in the Harvest Land Base after a thinning action in stands that would be managed with even-aged or two-aged with low green tree retention, contain 80 percent or more Douglas-fir by basal area, and have a total stand age ≤ 70 years old.

## Pruning

The objectives for pruning are the improvement of wood quality, disease mitigation (e.g., white pine blister rust), and fuels management. Pruning for wood quality usually removes the live and dead limbs on selected trees up to height of about 18 feet. The BLM generally implements pruning treatments as a two-phase process or 'lifts' between stand ages of approximately 15–40 years old. Timing varies by site productivity (i.e., treatments occur earlier on stands of higher site productivity). Removal of up to one-third to one-half of the live tree crown at each lift would not substantially affect diameter growth at breast height or height growth (Staebler 1963, Stein 1955, BCMOF 1995). Because the BLM would typically implement pruning treatments within this range and therefore would not have a substantial effect on tree growth, the Modeling Team did not simulate pruning in ORGANON.

# Stand Modeling Process

The prediction of forest stand development requires the projection of growth of BLM's existing forest stand types into the future, with and without further silvicultural treatments, and the simulation of stands, which represent future stands (i.e., new stands created following future timber harvest or natural disturbance). Depending on the management direction of the alternatives and Proposed RMP, both existing and future stands may be subject to different intensities of silvicultural treatments. The Modeling Team used two linked computer models, ORGANON and YTGTools, to project the growth and development of forest stands under various silvicultural systems.

## ORGANON Model Description

ORGANON is an individual-tree, distance-independent model developed by Oregon State University from data collected in western Oregon forest stands (Hann 2011). The architecture of the model makes it applicable for simulations of traditional and non-traditional silviculture (Hann 1998). Three variants of ORGANON are available for use in western Oregon. The Modeling Team used the northwest Oregon variant (NWO-ORGANON) to project the growth of forest stands located on the Coos Bay, Eugene, Roseburg (partial), and Salem Districts. The basic data underpinning of this variant of the model is from predominantly conifer forest stands with ages ranging from about 10–120 years old breast height age (Hann 2011). The Modeling Team used the southwest Oregon variant (SWO-ORGANON) to project forest stand growth on the Medford and Roseburg (partial) Districts, and the Lakeview District's Klamath Falls Field Office. The original basic data underpinning this variant of the model is from mixed-conifer forest stands with ages of the dominant trees ranging from about 13–138 years old breast height age (Ritchie and Hann 1985). Subsequently, additional new data has extended the applicability of the model to stands with older trees, higher proportions of hardwoods, and more complex spatial structure (Hann and Hanus 2001).

Simulations of the silvicultural prescriptions used in the alternatives and Proposed RMP extend beyond the ORGANON model's range of data for both variants. However, the timing of harvests and other silvicultural treatments generally occur within the range of the model's validated height growth projection and volume prediction capabilities. Height growth is the primary driving function in ORGANON (Ritchie 1999). Hann (1998) found that the SWO-ORGANON height growth equations can be extended to up to 245 years without loss of accuracy or precision.

The standard ORGANON configuration is not conducive to the efficient processing of large numbers of individual tree lists representing forest stands within a stratum. It is not configured to merge multiple simulation results to into average timber yield functions. In addition, the standard model does not produce specific stand structural characteristics that have utility for effects analysis on resources other than timber production, or for the incorporation of factors to simulate growth improvement of trees due to genetic improvement programs. To overcome these shortcomings, the Modeling Team linked ORGANON with the YTGTools computer program.

### YTGTools

YTG Tools is a proprietary computer software program designed to create and analyze yield tables in conjunction with a growth and yield simulation model that flow into the Woodstock harvest scheduling model. MBG designed YTGTools to automate the process of simulating large amounts of management regime projections for many stand conditions and to facilitate analyzing and reporting attributes of the resulting yield tables. The Modeling Team used YTGTools in conjunction with a growth and yield model to project future timber yields and stand attributes under the various management regimes applied to different forest inventory strata (Mason, Bruce & Girard, Inc. 2006).

### Existing Stands Modeling Description

The land base consists of existing forest stands that are the result of past harvests and natural disturbances, of various ages, structures, past management histories and potential for forest management. The Modeling Team stratified tree lists from CVS inventory subplots into modeling groups as described previously in this appendix. Using ORGANON and YTGTools, the Modeling Team used these modeling groups for depicting current stand condition and simulating future development with and without future silvicultural treatments. The Modeling Team applied the same base silvicultural prescription to each subplot within a modeling group.

### Future Stands Modeling Description

The Modeling Team developed modeling groups and tree lists for forest stand types or silvicultural prescriptions for which little or no specific CVS data existed using tree lists developed for the 2008 FEIS (USDI BLM 2008). Stand projections of 'future' stands formed the basis for initiating new stands following regeneration harvests in all alternatives and the Proposed RMP. The future stands category includes 'existing' stand types created because of regeneration harvest prescriptions with green-tree retention under the current RMPs, which is due to the low number of CVS subplots representing this condition. The Modeling Team applied the same base silvicultural prescription to strata average stand tables within a modeling group.

### Special Case – Swiss Needle Cast Zone (Salem District)

For all alternatives and the Proposed RMP, the Modeling Team developed a special subset of yield tables for modeling future stands within geographic areas currently identified with a high incidence of Swiss needle cast disease on the Salem District. The Modeling Team based future tree list species composition in the Swiss needle cast zone on an assumption of higher proportions of disease-resistant species (e.g., cedar and hemlock) being used for the reforestation of future harvested areas.

### Special Case – Wildfire Modeling (All Districts)

For all alternatives and the Proposed RMP, the Modeling Team simulated future wildfire occurrence and severity (**Appendix D**). For growth and yield projections, the Modeling Team modeled two fire severity regimes – high and moderate. The Modeling Team did not model a low-severity regime, because the stand disturbance would not affect stand structural development enough to merit separate modeling. The Modeling Team assumed 90 percent tree mortality in the high-severity fire regime and 50 percent tree mortality in the moderate-severity fire regime. The Modeling Team modeled salvage of live and dead trees following both high-severity and moderate-severity fires in those alternatives and the Proposed RMP that would allow salvage, subject to management direction for green-tree, snag, and down wood retention.

The Modeling Team simulated four different conditions associated with wildfire. These include: (1) high-intensity fire with salvage, (2) high-intensity fire without salvage, (3) moderate-intensity fire with salvage, and (4) moderate-intensity fire without salvage. In an effort to reduce the unwieldy number of yield tables in the Woodstock growth model, the Modeling Team used the existing two-aged overstory tree lists in modeling for land use allocations with green-tree retention requirements in conjunction with their corresponding regeneration tree list. The Modeling Team modeled salvaged stands in the High Intensity Timber Area as clearcut harvests. The Modeling Team modeled stands that would experience moderate-intensity fire but would not be salvaged as thinning harvests and assumed tree regeneration ingrowth similar to that described under the commercial thinning section.

### Types of Growth and Yield Tables

The ORGANON simulations produced two types of tables or curves for further use by the Woodstock model – simple and composite tables.

### Simple Growth and Yield Tables

Simple tables are produced from simulations representing a single sequence of silvicultural actions applied to an entire forest stand within a land use allocation. In other words, the entire area of the stand receives the same prescribed treatment at the same time. Simple tables were produced for all land use allocations with the exception of those where an uneven-aged management system was used.

### Composite Growth and Yield Tables

Uneven-aged management treatments required the construction of composite growth and yield tables. Simulating uneven-aged management requires subdividing the stand into four or five separate components, depending on the land use allocation. The Modeling Team simulated growths in each of these stand components separately in ORGANON. The components have the same starting condition, but diverge over time due to the difference in the timing of harvest treatments applied to each one independently. The Modeling Team created two separate varieties of uneven-aged management.

The first variety of uneven-aged management emphasizes the development of fire-resilient stand structures over time. The Modeling Team simulated this variety in the Uneven-aged Timber Area land use allocation. For modeling purposes, the Modeling Team divided stands into four separate components. The Modeling Team modeled three stand components, each comprising 30 percent of the stand area, to be available for harvest at repeating intervals. The Modeling Team modeled a fourth stand component, comprising 10 percent of the stand area, which would be reserved from future treatments.

The second variety of uneven-aged management primarily emphasizes the development and maintenance of northern spotted owl habitat. The Modeling Team simulated this variety in the Owl Habitat Timber Area and Late-Successional Reserve–Dry land use allocations. For modeling purposes, the Modeling Team divided stands into five separate components. The Modeling Team modeled four stand components, each comprising 15 percent of the stand area, to be available for harvest at repeating intervals. The Modeling Team modeled a fifth stand component, comprising 40 percent of the stand area, which would be reserved from future treatments.

The Modeling Team modeled the application of a combination of group selection (patch cut) harvests and thinning to various stand components at intervals of 40–50 years, depending on site productivity.

The Modeling Team created composite uneven-aged stand tables by combining the source stand tables in the proportions appropriate for each individual component's simulation. The Modeling Team created a single composite stand table with YTGTools that describes an 'average' condition across the stand. For some table attributes, such as trees per acre and timber volume, the combined data equals the weighted average of the components. Other outputs, such as canopy layers and conifer canopy cover, are a function of some stand parameters, and the calculation for the combined table does not equal the weighted average of the components.

Within both varieties of uneven-aged management, there are two kinds of silvicultural pathways. All eligible strata have a silvicultural prescription that begins with a group selection harvest if the initial relative density is too low to trigger a commercial thinning or the stand exceeds 80–90 years old. Strata less than 80–90 years old have a regime that starts with a commercial thinning if the initial relative density is high enough to trigger a thinning treatment and then is followed by group selection harvests. **Table C-14** shows stand component allocations for each land use allocation.

**Table C-14.** Uneven-aged management modeling strategies by land use allocation

| Stand Component Number | Owl Habitat Timber Area* | | | Uneven-aged Timber Area | | |
|---|---|---|---|---|---|---|
| | Percent of Stand | Option A | Option B | Percent of Stand | Option A | Option B |
| 1 | 40% | Grow only | Grow only | 10% | Grow only | Grow only |
| 2 | 15% | 1st GS | CT then 1st GS | 30% | 1st GS | CT then 1st GS |
| 3 | 15% | 2nd GS | CT then 2nd GS | 30% | 2nd GS | CT then 2nd GS |
| 4 | 15% | 3rd GS | CT then 3rd GS | 30% | 3rd GS | CT then 3rd GS |
| 5 | 15% | 4th GS | CT then 4th GS | N/A | N/A | N/A |

* Also Late-Successional Reserve – Dry
GS = Group selection (patch cut) harvest
CT = Commercial thinning harvest

## Growth and Yield Adjustments

The Modeling Team adjusted ORGANON projections of timber yields to account for the effects of genetic tree improvement and Swiss needle cast disease through direct inputs of growth modifiers to the ORGANON model. The Modeling Team accounted for other factors that could substantially affect recoverable commodity volumes as a percent reduction in volume. The Modeling Team applied reduction factors in the YTGTools program for timber defect and breakage, endemic insects and disease, soil compaction, future snag creation, future coarse woody debris creation, and green tree retention.

## Tree Improvement (Genetics)

The BLM has selected Douglas-fir and western hemlock for genetically controlled characteristics such as high growth rates and tree form. The BLM, in cooperation with other landowners, has established field test sites using progeny from the selected trees. The BLM has established seed orchards to produce locally adapted seed from these selected trees for reforestation. The Modeling Team accounted for the increase in growth and yield from the planting of genetically improved Douglas-fir seedlings by the use of the regeneration tree lists and ORGANON growth modifiers of seven percent for height growth and eight percent for diameter growth. The Modeling Team used the tree lists to simulate tree planting following a regeneration harvest. After insertion of a tree list into a growth simulation, the growth modifiers act to increase the growth of Douglas-fir trees in the tree list (USDI BLM 2008). The Modeling Team applied these growth modifiers only to Douglas-fir trees within the General Forest Management Area (No Action alternative), High Intensity Timber Area (Alternatives A and C), and the Moderate Intensity Timber Area (Alternatives B and D, and the Proposed RMP).

## Defect and Breakage

A proportion of harvested trees can contain defects, which reduce their utility from a commodity standpoint. In addition, damage can occur during harvesting that reduces recoverable timber volume. The proportion of volume that is not recoverable for commodity use increases with stand age. The Modeling Team reduced ORGANON-generated timber volumes by district-specific factors derived from historical timber sale cruise and scale data. **Table C-15** shows the district-specific deductions for defect and breakage applicable to all alternatives and the Proposed RMP.

**Table C-15.** Timber yield deductions due to defect and breakage by harvest stand age

| Stand Age (Years) | Coos Bay Timber Yield Deduction (Percent) | Eugene Timber Yield Deduction (Percent) | Klamath Falls Timber Yield Deduction (Percent) | Medford Timber Yield Deduction (Percent) | Roseburg Timber Yield Deduction (Percent) | Salem Timber Yield Deduction (Percent) |
|---|---|---|---|---|---|---|
| 30 | 3% | - | - | - | 5% | 4% |
| 40 | 3% | 5% | 1% | 1% | 5% | 5% |
| 50 | 4% | 5% | 2% | 2% | 5% | 5% |
| 60 | 4% | 5% | 2% | 2% | 5% | 5% |
| 70 | 4% | 6% | 3% | 3% | 5% | 6% |
| 80 | 5% | 6% | 4% | 4% | 5% | 6% |
| 90 | 5% | 7% | 5% | 5% | 5% | 7% |
| 100 | 6% | 8% | 6% | 6% | 6% | 8% |
| 110 | 6% | 9% | 7% | 7% | 7% | 9% |
| 120 | 7% | 10% | 8% | 8% | 8% | 10% |
| 130 | 7% | 11% | 9% | 9% | 9% | 11% |
| 140 | 7% | 12% | 9% | 9% | 9% | 12% |
| 150 | 8% | 13% | 9% | 9% | 9% | 13% |
| 160 | 9% | 14% | 10% | 10% | 10% | 14% |
| 170 | 9% | 15% | 11% | 11% | 11% | 15% |
| 180 | 10% | 16% | 12% | 12% | 12% | 16% |
| 190 | 12% | 17% | 13% | 13% | 13% | 17% |
| >200 | 17% | 23% | 20% | 20% | 20% | 23% |

### Soil Compaction

The Modeling Team calculated district-specific deductions to timber yield from soil compaction based on assumptions of the proportion of harvest types and associated forested area lost to new road construction. The Modeling Team modeled the same percentage deductions in all alternatives and the Proposed RMP. **Table C-16** shows the assumed proportion of harvest types and soils deduction by district.

**Table C-16.** Timber yield deductions due to soil compaction

| District/ Field Office | Proportion of Timber Harvest Yarding System Types | | Total Timber Yield Deduction (Percent) |
|---|---|---|---|
| | Cable and Helicopter (Percent) | Ground-based (Percent) | |
| Coos Bay | 95% | 5% | 1% |
| Eugene | 94% | 6% | 2% |
| Klamath Falls | 6% | 94% | 9% |
| Medford | 81% | 19% | 4% |
| Roseburg | 82% | 18% | 3% |
| Salem | 69% | 31% | 4% |

### Snag Retention

The Modeling Team modeled the yield impact of retaining varying amount of green trees for the creation of future snags by applying a percent volume reduction to meet the minimum snag requirements at the time of harvest. Retention requirements vary by alternative and the Proposed RMP, land use allocation, and district or field office. Error! Reference source not found. shows the deductions applied to the action lternatives and Proposed RMP. The Modeling Team based the reduction per retained tree on analysis for the 2008 FEIS for the action alternatives and the Proposed RMP (USDI BLM 2008). The Modeling Team assumed a reduction for snags in the No Action alternative of one and one-half percent of the regeneration harvest volume for all districts.

**Table C-17.** Timber yield deductions due to snag retention by land use allocation

| Alternative/PRMP | Land Use Allocation | Coos Bay Timber Yield Deduction (Percent) | Eugene Timber Yield Deduction (Percent) | Klamath Falls Timber Yield Deduction (Percent) | Medford Timber Yield Deduction (Percent) | Roseburg Timber Yield Deduction (Percent) | Salem Timber Yield Deduction (Percent) |
|---|---|---|---|---|---|---|---|
| Alt. A | Uneven-aged Timber Area | 2% | 2% | 2% | 2% | 2% | 2% |
| | High Intensity Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | 2% | 2% | 2% | 2% | 2% | 2% |
| | Riparian Reserve | 2% | 2% | 2% | 2% | 2% | 2% |
| Alt. B | Moderate Intensity Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Low Intensity Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Uneven-aged Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Late-Successional Reserve | 10% | 12% | 7% | 2% | 10% | 11% |
| | Riparian Reserve | 10% | 12% | 7% | 2% | 10% | 11% |
| Alt. C | Uneven-aged Timber Area | 2% | 2% | 2% | 2% | 2% | 2% |
| | High Intensity Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | 2% | 2% | 2% | 2% | 2% | 2% |
| | Riparian Reserve | 2% | 2% | 2% | 2% | 2% | 2% |
| Alt. D | Moderate Intensity Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Uneven-aged Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Owl Habitat Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Late-Successional Reserve | 10% | 12% | 7% | 2% | 10% | 11% |
| | Riparian Reserve | 10% | 12% | 7% | 2% | 10% | 11% |
| PRMP | Moderate Intensity Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Low Intensity Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Uneven-aged Timber Area | 2% | 3% | 2% | - | 3% | 2% |
| | Late-Successional Reserve | 10% | 12% | 7% | 2% | 10% | 11% |
| | Riparian Reserve | 10% | 12% | 7% | 2% | 10% | 11% |

## Down Woody Material Retention

The Modeling Team modeled the yield deductions of retaining varying amounts for future down woody material as a percent volume reduction at the time of harvest. Retention requirements vary by alternative and the Proposed RMP, land use allocation, and district or field office.

**Table C-18** shows the deductions applied to the action alternatives and the Proposed RMP. The Modeling Team based reduction per retained tree on analysis for the 2008 FEIS for the action alternatives and Proposed RMP (USDI BLM 2008). The Modeling Team assumed a down woody material deduction for the No Action alternative as a flat 300 cubic feet per acre for the Coos Bay District, the Klamath Falls Field Office, and the Medford and Roseburg Districts, and 600 cubic feet per acre for the Eugene and Salem Districts.

**Table C-18.** Timber yield deductions due to down woody material retention by the Proposed RMP and alternatives and land use allocation

| Alternative/PRMP | Land Use Allocation | Coos Bay Timber Yield Deduction (Percent) | Eugene Timber Yield Deduction (Percent) | Klamath Falls Timber Yield Deduction (Percent) | Medford Timber Yield Deduction (Percent) | Roseburg Timber Yield Deduction (Percent) | Salem Timber Yield Deduction (Percent) |
|---|---|---|---|---|---|---|---|
| Alt. A | Uneven-aged Timber Area | 5% | 4% | 4% | 5% | 5% | 4% |
| | High Intensity Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | 5% | 4% | 4% | 5% | 5% | 4% |
| | Riparian Reserve | 5% | 4% | 4% | 5% | 5% | 4% |
| Alt. B | Moderate Intensity Timber Area | - | - | - | - | - | - |
| | Low Intensity Timber Area | - | - | - | - | - | - |
| | Uneven-aged Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | - | - | - | - | - | - |
| | Riparian Reserve | - | - | - | - | - | - |
| Alt. C | Uneven-aged Timber Area | 5% | 4% | 4% | 5% | 5% | 4% |
| | High Intensity Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | 5% | 4% | 4% | 5% | 5% | 4% |
| | Riparian Reserve | 5% | 4% | 4% | 5% | 5% | 4% |
| Alt. D | Moderate Intensity Timber Area | - | - | - | - | - | - |
| | Uneven-aged Timber Area | - | - | - | - | - | - |
| | Owl Habitat Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | - | - | - | - | - | - |
| | Riparian Reserve | - | - | - | - | - | - |
| PRMP | Low Intensity Timber Area | - | - | - | - | - | - |
| | Uneven-aged Timber Area | - | - | - | - | - | - |
| | Late-Successional Reserve | - | - | - | - | - | - |
| | Riparian Reserve | - | - | - | - | - | - |
| | Low Intensity Timber Area | - | - | - | - | - | - |

## Stocking Irregularity

A stand may contain non-stocked openings of a size sufficient to affect timber yield. These openings fall into two categories: openings permanently incapable of growing commercial tree species and openings temporarily unoccupied by desirable trees. Portions of stands may contain permanent areas of non-productive rock or other areas incapable of growing commercial tree species. The Modeling Team partially accounts for these openings through reductions in the Harvest Land Base as a result of the Timber Production Capability Classification. Temporarily non-stocked areas occur due to variation in reforestation success from a variety of non-permanent factors, such as vegetative competition or logging slash.

The ORGANON model accounts for stocking variation by assuming that the degree of local competition experienced by a tree is reflected in its crown size. Trees growing next to openings have longer crowns and poor growth reflected as stem taper which reduces the volume of a tree next to the opening, compared to a similar size tree with shorter crown in an area with more uniform tree distribution. As long as the crown characteristics of sample trees are measured, then any long-term spatial variation within the stand will be modeled appropriately (FORsight 2006). Since existing CVS data used for existing stands and the development of future stands modeling groups contain the necessary crown measurement, the Modeling Team applied no external adjustment for stocking irregularity to ORGANON yields.

## Green-tree Retention

Green-tree retention is the long-term reservation of live trees within the context of a regeneration harvest to provide for various ecological functions. Green-tree retention has two effects from a stand growth and yield standpoint. First, otherwise harvestable volume is foregone for commodity use at the time of harvest. Second, retention trees compete for growing space with the newly regenerated trees (Di Lucca *et al.* 2004).

The Modeling Team modeled the first effect of retained trees on foregone harvest volume as a percent volume deduction applied to volume outputs. These yield deductions were the same ones calculated for the No Action alternative for the 2008 FEIS: the retention of 7–16 conifers over 20" in diameter at an average harvest age of 100 years old.

**Table C-19** shows the deductions applied at the time of a regeneration harvest by land use allocation by alternative and the Proposed RMP for trees reserved from harvest.

**Table C-19.** Timber yield deductions from foregone harvest volume due to green tree retention by land use allocation

| Land Use Allocation | Timber Yield Deduction | | | | | |
|---|---|---|---|---|---|---|
| | No Action (Percent) | Alt. A (Percent) | Alt. B (Percent) | Alt. C (Percent) | Alt. D (Percent) | PRMP (Percent) |
| General Forest Management Area | 11% | - | - | - | - | - |
| Moderate Intensity Timber Area | - | - | 11% | - | 11% | 11% |
| Connectivity/Diversity Block | 18% | - | - | - | - | - |
| Low Intensity Timber Area | - | - | 18% | - | - | 18% |
| Southern General Forest Management Area | 24% | - | - | - | - | - |
| Uneven-aged Timber Area* | - | 11% | 11% | 11% | 11% | 11% |
| Owl Habitat Timber Area* | - | - | - | - | 11% | - |
| High Intensity Timber Area* | - | - | - | - | - | - |
| Late-Successional Reserve† | - | 11% | 11% | 11% | 11% | 11% |
| Riparian Reserve | - | - | - | - | - | - |

* The Modeling Team applied green-tree deductions in Uneven-aged Timber Area and Owl Habitat Timber Area to reflect edge effect competition on regeneration in group selection and retention of some green trees in the larger group selection areas.
† Applies to uneven-aged management in the Late-Successional Reserve–Dry only

The Modeling Team modeled the second effect within ORGANON through retention of overstory trees when a stand is regeneration harvested. The retained trees slow the growth of the new understory regeneration trees relative to the amount of retained overstory trees. The Modeling Team used modeling group-specific **(Table C-1)** overstory tree lists to suppress regeneration growth and provide structural complexity. The Modeling Team used the same overstory tree lists for the General Forest Management Area in the No Action alternative, and the Moderate Intensity Timber Area in Alternatives B and D, and the Proposed RMP; and the Connectivity/Diversity Blocks in the No Action alternative, and the Low Intensity Timber Area in Alternative B and the Proposed RMP.

## Disease

Portions of the Salem District are located in an area with a moderate to high occurrence of Swiss needle cast disease, a foliage disease specific to Douglas-fir caused by the fungal pathogen *Phaeocryptopus gaeumannii*, that reduces growth rates. It does not affect the growth of other tree species. The Modeling Team used a growth modifier in ORGANON to reflect the estimated growth reductions for Douglas-fir in the Swiss needle cast zone. For the 2008 FEIS, the BLM calculated a mean foliage retention value modifier of 2.41 for the Swiss needle cast zone. The Modeling Team considers this modifier to be adequate for modeling the impacts of Swiss needle cast disease for this analysis. See the 2008 FEIS (USDI BLM 2008) for more details.

The Modeling Team assumed that the effects of endemic levels of insects and disease other than Swiss needle cast on timber yields are reflected in part in the defect and breakage allowance described previously and the additional overstory mortality factor described below. In addition to those factors, the Modeling Team assumed a further reduction by adjusting timber yields down by a percent volume reduction. These factors generally vary from about 1–3 percent, increasing with stand age and are based on literature and professional judgment.

## Constraint on Maximum Stand Density Index

Maximum values of basal area observed in preliminary simulations of various strata commonly exceeded values reported in empiric yield tables for well-stocked stands at later periods in the simulations. The probable cause is that the ORGANON model may be underestimating tree mortality from causes other than inter-tree competition, such as insects, disease, windthrow, and stem breakage (Tappeiner *et al.* 1997). This type of mortality is often irregular or episodic in nature, and is inherently difficult to predict the exact time in which it will occur (Franklin *et al.* 1987). Mortality from inter-tree competition becomes less significant as stands age, and irregular mortality caused by other factors becomes more substantial (Franklin *et al.* 2002).

Through sensitivity analysis, the Modeling Team determined that by setting the maximum stand density index (SDI) to 500 in ORGANON, the maximum basal area values were generally constrained below 400 square feet per acre. Simulation results with an SDI maximum of 500 were more in accordance with published normal and empiric yield tables at older ages (Chambers and Wilson 1978, Chambers 1980, McArdle *et al.* 1961, Schumacher 1930, Dunning and Reineke 1933).

## Forest Structural Stage Classification

For this analysis, the Modeling Team classified forested land within the decision area in a five-stage structural classification:

- Early Successional
- Stand Establishment
- Young
- Mature
- Structurally-complex

The Modeling Team further sub-divided these five structural classes by additional structural divisions and by the moist/dry designation as described below.

## Classification:

1. Early Successional–Moist
   Forests that are ≤ 30 years old, with < 30 percent canopy cover.

   1.1 (ES–WSL) with structural legacies
   ≥ 6 trees per acre ≥ 20" DBH

   1.2 (ES–WOSL) without structural legacies
   < 6 trees per acre ≥ 20" DBH

   Early Successional–Dry
   Forests that are ≤ 50 years old, with < 30 percent canopy cover.

   1.1 (ES–WSL) with structural legacies
   ≥ 6 trees per acre ≥ 20" DBH

   1.2 (ES–WOSL) without structural legacies
   < 6 trees per acre ≥ 20" DBH

2. Stand Establishment–Moist

Forests that are ≤ 30 years old, with ≥ 30 percent canopy cover.

2.1 (SE–WSL) with structural legacies
≥ 6 trees per acre ≥ 20" DBH

2.2 (SE–WOSL) without structural legacies
< 6 trees per acre ≥ 20" DBH

Stand Establishment–Dry
Forests that are ≤ 50 years old, with ≥ 30 percent canopy cover.

2.1 (SE–WSL) with structural legacies
≥ 6 trees per acre ≥ 20" DBH

2.2 (SE–WOSL) without structural legacies
< 6 trees per acre ≥ 20" DBH

3. Young–Moist
Forests that are over 30 years old

Young–High Density
Relative density (Curtis RD)[25] ≥ 25

3.1 (YHD–WSL) with structural legacies
< 24 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10"[26] ≥ 0.35

3.2 (YHD–WOSL) without structural legacies
< 24 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10" < 0.35

Young–Low Density
Relative density (Curtis RD) < 25

3.3 (YLD–WSL) with structural legacies
<2 4 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10" ≥ 0.35

3.4 (YLD–WOSL) without structural legacies
< 24 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10" < 0.35

Young–Dry
Forests that are over 50 years old

Young–High Density

[25] Curtis Relative Density = stand basal area/square root of the quadratic mean diameter.
[26] The coefficient of variation of tree diameters over 10" = standard deviation of the DBH/mean diameter breast height.

Relative density (Curtis RD) ≥ 25

3.1 (YHD–WSL) with structural legacies
< 12 trees per acre ≥ 2020" DBH and the coefficient of variation of tree diameters over 10" ≥ 0.35

3.2 (YHD–WOSL) without structural legacies
< 12 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10" < 0.35

Young–Low Density
Relative density (Curtis RD) < 25

3.3 (YLD–WSL) with structural legacies
< 12 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10" ≥ 0.35

3.4 (YLD–WOSL) without structural legacies
< 12 trees per acre ≥ 20" DBH and the coefficient of variation of tree diameters over 10" < 0.35

4. Mature–Moist
Forests that are over 30 years, ≥ 24 trees per acre, ≥ 20" DBH

4.1 (M–Single) Single-layered canopy
The coefficient of variation of tree diameters over 10" < 0.35

4.2 (M–Multi) Multi-layered canopy
The coefficient of variation of tree diameters over 10" ≥ 0.35 and < 4.7 trees per acre ≥ 40" DBH

Mature–Dry
Forests that are over 50 years, ≥12 trees per acre, ≥ 20" DBH

4.1 (M–Single) Single-layered canopy
The coefficient of variation of tree diameters over 10" < 0.34

4.2 (M–Multi) Multi-layered canopy
The coefficient of variation of tree diameters over 10" ≥ 0.34 and < 2.1 trees per acre ≥ 40" DBH

5. Structurally-complex

5.1 (SC–Dev) Developed Structurally-complex – Moist
Forests that are over 30 years old, ≥ 24 trees per acre that are ≥ 20" DBH, and ≥ 4.7 trees per acres ≥ 40" DBH. The coefficient of variation of tree diameters over 10" ≥ 0.35

Developed Structurally-complex – Dry
Forests that are over 50 years old, ≥ 12 trees per acre that are ≥ 20" DBH, and ≥ 2.1 trees per acres ≥ 40" DBH. The coefficient of variation of tree diameters over 10" ≥ 0.34

5.2 (SC–OF) Existing Old Forest
Stands currently ≥ 200 years old, but < 400 years old.

5.3 (SC–VOF) Existing Very Old Forest
Stands currently ≥ 400 years old

## Woodstock Modeling

### The Woodstock Model

The Woodstock model is at the heart of the Remsoft Spatial Planning System. Woodstock is a planning system used for decision support analyses and planning projects. It uses inventory and growth and yield data, and business rules to project forest growth and development over time, subject to management objectives and resource allocation constraints.

The Woodstock model is a linear programming model, which is inherently different from a simulation or scenario-based model such as the OPTIONS model that the BLM used for the 2008 FEIS (USDI BLM 2008). In a simulation model, the user decides what prescriptions to implement, and determines what order to implement them. In a linear programming (LP) model, the user decides what kind of outcome is desired, and the model determines the best means of accomplishing that objective.

Because there are many constraints that influence the management of BLM-administered lands within the planning areas, for this project, the Woodstock model functioned as an optimization model within a tightly controlled set of limitations. The Modeling Team used the optimization function primarily within the Harvest Land Base, to maximize the amount of sustainable volume produced through the 200-year modeling period.

The Woodstock system uses spatial data (ESRI geodatabases) to provide inputs to the model and to display maps of management schedules and forest conditions. It has been in use for over 20 years and is regularly updated and improved by the Remsoft Corporation. Remsoft software is currently being used for forest management planning by all ten Canadian provinces, six U.S. states, as well as the U.S. Army. The Washington Department of Natural Resources recently used Remsoft Spatial Planning to revise their management plans to create better northern spotted owl habitat in the long term and generate more revenue in the short-term without a significant decrease in the long-term sustainable harvest.

### Woodstock Model Overview

Each Woodstock model has an objective function–the mathematical expression of what the model will optimize. The Modeling Team chose the objective function to maximize the sum of allowable sale quantity timber volume production over the full 200-year planning horizon. Within the constraints that the Modeling Team provided in the GIS-based modeling rules and the landscape-level modeling rules, the Woodstock model produced a solution with the highest possible level of timber volume production.

While this objective function works well for the goals and objectives of the Harvest Land Base, it is not appropriate for the reserve thinning in either the Riparian Reserve or the Late-Successional Reserve. In both of these land use allocations, the Modeling Team applied specific constraints for both acres and volume, to provide a realistic level of harvest, given the management direction of the alternative or Proposed RMP, and the extensive experience the BLM has with reserve thinning. These specific constraints varied by alternative and the Proposed RMP, and are presented later in this appendix.

The Woodstock model determines the timing and type of management activities needed to optimize the constrained objective function within a BLM sustained yield unit. Land management units are created in a GIS process that combines multiple layers of resource information and objectives into a single resultant layer. Examples of these resource layers include FOI units, administrative boundaries, Riparian Reserve, Late-Successional Reserve, and Visual Resource Management areas.

The Modeling Team built strata-based Woodstock models that respond to the modeling instructions. The Modeling Team developed Woodstock models for each BLM office and each alternative and the Proposed RMP. For each alternative and the Proposed RMP, the Modeling Team developed a model for a single 'test' district first. Once the Modeling Team checked and confirmed the test model outputs, the Modeling Team applied its essential structure to new Woodstock models for the other BLM offices. Using this methodology, the Modeling Team was able to develop adaptively modeling guidelines that represented the management direction in alternatives and the Proposed RMP.

The BLM and MBG conducted extensive quality control and quality assurance on each Woodstock model. In total, the Modeling Team developed 49 final Woodstock models for the No Timber Harvest reference analysis, No Action alternative, Alternatives A, B, C, and D, Sub-alternatives B and C, and the Proposed RMP. All of these Woodstock models had at least two iterations.

In the final step in the modeling process, the Modeling Team took the results from the strata-based models and allocated them back into the spatially explicit GIS polygons that represent the decision area. The Modeling Team used the Spatial Woodstock software for this final task. The Modeling Team then combined the results from Spatial Woodstock into Microsoft Access databases and pivot tables that the interdisciplinary team used for their analyses.

The Modeling Team used a 200-year planning horizon for the modeling runs, and all results were reported in 10-year periods. The Modeling Team chose this time length because it represents a long-term view for sustained yield calculations. The dataset behind the ORGANON growth and yield curves provides reasonable modeling results for this period.

## Management Activities and Rules

### Management Activities

Within the Woodstock model, forest management activities can occur on a stand level or landscape level. These management activities occur by either defining constraints or targets. Constraints are used to control the flow of outputs on a period-by-period basis. For example, even-flow of timber volume would force the model to keep a constant volume level over the planning horizon. Targets are specific goals that the model is trying to reach: for example, a specified number of Riparian Reserve acres to be harvested in a specific period. The Modeling Team defined each one of these different sets of instructions used within the model.

Stand-level silvicultural treatments include planting, pre-commercial thinning, pruning, and fertilization. Stand-level harvesting activities include commercial thinning, two-age harvest, selection harvest, salvage harvest, and clearcut harvest. Each one of these activities had specific controls within the ORGANON model or modifiers within the Woodstock model. The Modeling Team limited the number of potential pathways that any strata could have, as well as 'hardwired' certain treatments for certain strata. This was to limit the complexity of options that could be considered, in order to efficiently utilize the model resources and have the models run more quickly. For example, the BLM always included pre-commercial thinning in some strata and limited most thinning to stands less than 80 years old in the moist forest. The part of this appendix on Growth and Yield Modeling provides more detail on this topic.

Landscape-level constraints applied to all of the polygons within a particular region. For example, in the No Action alternative, the Modeling Team placed a constraint on each 5th field watershed to not harvest any older forest until at least 15 percent of the watershed was composed of older forest to reflect management direction in the 1995 RMPs.

The model would not apply specific silvicultural treatments unless all eligibility criteria were met for that treatment.

## GIS-based Modeling Rules

This section will describe, by topic area, the modeling rules and GIS data as applied by the Modeling Team to simulate the alternatives and the Proposed RMP within the Woodstock model. The Woodstock model uses attributes associated with the GIS spatial data to identify where the modeling rules are applied.

The Modeling Team applied the following modeling rules to all alternatives and the Proposed RMP:

- **Sustained Yield Units** – The Modeling Team divided the decision area into sustained yield units for the purpose of defining the area in which the model would determine the allowable sale quantity. The Sustained Yield Units are the BLM-administered lands within the district boundaries for the Coos Bay, Eugene, Medford, Roseburg, and Salem Districts, and the western portion of the Lakeview District's Klamath Falls Field Office (all land west of Highway 97). The eastern portion of the Klamath Falls Field Office does not contain any O&C lands, and is not a designated sustained yield unit. The Modeling Team used the district attribute in the FOI data as the basis for the sustained yield units in the Woodstock modeling. The Modeling Team used land use allocation data to segregate the Klamath Falls Field Office into the Klamath Falls Sustained Yield Unit and the Eastside Management Lands. The Modeling Team did provide an estimate of the sustainable harvest level for the Eastside Management Lands as part of this analysis.
- **Minimum Commercial Thinning Volumes** – The Modeling Team derived the minimum commercial thinning volumes from historical BLM data for economically viable timber sales. The definition of minimum commercial thinning volumes for a harvest removal varied by ORGANON variant:
  - Northwest ORGANON variant: northern Coos Bay, Eugene, north Roseburg, and Salem–8 Mbf/acre gross volume
  - Southwest ORGANON variant: southern Coos Bay, Klamath Falls, Medford, and southern Roseburg–5 Mbf/acre gross volume
- **Structural Stage Calculations** – The Forest Structural Stage Classification section earlier in this appendix describes the structural stage calculations for moist and dry forests.
- **Swiss Needle Cast (SNC)** – The Modeling Team used specific SNC yield tables and harvest yield tables in the Swiss Needle Cast zone, which are described in Forest Growth and Yield section earlier in this appendix.
- **Timing of Reporting Actions** – The model reported all actions in the period that they would occur. For example, if a thinning would occur in period 2, the harvest acres and volumes would be reported for period 2 after harvest. Modeled outputs are reported in 10-year periods.
- **Wildfire Modeling - Appendix D** – Modeling Large Stochastic Wildfires and Fire Severity within the Range of the Northern Spotted Owl describes how the BLM modeled wildfire. The location and intensity of the modeled wildfire did not vary among alternatives or the Proposed RMP, but the specific silvicultural prescriptions modeled in each alternative and the Proposed RMP *did* change in the wildfire areas. The Forest Growth and Yield section earlier in this appendix provides more information on wildfire modeling.

- **Riparian Reserve Thinning –** For all of the action alternatives and the Proposed RMP, the BLM divided the Riparian Reserve into inner zones and outer zones. The Modeling Team did not model timber harvest in the inner zone, and did model harvest in the outer zone in both moist and dry forests consistent with alternative-specific management direction. The Modeling Team modeled harvest in the Riparian Reserve as commercial thinning and included stands from 30 to 80 years old. The number of acres harvested and the volume removed varied by district and alternative. In the Woodstock model, constraints specified the maximum amount of average volume that could be removed. In Alternative A, the harvest in the outer zone of the moist Riparian Reserve did not produce any non-ASQ volume, consistent with Alternative A management direction. For the Proposed RMP, the Modeling team divided the Riparian Reserve into inner, middle, and outer zones. Inner and outer zones were treated similarly to the description above. The middle zone was treated similarly to the harvest modeled in the outer zone in Alternative A.

## Modeling Direction Specific to the No Action Alternative

### Connectivity/Diversity Blocks

The Modeling Team aggregated Connectivity/Diversity blocks based on BLM field office boundaries. The Modeling Team did not model regeneration harvest unless at least 25 percent of the forest acres in the block were in stands age 80 years or older. For each block, a maximum of 1/15 of the acres could be in age zero (regenerated) in any one decade of the projection to simulate the area control requirement.

### 15 Percent Standard and Guideline

Within each 5th field watershed, the Modeling Team did not model regeneration harvest until at least 15 percent of the forested area was in stands 80 years and older. In those watersheds that were in deficit, the Modeling Team earmarked the oldest stands for recruitment to meet the 15 percent target. Until the watershed reached the 15 percent level, the Modeling Team modeled only commercial thinning.

### Minimum Harvest Age

The Modeling Team did not model regeneration harvest in stands below the minimum harvest ages described in **Table C-20**. The Modeling Team set these minimum ages by site productivity class 1 through 5, as shown in the following table.

**Table C-20.** Minimum harvest age by site productivity class for the No Action alternative

| Location* | Site Productivity Class | | | | |
|---|---|---|---|---|---|
| | 5 (Minimum Harvest Age) | 4 (Minimum Harvest Age) | 3 (Minimum Harvest Age) | 2 (Minimum Harvest Age) | 1 (Minimum Harvest Age) |
| Northern Districts | 110 | 100 | 90 | 90 | 80 |
| Southern Districts | 150 | 120 | 110 | 110 | 100 |

* Northern districts include the Coos Bay, Eugene, and Salem Districts; southern districts include the Klamath Falls Field Office and the Medford and Roseburg Districts.

### Coos Bay – Projection of Future Marbled Murrelet Sites

The Modeling Team modeled all existing stands 120 years and older within approximately 4 townships of the coast as no harvest to simulate future occupied marbled murrelet sites.

## Bald Eagle Management Areas (BEMA)

The Modeling Team modeled Bald Eagle Management Areas as available for commercial thinning only in stands less than 80 years old.

## Salem Adaptive Management Area (AMA)

The Modeling Team modeled the Salem Adaptive Management Area with commercial thinning in stands less than 110 years old and no regeneration harvest.

## Reserve Northern Spotted Owl Pair Areas

The Modeling Team modeled no harvest in the northern spotted owl habitat classified as suitable and next best dispersal categories within the reserve pair areas in the Salem District. The Modeling Team modeled no regeneration harvest in the northern spotted owl habitat classified as non-suitable dispersal, and non-habitat within the reserve pair areas in the Salem District.

## Salvage Harvesting

The Modeling Team modeled salvage harvest in the Harvest Land Base after high-, moderate-, or multiple high-severity fires. The salvage harvest occurred in the same decade as the fire and contributed to the ASQ.

# Modeling Direction Specific to Alternative A

## Riparian Reserve

The Modeling Team modeled harvest in the outer zone of the Riparian Reserve differently in the moist and the dry forest. In the moist forest, the density management harvest treatment does not produce any volume. In the dry forest, harvest did contribute to non-ASQ timber volume. The Modeling Team modeled thinning up to age 80 in both the moist and dry forest. The Modeling Team assumed that 15 percent of the outer zone acreage would be eligible for thinning, and assumed an average volume harvested of 10 Mbf/acre.

## Late-Successional Reserve

The Late-Successional Reserve consists of five different components: large block reserves–moist, large block reserves–dry; older forest reserves, occupied marbled murrelet sites, and existing red tree vole sites in the North Coast DPS. The Modeling Team modeled harvest only in the large block reserves, with different harvest treatments in the moist and the dry forests. In the dry forests, the harvest counted towards non-ASQ volume. The Modeling Team assumed no age limit on harvest in the dry forest. In the moist forest, the harvest did not count towards non-ASQ volume (assuming that cut trees would not be removed). The Modeling Team assumed that non-commercial thinning would occur up to age 80 in the moist forest. The Modeling Team assumed that older forest reserves, the occupied marbled murrelet sites, and the existing red tree vole sites would not have any harvest.

**Table C-21** shows the volume and percent of eligible acre constraints in the Late-Successional Reserve and Riparian Reserve for Alternative A. The constraints were different for northern and southern districts within the Late-Successional Reserve and different for moist and dry forests. The target percentage of eligible treatment acres was met over the entire modeling period (20 decades) with the following exception: for Late-Successional Reserve–Dry, the target was met in the first five modeling periods (decades) in the Medford District and the Klamath Falls Field Office, and in the first four modeling periods in the Roseburg District.

**Table C-21.** Reserve harvesting constraints for Alternative A

| Land Use Allocation (Region) | Maximum Average Volume (Mbf/Acre) | Eligible Acres Treated (Percent) |
|---|---|---|
| Riparian Reserve | | |
| Northern District* | 10 | 15 |
| Southern District† | 10 | 15 |
| Late-Successional Reserve | | |
| Northern District* Moist | 10 | 15 |
| Northern District* Dry | N/A | N/A |
| Southern District† Moist | 10 | 15 |
| Southern District†,‡ Dry | 15 | 50 |

* Salem, Eugene, Coos Bay
† Roseburg, Medford, Klamath Falls
‡ Dry LSR has 2 constraints. The first constraint is that the maximum volume for the first 5 decades was 15 Mbf, and after 5 decades, it can be higher. The second constraint is that on the Roseburg District, 50 percent of the eligible acres were treated during the first 4 decades, and in the Medford District and Klamath Falls Field Office, 50 percent of the eligible acres were treated in the first 5 decades.

## Harvest Land Base

The Harvest Land Base consists of two components, the Uneven-aged Timber Area and the High Intensity Timber Area. All harvest in the Harvest Land Base would contribute to the ASQ. The Modeling Team modeled that all acres in Uneven-aged Timber Area would be harvested within the first eight modeling periods (decades).

The Modeling Team modeled timber harvest on the Harvest Land Base using a combination of non-declining and even flow constraints. The Modeling Team modeled the High Intensity Timber Area using an even-flow constraint, in which timber harvest from this allocation does not vary from decade to decade. The Modeling Team modeled the Uneven-aged Timber Area using an even-flow constraint where it composed 10 percent or less of the Harvest Land Base by sustained yield unit area. Where the Uneven-aged Timber Area composed greater than 10 percent of the Harvest Land Base by sustained yield unit area, the Modeling Team used only a non-declining flow constraint. Non-declining flow constraints allow timber harvest to increase but not decrease from decade to decade. Where the Modeling Team used a non-declining flow constraint, the Modeling Team forced the timber harvest to also meet an even-flow constraint for the first four decades.

The Modeling Team applied a minimum regeneration harvest age of 50 years in the High Intensity Timber Area.

In the High Intensity Timber Area, the Modeling Team set a target of applying regeneration harvest on 8–17 percent of acres in the High Intensity Timber Area per decade. Because of this goal, the average rotation ages trended between 60–120 years.

The Modeling Team modeled salvage harvest in the Harvest Land Base after high-, moderate-, or multiple, high-severity burns. The salvage harvest occurred in the same decade as the burn and contributed to the ASQ.

## Modeling Direction Specific to Alternative B

### Scenarios

The Modeling Team modeled Alternative B and Sub-alternative B as two scenarios of the same alternative because of their overall similar design. Scenario 1 corresponds to Sub-alternative B, in which all known and historic northern spotted owl sites are included in the Late-Successional Reserve. Scenario 2 corresponds to Alternative B, in which some known and historic northern spotted owl sites are included in the Harvest Land Base.

### Riparian Reserve

The Modeling Team assumed that 50 percent of the outer zone Riparian Reserve would be eligible for thinning in both the moist and dry forest, and assumed an average volume harvested of 20 Mbf/acre in the northern districts and 15 Mbf/acre in the southern districts.

### Late-Successional Reserve

The Modeling Team modeled no harvest activities in the older forest reserve, occupied marbled murrelet sites, occupied red tree vole sites, and within known or historic northern spotted owl sites. In the large block reserves, the Modeling Team assumed that 50 percent of the Late-Successional Reserve – Moist that is less than or equal to 80 years old would be eligible for thinning, and that 50 percent of the Late-Successional Reserve – Dry would be eligible for uneven-aged management regardless of age. The Modeling Team assumed an average volume harvested of 20 Mbf/acre in the northern districts and 15 Mbf/acre in the southern districts.

The Modeling Team modeled the Late-Successional Reserve – Dry with two specific constraints. The Modeling Team assumed an average volume harvest of 15 Mbf for the first 5 decades, after which it could increase. Second, the Modeling Team assumed that 50 percent of the eligible acres in the Roseburg District would treated during the first four decades, and that 50 percent of the eligible acres in the Medford District and the Klamath Falls Field Office would be treated in the first five decades.

### Harvest Land Base

The Harvest Land Base consists of three components: the Uneven-aged Timber Area, the Moderate Intensity Timber Area, and the Low Intensity Timber Area, each with different silvicultural prescriptions. The Modeling Team modeled regeneration harvest to occur on 8–17 percent of the area in the Moderate Intensity Timber Area in each decade. The Modeling Team modeled regeneration harvest to occur on 6–10 percent of the area in the Low Intensity Timber Area in each decade.

The Modeling Team modeled timber harvest on the Harvest Land Base using a combination of non-declining and even flow constraints. The Modeling Team modeled the Low Intensity Timber Area and Moderate Intensity Timber Area using an even-flow constraint, in which timber harvest from this allocation does not vary from decade to decade. The Modeling Team modeled the Uneven-aged Timber Area using an even-flow constraint where it composed 10 percent or less of the Harvest Land Base by sustained yield unit area. Where the Uneven-aged Timber Area composed greater than 10 percent of the Harvest Land Base by sustained yield unit area, the Modeling Team used only a non-declining flow constraint. Non-declining flow constraints allow timber harvest to increase but not decrease from decade to decade. Where the Modeling Team used a non-declining flow constraint, the Modeling Team forced the timber harvest to also meet an even-flow constraint for the first four decades.

The Modeling Team used the minimum harvest age constraints in the model shown in **Table C-22**. These constraints allowed the BLM to transition a relatively young land base to long rotations without excessively reducing the acreage available for short-term harvesting.

**Table C-22.** Minimum harvest age constraints by 10-year Woodstock period for Low Intensity Timber Area and Moderate Intensity Timber Area

| Area (Intensity Type) | Periods 1 through 7 (Minimum Harvest Age) | Periods 8 through 20 (Minimum Harvest Age) |
|---|---|---|
| Northern Districts* | | |
| Moderate Intensity Timber Area | 50 | 90 |
| Low Intensity Timber Area | 50 | 110 |
| Southern Districts† | | |
| Moderate Intensity Timber Area | 50 | 120 |
| Low Intensity Timber Area | 50 | 140 |

* Coos Bay, Eugene, Salem

† Klamath Falls, Medford, Roseburg

The Modeling Team modeled salvage harvest in the Harvest Land Base after high-, moderate-, or multiple, high-severity burns. The salvage harvest occurred in the same decade as the burn and contributed to the ASQ.

## Modeling Direction Specific to Alternative C

### Riparian Reserve

The Modeling Team assumed that 50 percent of the outer zone would be eligible for thinning in both the moist and dry forest, and assumed an average volume harvested of 20 Mbf/acre in the northern districts and 15 Mbf/acre in the southern districts.

### Late-Successional Reserve

The Modeling Team modeled no harvest activities in the older forest reserve, occupied marbled murrelet sites, occupied red tree vole sites. In the large block reserves, the Modeling Team assumed that 50 percent of the Late-Successional Reserve–Moist that is less than or equal to 80 years old would be eligible for thinning, and that 50 percent of the Late-Successional Reserve–Dry would be eligible for uneven-aged management regardless of age. The Modeling Team assumed an average volume harvested of 20 Mbf/acre in the northern districts and 15 Mbf/acre in the southern districts.

The Modeling Team modeled the Late-Successional Reserve – Dry with two specific constraints. The Modeling Team assumed an average volume harvest of 15 Mbf for the first five decades, after which it could increase. Second, the Modeling Team assumed that 50 percent of the eligible acres in the Roseburg District would treated during the first four decades, and that 50 percent of the eligible acres in the Medford District and Klamath Falls Field Office would be treated in the first five decades.

The Modeling Team also modeled salvage harvest in the Late-Successional Reserve after high-severity fire events.

### Harvest Land Base

The Harvest Land Base consists of two components, the Uneven-aged Timber Area and the High Intensity Timber Area. All harvest in the Harvest Land Base would contribute to the ASQ. The Modeling Team modeled that all acres in the Uneven-aged Timber Area would be harvested within the first eight modeling periods (decades).

The Modeling Team modeled timber harvest on the Harvest Land Base using a combination of non-declining and even flow constraints. The Modeling Team modeled the High Intensity Timber Area using an even-flow constraint, in which timber harvest from this allocation does not vary from decade to decade. The Modeling Team modeled the Uneven-aged Timber Area using an even-flow constraint where it composed 10 percent or less of the Harvest Land Base by sustained yield unit area. Where the Uneven-aged Timber Area composed greater than 10 percent of the Harvest Land Base by sustained yield unit area, the Modeling Team used only a non-declining flow constraint. Non-declining flow constraints allow timber harvest to increase but not decrease from decade to decade. Where the Modeling Team used a non-declining flow constraint, the Modeling Team forced the timber harvest to also meet an even-flow constraint for the first four decades.

The Modeling Team applied a minimum regeneration harvest age of 50 years in the High Intensity Timber Area.

In the High Intensity Timber Area, the Modeling Team set a target of applying regeneration harvest on 8–17 percent of acres in the High Intensity Timber Area per decade. Because of this goal, the average rotation ages trended between 60–120 years.

The Modeling Team modeled salvage harvest in the Harvest Land Base after high-, moderate-, or multiple, high-severity burns. The salvage harvest occurred in the same decade as the burn and contributed to the ASQ.

## Modeling Direction Specific to Alternative D

### Riparian Reserve

The Modeling Team assumed that 15 percent of the outer zone Riparian Reserve acreage would be eligible for thinning, and assumed an average volume harvested of 10 Mbf/acre.

### Late-Successional Reserve

The Modeling Team assumed no harvest in the Late-Successional Reserve.

### Harvest Land Base

The Harvest Land Base consists of six components: predicted marbled murrelet sites, predicted red tree vole sites, the home ranges of known and historic northern spotted owl sites, the Owl Habitat Timber Area, the Uneven-aged Timber Area, and the Moderate Intensity Timber Area.

The Modeling Team assumed no harvest in the predicted marbled murrelet sites or the predicted red tree vole sites, as surveys for these species are required under Alternative D and newly discovered sites would be included in the Late-Successional Reserve.

The Modeling Team modeled timber harvest in the Harvest Land Base using a combination of non-declining and even flow constraints. The Modeling Team modeled the Moderate Intensity Timber Area using an even-flow constraint, in which timber harvest from this allocation does not vary from decade to decade. The Modeling Team modeled the Owl Habitat Timber Area, Uneven-aged Timber Area, and the home ranges of known and historic northern spotted owl sites using the discounted non-declining flow constraint.

The Modeling Team used the minimum harvest age constraints for the Moderate Intensity Timber Area as shown for the Moderate Intensity Timber Area in **Table C-22**.

## Modeling Direction Specific to the Proposed RMP

### Riparian Reserve

The Modeling Team assumed that 15 percent of the stands that are 80 years or less in the middle zone Riparian Reserve would be eligible for non-commercial thinning, and assumed an average volume harvested of 10 Mbf/acre.

The Modeling Team modeled outer zone Riparian Reserve treatments differently in the moist and dry forest. The Modeling Team assumed in the dry forest that 50 percent of the stands that are less than or equal to 80 years old would be eligible for thinning, and assumed an average volume harvest of 10 Mbf/acre.

The Modeling Team assumed in the moist forest that 26 percent of the stands less than or equal to 80 years old would be eligible for thinning. The Modeling Team set the constraint for the average volume harvested in the northern districts as 20 Mbf/acre and 15 Mbf/acre in the southern districts.

### Late-Successional Reserve

The Modeling Team modeled no harvest activities in the older forest reserve, occupied marbled murrelet sites, and occupied red tree vole sites. In the large block reserves, the Modeling Team assumed that 50 percent of the Late-Successional Reserve–Moist that is less than or equal to 80 years old would be eligible for thinning, and that 80 percent of the Late-Successional Reserve–Dry would be eligible for uneven-aged management regardless of age. The Modeling Team assumed an average volume harvested of 20 Mbf/acre in the northern districts and 15 Mbf/acre in the southern districts.

The Modeling Team modeled the Late-Successional Reserve–Dry with two specific constraints. The Modeling Team assumed an average volume harvest of 15 Mbf for the first 5 decades, after which it could increase. Second, the Modeling Team assumed that 50 percent of the eligible acres in the Roseburg District would treated during the first four decades, and that 50 percent of the eligible acres in the Medford District and the Klamath Falls Field Office would be treated in the first 5 decades.

### Harvest Land Base

The Harvest Land Base consists of three components: the Uneven-aged Timber Area, the Moderate Intensity Timber Area, and the Low Intensity Timber Area, each with different silvicultural prescriptions. The Modeling Team modeled regeneration harvest to occur on 7–18 percent of the area in the Moderate Intensity Timber Area in each decade. The Modeling Team modeled regeneration harvest to occur on 6–10 percent of the area in the Low Intensity Timber Area in each decade.

The Modeling Team modeled timber harvest in the Harvest Land Base using a combination of non-declining and even flow constraints. The Modeling Team modeled the Low Intensity Timber Area and Moderate Intensity Timber Area using an even-flow constraint, in which timber harvest from this allocation does not vary from decade to decade. The Modeling Team modeled the Uneven-aged Timber Area using an even-flow constraint where it composed 10 percent or less of the Harvest Land Base by sustained yield unit area. Where the Uneven-aged Timber Area composed greater than 10 percent of the Harvest Land Base by sustained yield unit area, the Modeling Team used only a non-declining flow constraint. Non-declining flow constraints allow timber harvest to increase but not decrease from decade to decade. Where the Modeling Team used a non-declining flow constraint, the Modeling Team forced the timber harvest to also meet an even-flow constraint for the first four decades.

The Modeling Team used the minimum harvest age constraints for the Moderate Intensity Timber Area and Low Intensity Timber Area in the model as shown in **Table C-22**. These constraints allowed the BLM to transition a relatively young land base to long rotations without excessively reducing the acreage available for short-term harvesting.

## GIS Data – Modeled Harvest and Contribution to ASQ

**Table C-23** provides a summary of how the Modeling Team modeled each category of GIS data and which categories contribute to the Allowable Sale Quantity. A data code of X = non-forested; N=forested, modeled without any harvest; P= forested, modeled with non-ASQ harvest; Y=forested, modeled with ASQ harvest; S= forested, modeled with no harvest; L=forested, modeled with harvest does not contribute to either ASQ or non-ASQ harvest; and N/A = not applicable.

**Table C-23.** Modeled harvest and contribution to ASQ

| GIS Modeling Data Category | No Action (Code) | Alt. A (Code) | Alt. B (Code) | Alt. C (Code) | Alt. D (Code) | PRMP (Code) |
|---|---|---|---|---|---|---|
| Roads | X | X | X | X | X | X |
| Water | X | X | X | X | X | X |
| TPCC Non Forest | X | X | X | X | X | X |
| TPCC Non Suitable Woodlands | N | N | N | N | N | N |
| TPCC Suitable Woodlands–Low Site and Non Commercial Species | N | N | N | N | N | N |
| TPCC Suitable Woodlands–Reforestation | N | N | N | N | N | N |
| Recreation Sites–Existing | N | N | N | N | N | N |
| Recreation Sites–Proposed | N/A | N | N | N | N | N |
| Visual Resource Management Class I | N | N | N | N | N | N |
| Visual Resources Management Class II | N | N | N | N | N | N |
| Areas of Critical Environmental Concern–Existing | N | N | N | N | N | N |
| Areas of Critical Environmental Concern–Proposed | Y/P | N/Y/P | N/Y/P | N/Y/P | N/Y/P | N/Y/P |
| Occupied Marbled Murrelet Sites | N | N | N | N | N | N |
| Simulated Future Murrelet Sites | N | N | N | N | N | N |
| Known Owl Activity Centers | N | N | N | N | N | N |
| Reserve Pair Areas (Salem only) | N | N/A | N/A | N/A | N/A | N/A |
| Survey and Manage Species | N | N/A | N/A | N/A | N/A | N/A |
| Special Status Species | N/A | N | N | N | N | N |
| Species Management Areas | N | N/A | N/A | N/A | N/A | N/A |
| LUA–Riparian Reserve | P | P/L/N | P/N | P/N | P | P/L/N |
| LUA–Congressionally Reserved | N | N | N | N | N | N |
| LUA–Administratively Reserved | N | N | N | N | N | N |
| LUA–Late-Successional Reserve | P | P/L/N | P/N | P/N | N | P/N |
| LUA–Adaptive Management Areas | Y | N/A | N/A | N/A | N/A | N/A |
| LUA–Adaptive Management Reserve | P | N/A | N/A | N/A | N/A | N/A |
| LUA–Harvest Land Base | N/A | Y | Y | Y | Y/S | Y |
| LUA–General Forest Management Areas | Y | N/A | N/A | N/A | N/A | N/A |
| LUA–Connectivity Diversity Blocks | Y | N/A | N/A | N/A | N/A | N/A |
| LUA–Southern General Forest Management Area | Y | N/A | N/A | N/A | N/A | N/A |
| LUA–District-Designated Reserve | N | N | N | N | N | N |
| Burned Areas | N/Y/P | N/Y/P | N/Y/P | N/Y/P | N/Y/P | N/Y/P |
| LUA–Eastside Management Lands | X | X | X | X | X | X |
| Fauna Critical Habitat | N/A | N | N | N | N | N |
| Flora Critical Habitat | N/A | N | N | N | N | N |
| Existing Red Tree Vole Sites | N/A | N | N | N | N | N |
| Predicted Red Tree Vole Sites | N/A | N | N | N | N | N |
| Pacific Crest Trail | N/A | N | N | N | N | N |
| Wild and Scenic Rivers, Designated Corridors | N | N | N | N | N | N |
| Wild and Scenic Rivers, eligible and suitable | N | N | N | N | N | N |
| Wilderness | N | N | N | N | N | N |
| Wilderness Study Areas | N | N | N | N | N | N |
| LUA–District-Designated Reserve – Lands Managed for their Wilderness Characteristics | N/A | N/Y/P | N/Y/P | N/Y/P | N/Y/P | N/Y/P |

Note: Green and dark blue cells indicate codes contributing to ASQ.
X = non-forested
N = forested, modeled without any harvest
P = forested, modeled with non-ASQ harvest
Y = forested, modeled with ASQ harvest
S = forested, modeled with no harvest
L = forested, modeled with harvest does not contribute to either ASQ or non-ASQ harvest
N/A = not applicable

## Reference Analysis and Sub-alternative Modeling Rules

### No Timber Harvest

The Modeling Team tested and calibrated the data and the model by running the first model for 150 years without any management. This run provided the Modeling Team with a baseline for comparison to the action alternatives and the Proposed RMP. The Modeling Team conducted the No Timber Harvest reference analysis run both with and without wildfire. The Modeling Team modeled a full range of outputs, including stand structure, stand metrics, wildlife modeling metrics, and growth and yield. BLM inventory specialists reviewed the results to determine that attributes from GIS and strata were properly applied to the modeling and that stand metrics and projections were reasonable. In all, the Modeling Team completed five iterations of the No Timber Harvest reference analysis. As a result of these reviews, the Modeling Team made several revisions to the modeling process:

- Capped maximum stand density index (SDI) at 500 to prevent unrealistically high growth and volume projections
- Calculated canopy cover using ORGANON equations in addition to FVS
- Revised stand structural classifications to 'hardwire' reversion to early seral stages after regeneration harvests or fire, despite significant legacy retention
- Re-set stand age to zero after high-severity fire
- Tracked stands that are currently over 200 years old as a separate structural class, 'old', and currently over 400 years as 'very old'[27]

### Sub-alternative B

The Modeling Team developed Sub-alternative B to provide a comparison for the effects of precluding harvest in the home ranges of the known and historic northern spotted owl sites. The BLM provided one input database to MBG that had the variables for both Alternative B and Sub-alternative B. This database had two sets of land use allocations, two sets of harvest modeling codes, and two sets of harvest modeling pieces[28].

### Sub-alternative C

The Modeling Team developed Sub-alternative C to provide a comparison to Alternative C that precluded harvest in stands 80 years and older. The BLM provided one input database to MBG for both modeling runs.

## Establishing Harvest Levels

The Modeling Team based harvest volume projections on the lands available for harvest, under the assumptions of each alternative and the Proposed RMP, within each sustained-yield unit. Due to the assumed timber management limitations, harvest from moist forest reserves (i.e., Late-Successional Reserve and Riparian Reserve) would diminish as stands grew past the conditions suitable for thinning and would not produce a sustainable harvest over time. The Modeling Team assumed that timber volume

[27] Throughout the modeling process, no new stands were allowed to grow into the 'old' and 'very old' classes. The purpose of this modification was for transparency of the fate of all stands currently over 200 years of age.
[28] Harvest modeling codes were applied to land use allocations or sub-allocations in the model and were used to direct the model in where the vegetation would be grown, where harvest would occur, and if the harvest counted toward ASQ. Harvest modeling pieces were used to assign specific forest management prescriptions, such as uneven-aged or even-aged management, to harvest modeling codes where harvest would occur.

from selection harvesting in Late-Successional Reserve–Dry would continue perpetually where the BLM would use timber harvest to maintain fire-resilient conditions.

The Modeling Team modeled the sustained-yield harvest level from the land base supporting the ASQ separately from the harvest volume from the reserves. Segregating the land base and modeling of harvest volume in this manner eliminated the interaction of these two types of allocations.

Within the Harvest Land Base, the Modeling Team applied two different harvest flow constraints. These include a non-declining, even-flow strategy and a non-declining discounted flow constraint. In the even-flow constraint, the harvest is constant throughout the planning horizon. In the non-declining flow constraint, the harvest in any period must be equal to or greater than harvest in the prior period. To find the non-declining flow harvest schedule that maximized the harvest in the early part of the planning horizon, we maximized discounted harvest over the planning horizon. The Modeling Team always applied the non-declining even-flow strategies to the High Intensity Timber Area, Low Intensity Timber Area, and Moderate Intensity Timber Area. The Modeling Team also applied this same non-declining, even-flow strategy to the Uneven-aged Timber Area and Owl Habitat Timber Area where they comprised 10 percent or less of the Harvest Land Base within a sustained yield unit **(Figure C-8)**.

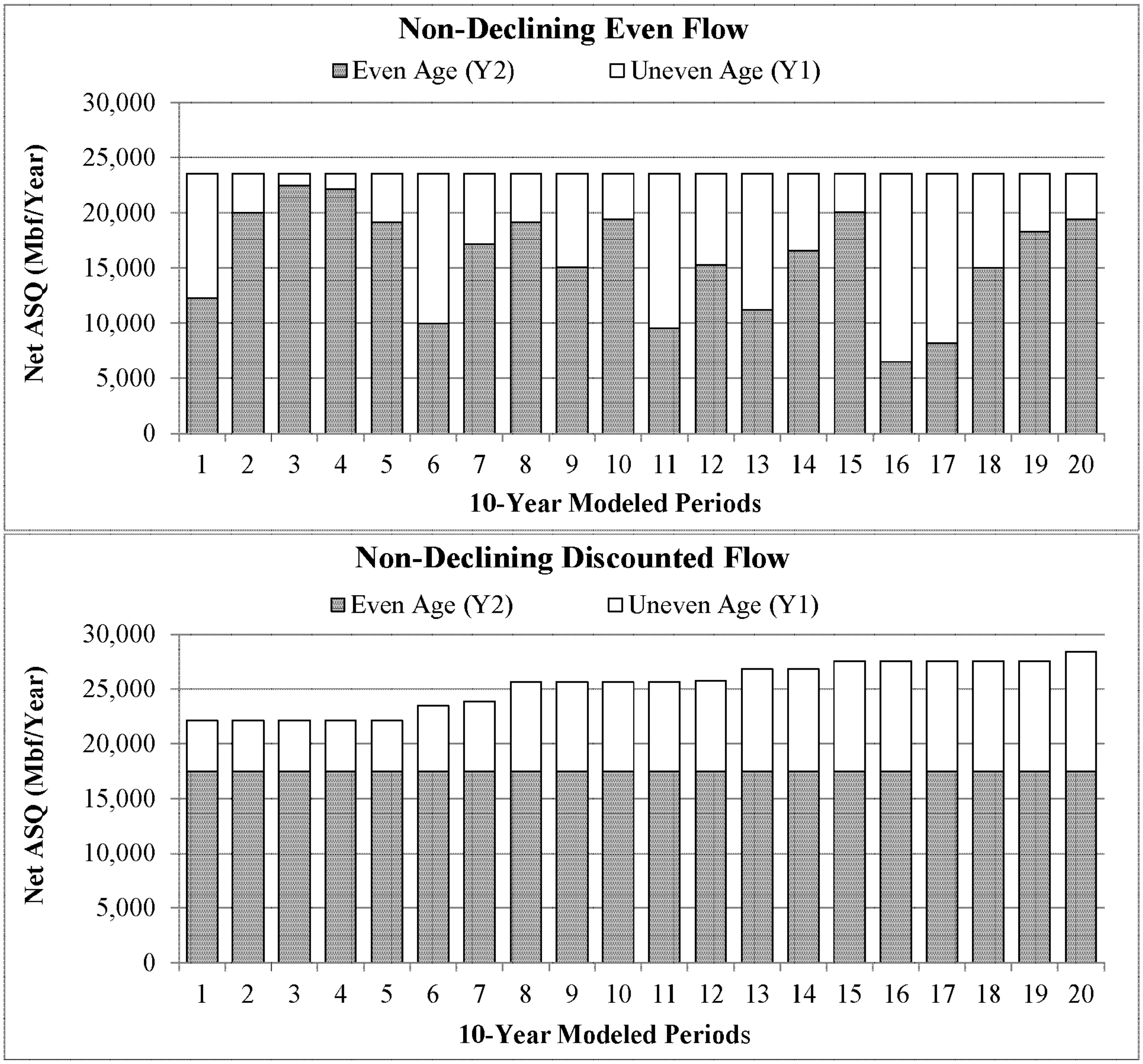


**Figure C-8.** Non-declining even-flow (top) and non-declining discounted flow (bottom)

Where the Uneven-aged Timber Area or Owl Habitat Timber Area comprised more than 10 percent of the Harvest Land Base in a sustained yield unit, the Modeling Team applied a non-declining discounted flow strategy, because it provided—

- A relatively even distribution of both selection harvest and even-aged harvest across the Harvest Land Base through time;
- A predictable, even-flow harvest in the even-aged components of the Harvest Land Base; and
- A relatively high level of ASQ in the selection harvest in the Harvest Land Base.

The selection prescriptions in Uneven-aged Timber Area and Owl Habitat Timber Area increased the amount of harvest volume that would be removed through time with successive entries. Without being able to adjust harvest levels in the course of the 200-year modeling horizon, it would not be possible to implement the management direction for the Uneven-aged Timber Area and Owl Habitat Timber Area.

## Woodstock Products

The final product from all Woodstock modeling runs was a Microsoft Access relational database, covering the entire project area, and containing all of the output variables for each individual polygon (RMPWO_ID) (**Table C-24**). The model generated outputs for time steps: 0, 1, 2, 3, 4, 5, 10, and 20 (i.e., 2013, 2023, 2033, 2043, 2053, 2063, 2113, and 2213).

**Table C-24.** Woodstock modeling output variables

| Table | Field Name | Description |
|---|---|---|
| Wildlife | District | District name (Woodstock Theme 9) |
| | RMPWO_ID | Unique polygon Identification Number |
| | GIS_ACRES | Area in acres |
| | Platforms1_yr2013 | Murrelet platforms(1) per acre in period 0–after treatment |
| | Platforms2_yr2013 | Murrelet platforms(2) per acre in period 0–after treatment |
| | QMDCON_yr2013 | Quadratic mean diameter of all live conifers in centimeters in period 0–after treatment |
| | StructBLM_yr2013 | Structural stage code in period 0–after treatment |
| | StructBLM_CurrentAge_yr2013 | Current age of stand used for structural stage code in period 0 |
| | StructBLM_StartingAge_yr2013 | Starting age of stand used for structural stage code in period 0 |
| | StructBLM_TPA20_yr2013 | Trees per acre of trees ≥ 20" DBH used for structural stage code in period 0–after treatment |
| | StructBLM_TPA40_yr2013 | Trees per acre of trees ≥ 40" DBH used for structural stage code in period 0–after treatment |
| | StructBLM_CV_yr2013 | Current Vegetation of the DBH of all trees used for structural stage code in period 0–after treatment |
| | StructBLM_RD_yr2013 | Curtis relative density used for structural stage code in period 0–after treatment |
| | StructBLM_Height_yr2013 | Average height of reported trees greater or equal to 7" DBH, structural stage code–after treatment |
| | StructBLM_CanopyCover_yr2013 | ORGANON Canopy cover from all trees used for structural stage code in period 0–after treatment |
| | DDivBLM_yr2013 | Diameter Diversity Index in period 0–after treatment |
| | TPHaLgCon_yr2013 | Trees per hectare of large conifers (≥ 30") in period 0–after treatment |
| | TFir_PCT_yr2013 | Percent of total basal area in subalpine fir species list in period 0–after treatment |
| | Pine_PCT_yr2013 | Percent of total basal area in pine species list in period 0–after treatment |
| | Oak_PCT_yr2013 | Percent of total basal area in oak species list in period 0–after treatment |
| | EvgHdw_PCT_yr2013 | Percent of total basal area in evergreen hardwoods species list in period 0–after treatment |
| | Redwd_PCT_yr2013 | Percent of total basal area in redwood (always 0) in period 0–after treatment |
| | CCovCon_FVS_PCT_yr2013 | Forest Vegetation Simulator canopy cover of all live conifers in percent in period 0–after treatment |
| | CCovCon_ORG_PCT_yr2013 | ORGANON canopy cover of all live conifers in percent in period 0–after treatment |
| | CCovHdw_FVS_PCT_yr2013 | FVS canopy cover of all live hardwoods in percent in period 0–after treatment |
| | CCovHdw_ORG_PCT_yr2013 | ORGANON canopy cover of all live hardwoods in percent in period 0–after treatment |

| Table | Field Name | Description |
|---|---|---|
| | VegCl_1011_yr2013 | Gradient Nearest Neighbor Vegetation Class code in period 0–after treatment |
| | TCanopyLyr_yr2013 | Number of tree canopy layers present in period 0–after treatment |
| | StndDomHt_yr2013 | Average height of dominant and co-dominant trees in meters in period 0–after treatment |
| Harvest | District | District name (Woodstock Theme 9) |
| | RMPWO_ID | Unique polygon Identification Number |
| | GIS_ACRES | Area in acres |
| | CurrPeriod_yr2013 | Current period in 2013 = 0 |
| | GrossToNet_yr2013 | Adjustment factor for gross to net inventory volume in period 0 |
| | TenYrAge_yr2013 | Forest operations inventory 10-year age in years in period 0 |
| | TotNetInv_yr2013 | Net inventory volume per acre (Mbf/acre) commercial species 16 feet scale in period 0 |
| | TotNetInv_Extended_yr2013 | Net inventory total volume (Mbf) commercial species 16 feet scale (TotNetInv_yr2013 × GIS_ACRES) in period 0 |
| | BlmTotGross_yr2013 | Gross inventory volume per acre (Mbf/acre) all species 16 feet scale in period 0–after treatment |
| | BlmTotGross_Extended_yr2013 | Gross inventory total volume (Mbf) all species 16 feet scale (BlmTotGross_yr2013 × GIS_ACRES) in period 0 |
| | ASQ_yr2013 | Gross inventory volume per acre (Mbf/acre) commercial species 16 feet scale in period 0–after treatment |
| | TPA_yr2013 | Trees per acre in period 0–before treatment |
| | BA_yr2013 | Basal area in square feet per acre in period 0–before treatment |
| | QMD_yr2013 | Quadratic mean diameter in inches, all species in period 0–before treatment |
| | thin_acres | Acres of thinning in period 0 |
| | clearcut_acres | Acres of clearcut in period 0 (NRTA only) |
| | selection_acres | Acres of selection (uneven-aged) harvest in period 0 (LSUMA prescription, UEMA, Owl Habitat Timber Area) |
| | salvage_acres | Acres of salvage harvest in period 0 (General Forest Management Area (No Action), Harvest Land Base in action alternatives and Proposed RMP, Late-Successional Reserve in Alt. C) |
| | thin_vol | Volume of thinning in period 0 (Alt. A only) |
| | clearcut_vol | Volume of clearcut harvest in period 0 (NRTA) |
| | selection_vol | Volume from selection (uneven-age) harvest in period 0 (net volume, 16 feet scale) |
| | salvage_vol | Volume of salvage harvest in period 0 (net volume, 16 feet scale) |
| | restoration_acres | Acres of restoration harvest in period 0 (Alt. A only) |
| | restoration_vol | Volume from restoration harvest (gross, does not count towards allowable sale quantity) Alt. A only |
| | 2-age_acres | Acres of 2-age harvest in period 0 (General Forest Management Area, Connectivity SGFMA, LRTA and MRTA) |
| | 2-age_vol | Volume from 2-age harvest in period 0 (net volume, 16 feet scale) |
| | Grade_1_vol | Volume harvested in size/grade class 1 in period 0 (net volume, 16 feet scale) |
| | Grade_2_vol | Volume harvested in size/grade class 2 in period 0 (net volume, 16 feet scale) |
| | Grade_3_vol | Volume harvested in size/grade class 3 in period 0 (net volume, 16 feet scale) |

| Table | Field Name | Description |
| --- | --- | --- |
| | Grade_4_vol | Volume harvested in size/grade class 4 in period 0 (net volume, 16 feet scale) |
| | ASQ_harv_vol | Total volume harvested that counts towards allowable sale quantity (net volume, 16 feet scale) |
| | nonASQ_harv_vol | Total volume harvested that doesn't count towards allowable sale quantity (net volume, 16 feet scale) |
| Baseline | District | District name (Woodstock Theme 9) |
| | RMPWO_ID | Unique polygon Identification Number |
| | GIS_ACRES | Area in acres |
| | SUBJ_FOI | Forest operations inventory Stand Identification Number |
| | YieldStrataID | Timber stratification Yield Strata Identification Number (Woodstock Theme 1) |
| | Modeling_Group | Timber stratification Modeling Group (Woodstock Theme 2) |
| | Species_Group | Timber stratification Species Group (Woodstock Theme 3) |
| | Site_Class | Timber stratification Site Class (Woodstock Theme 4) |
| | Age_Group | Timber stratification Age Group (Woodstock Theme 5) |
| | LandUseAllocation_init | Land Use Allocation (Woodstock Theme 6) |
| | Regine_GrowOnly | Management regime; GrowOnly or Fire (Woodstock Theme 7) |
| | HarvestLandBaseCodes | Harvest Land Base code; Y, N, or X* (Woodstock Theme 8) |
| | Rotation | Current rotation; EX or RE† (Woodstock Theme 10) |
| | StartingTenYearAge | Forest Operations Inventory Ten Year Age in years in 2013 (Woodstock Theme 11) |
| | StartingAge_inPeriods | Timber stratification age in periods in 2013 (Woodstock Theme 12) |
| | Swiss_Needle_Cast | Swiss needle cast presence; Yes or No (Woodstock Theme 13) |
| | Burn_Regime | Burn regime timing and severity in periods (Woodstock Theme 14) |
| | Wet_Or_Dry_Site | Wet or dry site; W or D (Woodstock Theme 15) |
| Economic | RMPWO_ID | Unique polygon Identification Number |
| | GIS_ACRES | Area in acres |
| | oG_RevCC$ | Gross Revenue from Clearcutting ($) |
| | oG_RevSL$ | Gross Revenue from 2-Age ($) |
| | oG_Rev2A$ | Gross Revenue from Selection ($) |
| | oG_RevThn$ | Gross Revenue from Thins ($) |
| | oG_RevTot$ | Total Gross Revenue ($) |
| | oLog_CC$ | Clearcut Logging Cost ($) |
| | oLog_2A$ | 2-Age Logging Cost ($) |
| | oLog_SL$ | Selection Logging Cost ($) |
| | oLog_Thn$ | Thin Logging Cost ($) |
| | oLog_Tot$ | Total Logging Costs ($) |
| | oUnd_Brn$ | Underburn/Broadcast Burn Cost ($) |
| | oHnd_Brn$ | Hand pile/Burn Cost ($) |
| | oLnd_Brn$ | Landing Pile/Burn Cost ($) |
| | oMchn_Brn$ | Machine Pile/Burn Cost ($) |
| | oSlsh_Sct$ | Slashing/Lop/Scatter Cost ($) |
| | oMstctn$ | Mastication Cost ($) |
| | oPlant$ | Planting Cost ($) |
| | oManClear$ | Manual Clearing Cost ($) |
| | oManCut$ | Manual Cutting Cost ($) |

| Table | Field Name | Description |
|---|---|---|
| | oMulch$ | Mulching Cost ($) |
| | oTubing$ | Leader Protection Cost ($) |
| | oShading$ | Shading Cost ($) |
| | oTrapping$ | Trapping Cost ($) |
| | oScalp$ | Scalping Cost ($) |
| | oHerb$ | Herbicide Cost ($) |
| | oBlstCtrl$ | Blister Rust Control Cost ($) |
| | oPCT$ | Pre-commercial Thin Cost ($) |
| | oFert$ | Fertilization Cost ($) |
| | oPrune$ | Pruning Cost ($) |
| | oConversn$ | Stand Conversion Cost ($) |
| | oTotCosts$ | Total Costs ($) |
| | oNetRev$ | Net Revenue ($) |
| Silviculture | RMPWO_ID | Unique polygon Identification Number |
| | GIS_ACRES | Area in acres |
| | oUnd_Brn_Ac | Underburn/Broadcast Burn Acres |
| | oHnd_Brn_Ac | Hand pile/Burn Acres |
| | oLnd_Brn_Ac | Landing Pile/Burn Acres |
| | oMchn_Brn_Ac | Machine Pile/Burn Acres |
| | oSlsh_Sct_Ac | Slashing/Lop/Scatter Acres |
| | oMstctn_Ac | Mastication Acres |
| | oPlant_Ac | Planting Acres |
| | oManClear_Ac | Manual Clearing Acres |
| | oManCut_Ac | Manual Cutting Acres |
| | oMulch_Ac | Mulching Acres |
| | oTubing_Ac | Leader Protection Acres |
| | oShading_Ac | Shading Acres |
| | oTrapping_Ac | Trapping Acres |
| | oScalp_Ac | Scalping Acres |
| | oHerb_Ac | Herbicide Acres |
| | oBlstCtrl_Ac | Blister Rust Control Acres |
| | oPCT_Ac | Pre-commercial Thin Acres |
| | oFert_Ac | Fertilization Acres |
| | oPrune_Ac | Pruning Acres |
| | oConversn_Ac | Stand Conversion Acres |

* Y = forested, modeled with ASQ harvest; N = forested, modeled without any harvest; X= non-forest
Mbf = thousand board feet

# Vegetation Modeling Team and Interdisciplinary Team Members

## Modeling Team

| | |
|---|---|
| Carolina Hooper | Forester and Vegetation Modeling Coordinator<br>RMPs for Western Oregon Core Team<br>BLM Oregon State Office |
| Mark Rasmussen | Forester and Manager<br>Principal, Mason, Bruce & Girard, Inc. |
| Kendrick Greer | Woodstock Modeler<br>Mason, Bruce & Girard, Inc. |
| Henk Stander | Forester/Woodstock Modeler<br>Mason, Bruce & Girard, Inc. |
| Douglas Larmour | Programmer<br>Mason, Bruce & Girard, Inc. |
| Zach Dewees | Forester<br>Mason, Bruce & Girard, Inc. |
| Brandon Vickery | Forester<br>Mason, Bruce & Girard, Inc. |
| Abe Wheeler | IDT member: Forest Management and Silviculture<br>BLM Roseburg District |
| Craig Kintop | IDT member: Forest Management and Silviculture<br>BLM Roseburg District |

## Inventory Specialists

| | |
|---|---|
| Hugh Snook | Forester (Inventory Specialist)<br>BLM Salem District |
| Joe Graham | Forester (Inventory Specialist)<br>BLM Eugene District |
| Chris Schumacher | Forester (Inventory Specialist)<br>BLM Coos Bay District |
| Terry Fairbanks | Forester (Inventory Specialist)<br>BLM Medford District |
| Kevin Carson | Forester (retired)<br>BLM Roseburg District |
| Robert Pierle | Forester (retired)<br>BLM Eugene District |
| Madelyn Campbell | Forester (Inventory Specialist)<br>BLM Lakeview District |
| Dan Couch | Forester (Inventory Specialist)<br>BLM Roseburg District |

## GIS Team

| | |
|---|---|
| Arthur Miller | Lead GIS Specialist<br>BLM Oregon State Office |
| Craig Ducey | GIS Specialist/NSO Modeling<br>BLM Oregon State Office |
| Gerald (Jay) Stevens | GIS Specialist<br>BLM Oregon State Office |

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# Appendix D – Modeling Large Stochastic Wildfires and Fire Severity within the Range of the Northern Spotted Owl

Raymond Davis, Louisa Evers, Yanu Gallimore, Jena Volpe, and C. Belongie

## Introduction

Wildfire is a natural process within the identified range for the northern spotted owl (*Strix occidentalis caurina*), especially in the southern and eastern portions of the range. While the bird has adapted to wildfire and its effects in an intact landscape, human development and land use have reduced and fragmented habitat and populations in large portions of the region (Davis and Lint 2005, Davis *et al.* 2011). One result has been an increase in the potential for adverse effects of large, high severity wildfires on remnant northern spotted owl habitats and populations. Over the past two decades, large wildfires have accounted for the majority of northern spotted owl nesting and roosting habitat losses on federally managed forests (Davis *et al.* 2011). In addition, fire suppression, inadequate levels of natural or prescribed fire, and climate change are believed to have created conditions considered more favorable for frequent, higher severity, and larger wildfires (Westerling *et al.* 2006, Littell *et al.* 2009, Dillon *et al.* 2011a, Miller *et al.* 2012).

In 2008, the Bureau of Land Management (BLM) attempted to revise six resource management plans in western Oregon, but subsequently withdrew the decisions. A scientific review of that effort noted that one significant weakness was the failure to account for the potential effects of high severity wildfire on habitat for the northern spotted owl, a threatened species under the Endangered Species Act. Specifically, the review stated that the models overestimated amounts of owl habitat and did not assume that any would be lost to high severity wildfire during the projected modeling timeline (Drake *et al.* 2008). To address that weakness under the current planning effort, BLM assembled a team of northern spotted owl experts, fire ecologists, silviculturists, and modelers to develop an approach to model and analyze the potential effects on northern spotted owl habitat and populations from large wildfires.[29] For this analysis, the BLM predicted future wildfire effects based upon historic fire frequency, size, and severity.

This effort also supports a U.S. Fish and Wildlife Service request for the BLM to evaluate whether the resulting plan would provide sufficient habitat to assure persistence of the northern spotted owl for the next 50 years. This estimation of the quantity of habitat affected by fire over the next five decades better informs the development of land management strategies for the BLM-administered lands in western Oregon. This report describes the methods used to determine potential burned area and fire severity, and the results of that analysis. Subsequent modeling will evaluate the potential results on habitat availability

[29] The BLM panel of experts includes listed authors: Raymond Davis, USFS, spotted owl and modeling expertise; Louisa Evers, BLM, fire modeling and climate change expertise; Yanu Gallimore, BLM, fire and fuels management expertise; and Jena Volpe, BLM, fire modeling and fuels management expertise; and C. Belongie, USFS, GIS analysis expertise. These authors conducted the analysis on behalf of the BLM. In addition to these authors, the panel of experts assembled includes: Craig Ducey, BLM, forest stand dynamics modeling expertise; Joe Graham, BLM, forest structure modeling expertise; Richard Hardt, BLM, forest ecology expertise; Bruce Hollen, BLM, northern spotted owl expertise; Carolina Hooper, BLM, Woodstock attribute modeling expertise; Rex McGraw, BLM, forest ecology expertise; Arthur Miller, BLM, forest stand modeling expertise; Eric Greenquist, BLM, northern spotted owl expertise; Bruce Marcot, USFS, northern spotted owl and northern spotted owl modeling expertise; Betsy Glenn, USFWS, northern spotted owl expertise; Jim Thrailkill, USFWS, northern spotted owl expertise; Brendan White, USFWS, northern spotted owl expertise; Jeffery Dunk, Humboldt State University, northern spotted owl habitat modeling expertise; and David LaPlante, Natural Resource-Geospatial, northern spotted owl population response to habitat change expertise.

for the northern spotted owl. Since the BLM conducted this analysis in direct support of the analysis of environmental effects in conjunction with an environmental impact statement, model parameters are constrained by the 'reasonably foreseeable' criteria in BLM's planning regulations.

## Analysis Area

The range of the northern spotted owl used in this analysis extends from the Canadian border through northern California and from the west coast to the eastern foothills of the Cascade and Klamath Mountain ranges. The BLM used the entire range of the northern spotted owl for the analysis area to maintain consistency with the previous fire analyses conducted within the range of the northern spotted owl. The BLM planning area for western Oregon comprises 19,647,000 acres, or approximately 34 percent, of the lands within this range and is located within the core of that range, divided among six Districts (Salem, Eugene, Roseburg, Coos Bay, Medford, and Lakeview) **(Figure D-1)**. The majority of BLM-administered lands consist of a so-called 'checkerboard' pattern (alternating square mile sections), largely intermingled with privately owned industrial and non-industrial forests, along with state-owned lands, and a limited amount of U.S. Forest Service National Forest System lands and Tribal lands. Large contiguous blocks of BLM-administered lands are rare within the range of the northern spotted owl. The largest concentration of BLM-administered lands in western Oregon occurs on the Medford and Roseburg Districts in southwestern Oregon.

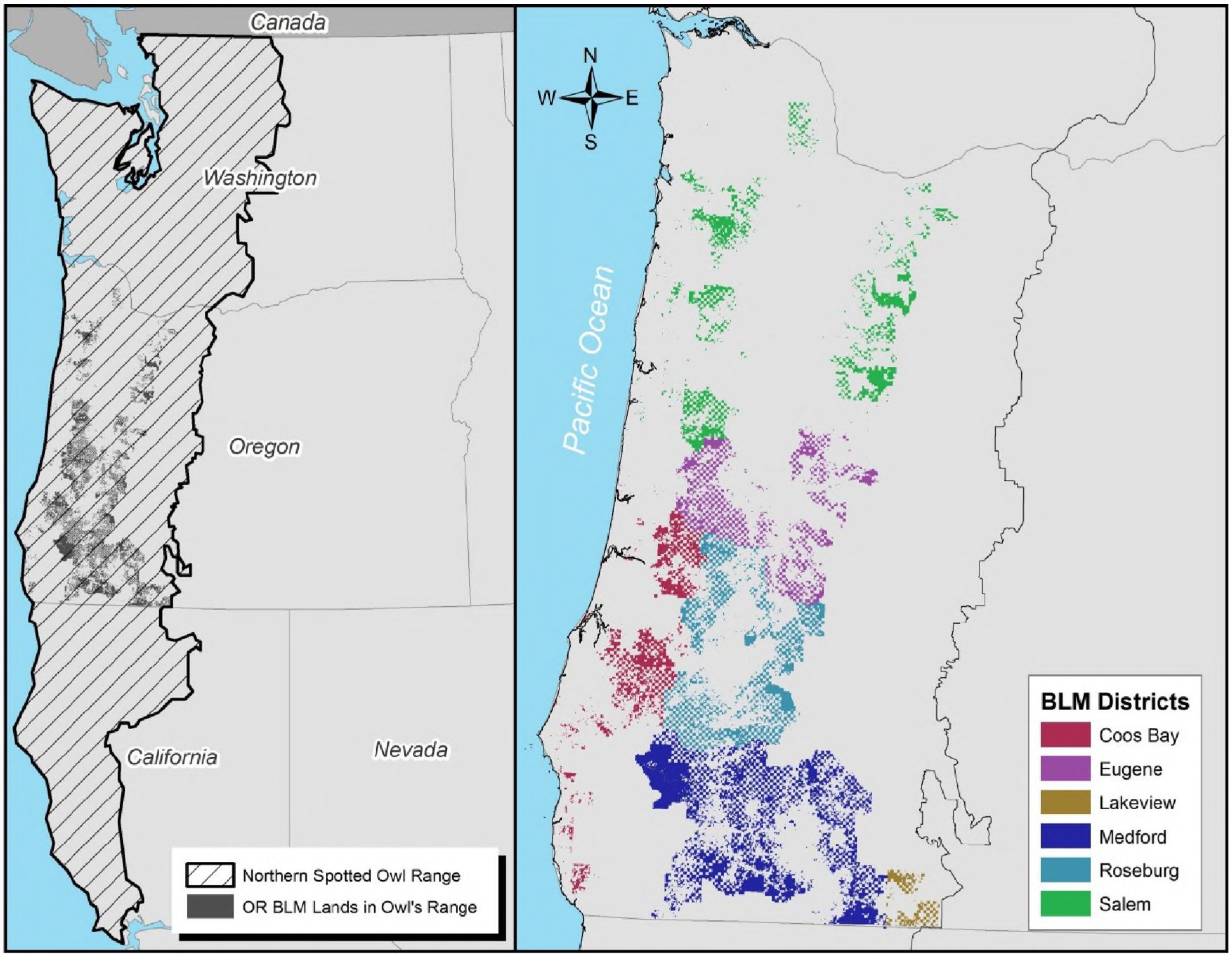

**Figure D-1.** Analysis area for modeling and analysis of potential effects on northern spotted owl habitat and populations from large wildfires (left), and BLM-administered lands within the analysis area by district (right)

Forest types within the analysis area range from dry mixed evergreen forests in California and southwestern Oregon to temperate rainforests along the coast and in much of western Washington. The climate ranges from maritime in western Washington, northwestern Oregon, and the coast; to Mediterranean in southwestern Oregon and northern California. Soils are highly variable in texture, depth, and other characteristics, and derive primarily from volcanic parent materials with ultramafic soils common in southwestern Oregon.

## Methods

The BLM used the entire range of the northern spotted owl as the analytical framework to provide sufficient data to capture the potential range of annual area burned and fire severity proportions. This more accurately reflects impacts to northern spotted owl habitat, unaffected by arbitrary divisions along biologically irrelevant lines such as state, ownership, and administrative boundaries. The modeling regions used in this analysis were similar to those used by the U.S. Fish and Wildlife Service for the revised Northern Spotted Owl Recovery Plan and designation of critical habitat (USDI FWS 2011 and 2012).

The median northern spotted owl territory size ranges from 1,300 to 11,800 acres, depending on geographic location (Appendix B in Davis *et al.* 2011), thus it takes a rather large wildfire to have a substantial effect on one owl territory (Davis and Lint 2005). As such, this analysis evaluates larger wildfires in identifying effects to northern spotted owls using the large wildfire suitability model (LWSM). Developed as part of the 15-year monitoring report for the Northwest Forest Plan (Chapter 4, in Davis *et al.* 2011), the LWSM model is based on large wildfires (≥ 1,000 acres) from 1970 through 2002, and validated against large wildfires that occurred from 2003 through 2009. The LWSM represents a relative probability surface for large wildfire occurrence within the range of the northern spotted owl that has continued to predict the locations of nearly all large wildfires that have occurred since 2009.

Using the regional wildfire history from 1970 through 2013 (4.4 decades), the BLM modeled large wildfires five decades into the future using a three-step process to determine wildfire: 1) number and location, 2) size distribution, and 3) severity.

## Step 1 - Estimating Number and Location of Future Large Wildfires

Records for large wildfire occurrence from 1970 through 2013 show a marked increase in the occurrence of large wildfires in the last decade of this timeframe **(Figure D-2)**. While the decadal totals suggest the number of large wildfires is increasing, the short period of record and the influence of the phase and annual sign of the Pacific Decadal Oscillation are confounding factors in identifying a definite trend. As such, this analysis used the decadal average of 100 large wildfires to generate 500 potential large wildfires over the next 5 decades. To do this, the BLM used the 'Generate Random Points' tool in Geospatial Modeling Environment (GME version 0.7.2.1) software (Beyer 2012) to produce five sets of randomly placed points (n=100) for each decade, using the LWSM as a relative probability surface for point placement. Points could occur anywhere, but were more likely to occur where the probability of a large wildfire (i.e., wildfire suitability) was higher **(Figure D-3)**.

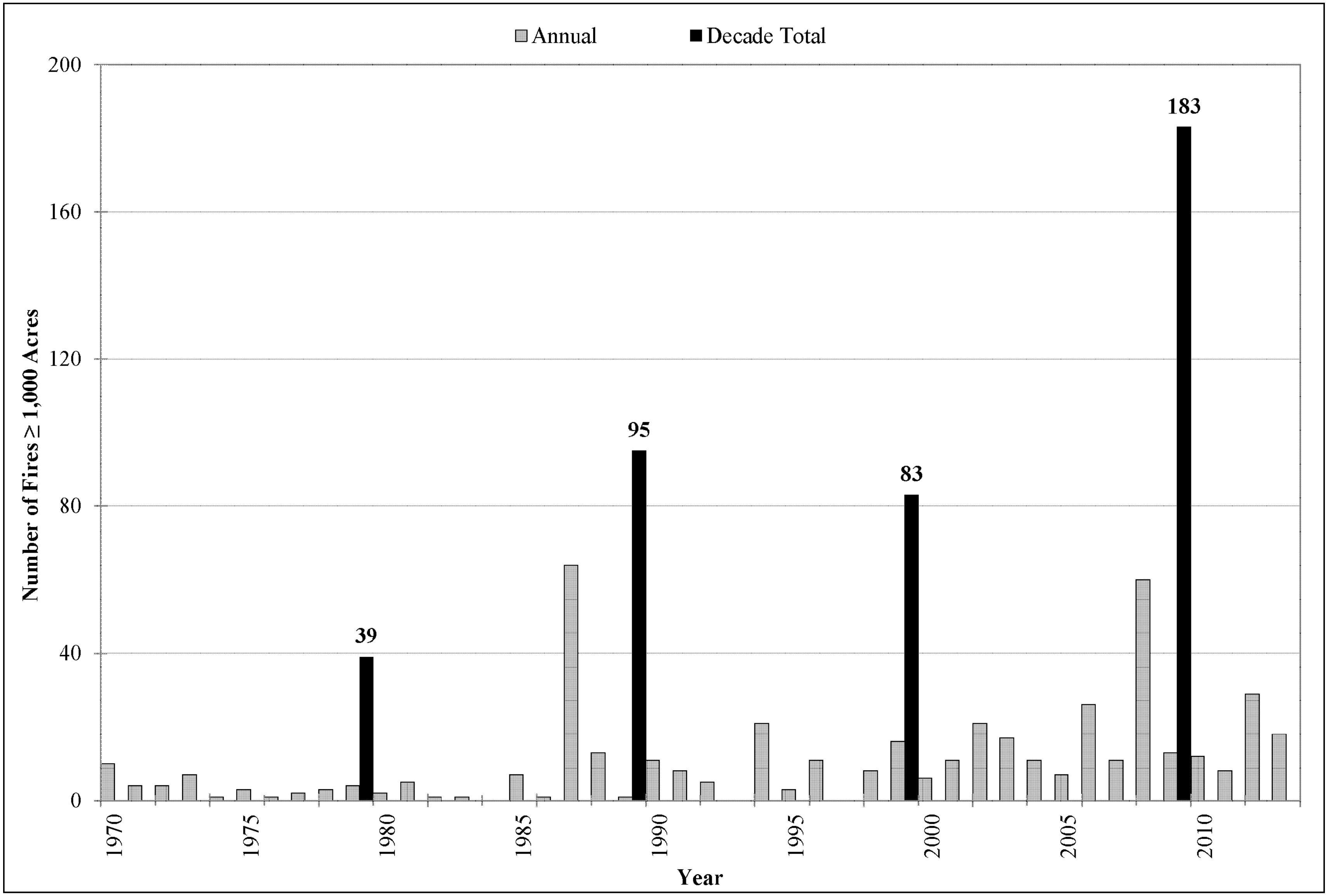


**Figure D-2.** Annual and decadal numbers of large wildfires (≥ 1,000 acres) in the analysis area (1970–2013)

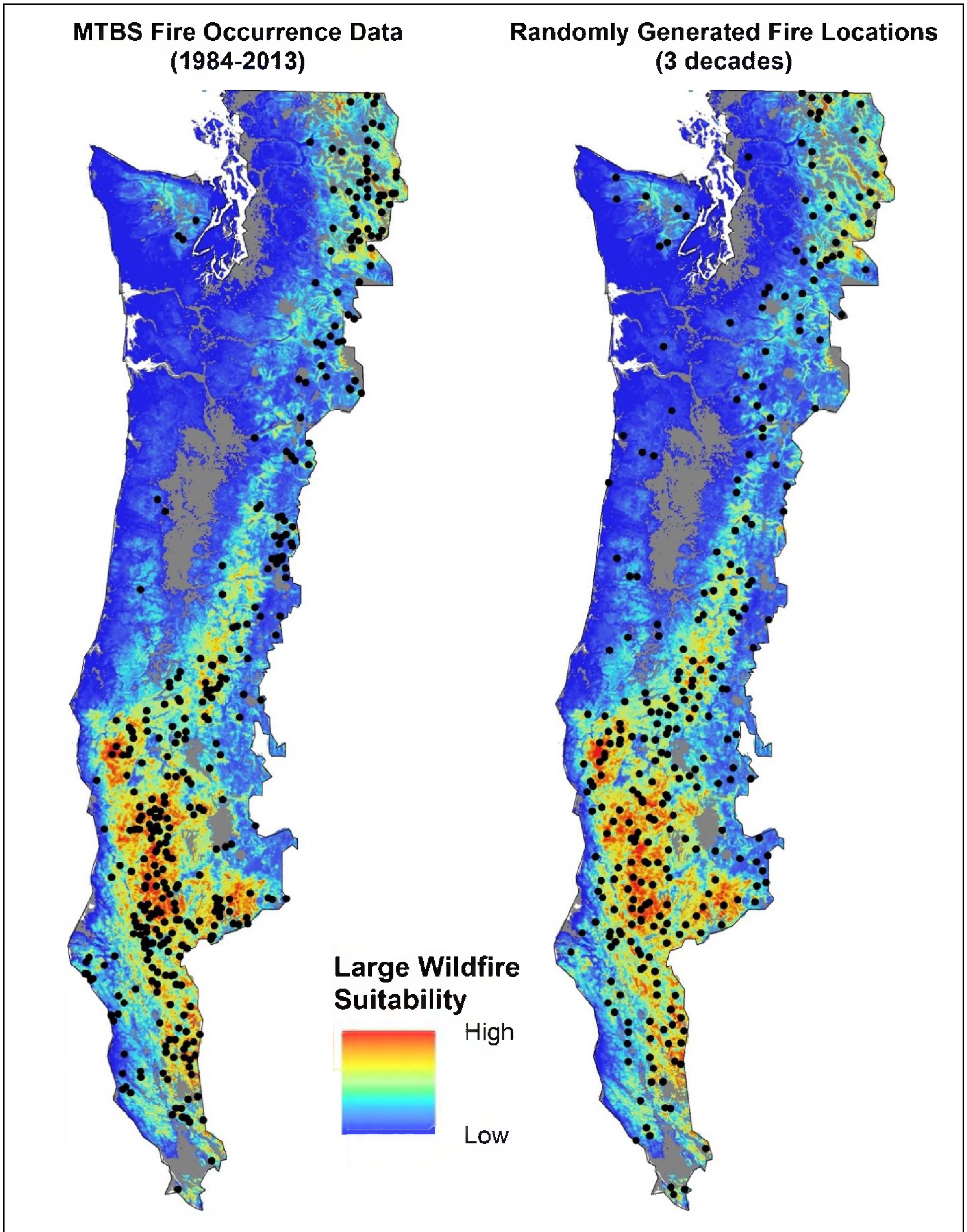


**Figure D-3.** Comparison of three decades of observed large wildfire history from Monitoring Trends in Burn Severity fire occurrence data (left) with the first three decades of randomly generated fire locations (right)

Reburning has been observed within the analysis area on several occasions. For example, the Biscuit Fire in 2002 reburned nearly all of the 1987 Silver Fire, and a portion of this area burned again in 2013. Portions of the 1933 Tillamook Fire area reburned as many as five times before 1960. To account for reburns, the BLM calibrated the model by comparing the area burned by projected large wildfires to the actual area burned by past large wildfires. Initially, the model projected much more reburning than has been observed. To correct for this over-prediction, the BLM added a decadal constraint parameter on reburning by preventing the placement of random points within 5 km of fire 'perimeter' locations from the prior decade. In subsequent decades, and consistent with historical observations, random points could occur within or adjacent to previous modeled fire perimeters. Subsequent model runs produced similar levels of acres burned, and proportion of area reburned, as the observed record.

## Step 2 - Estimating Size of Future Large Wildfires

The LWSM generates an estimate of the number and location of future large wildfires, but does not generate sizes of these future wildfires. To determine acres of future large wildfires, the BLM applied the historical trends in fire size to predict future large wildfire sizes (1970–2013). In the analysis area, the majority (85 percent) of large wildfires burned less than 15,000 acres, and only 1 percent of them exceeded 100,000 acres in size **(Figure D-4)**. Using this information, the BLM created eight large wildfire size class bins to represent the occurrence of future large wildfires **(Figure D-4)**.

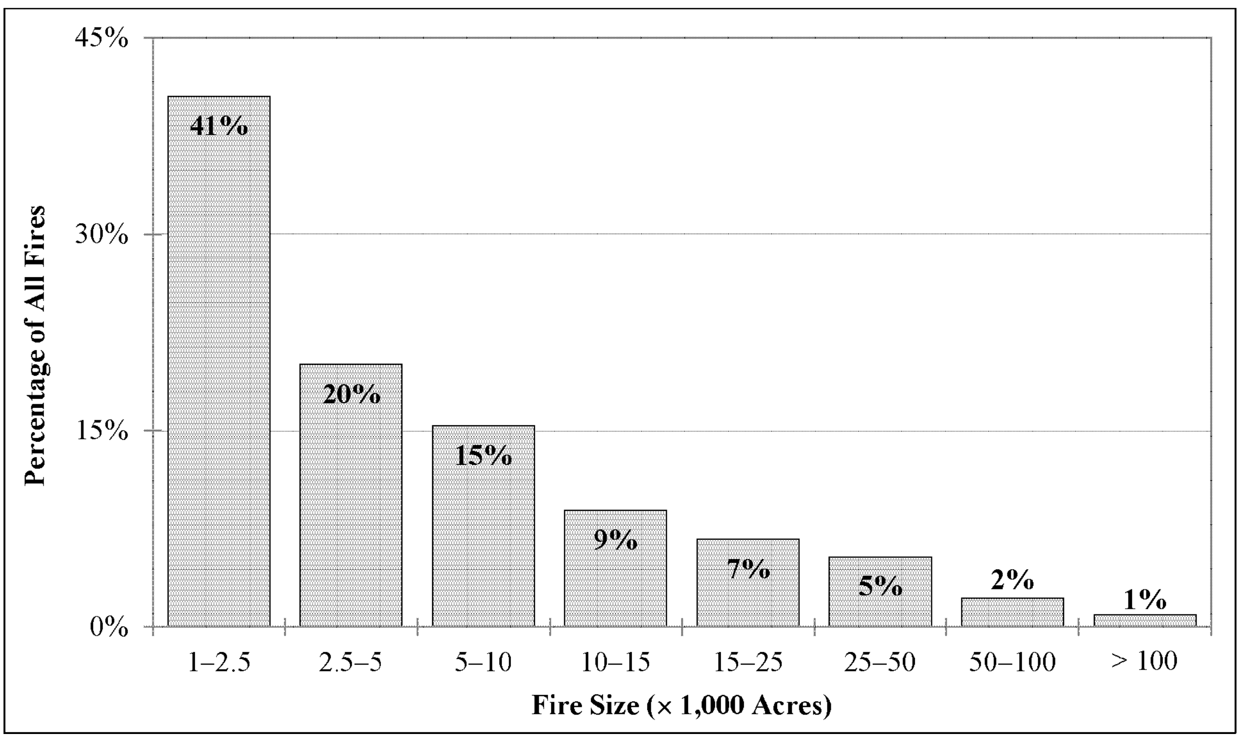


**Figure D-4.** Historical (1970–2013) wildfire distribution by fire size within the range of the northern spotted owl

Because this analysis was more concerned with the overall potential loss of habitat than with accurately representing fire shapes, modeling simply represented wildfires as circles associated with the median sizes. The BLM used the median fire size for each size-class bin to determine the appropriate radius for creating a circular fire perimeter for modeling **(Table D-1)**.

**Table D-1.** Parameters used to assign random points a wildfire size by buffering the point location

| Simulated Wildfire Size (Acres) | Fire Perimeter Radius (Miles) | Simulated Decadal Number of Future Large Wildfires (Random Points) |
|---|---|---|
| 1,250 | 0.79 | 41 |
| 3,750 | 1.37 | 20 |
| 7,500 | 1.93 | 15 |
| 12,500 | 2.55 | 9 |
| 20,000 | 3.15 | 7 |
| 37,500 | 4.32 | 5 |
| 75,000 | 6.11 | 2 |
| 100,000 | 7.05 | 1 |

The BLM then used the underlying LWSM probability layer to apply a fire size to the random points generated by the GME software. The higher the underlying LWSM probability value, the more likely a random point would 'burn' more acres, although smaller fires could also occur in the higher probability areas. Beginning with random points having the lowest wildfire suitability value, the BLM assigned the smallest radius to each point; ending with assignment of the largest radius to the last random point of the highest wildfire suitability score (**Table D-1**). To establish the hypothetical fire perimeters, the BLM buffered each random point by the assigned radii. The resulting individual and overlapping circles represented that decade's 'footprint' of large wildfires. The BLM repeated this process for each decade.

## Step 3 - Estimating Fire Severity of Future Large Wildfires

After determining potential future wildfire locations and sizes, the BLM estimated fire severities within their perimeters. Analysis relied on data from the Severe Fire Potential Map (Dillon *et al.* 2011a and 2011b, Dillon *et al.* 2012) portion of the Fire Severity Mapping Tools (FIRESEV) project (Keane *et al.* 2013) to assign fire severities within each decadal wildfire footprint. The FIRESEV data reflect spatial predictions of the conditional likelihood of high severity fire. The FIRESEV project based these projections on statistical models relating topographic, vegetation, and fire weather variables to empirical satellite-derived wildfire severity from 1984 to 2007 as mapped by the Monitoring Trends in Burn Severity (MTBS) program (Eidenshink *et al.* 2007). The FIRESEV model's spatial predictions use 90$^{th}$ percentile fuel moisture conditions for dryness, although actual fuel moistures often varied over the spatial and temporal extent of any given large fire (Dillon *et al.* 2011a and 2011b, Miller *et al.* 2012).

Since the FIRESEV only estimated the probability for high severity fire, the BLM classified this probability into three quantile classes. The BLM assumed that lower severity fires would occur in areas modeled as having a lower probability for high severity fire and that high severity fires would most likely occur in areas modeled as high probability. These three quantile classes served as our low, moderate, and high severity map classification for assignment of fire severity to the fire footprints created in Step 2. To test this assumption, the BLM compared relative proportions of observed wildfire severity (based on MTBS severity mapping from 1986–2011) to the classified FIRESEV model from the five decadal maps. Comparisons found similar proportions between observed and modeled wildfire severities indicating that the assumption was a valid one and would produce proportions of area burned by low to high severity that were similar to the observed record (**Figure D-5**).

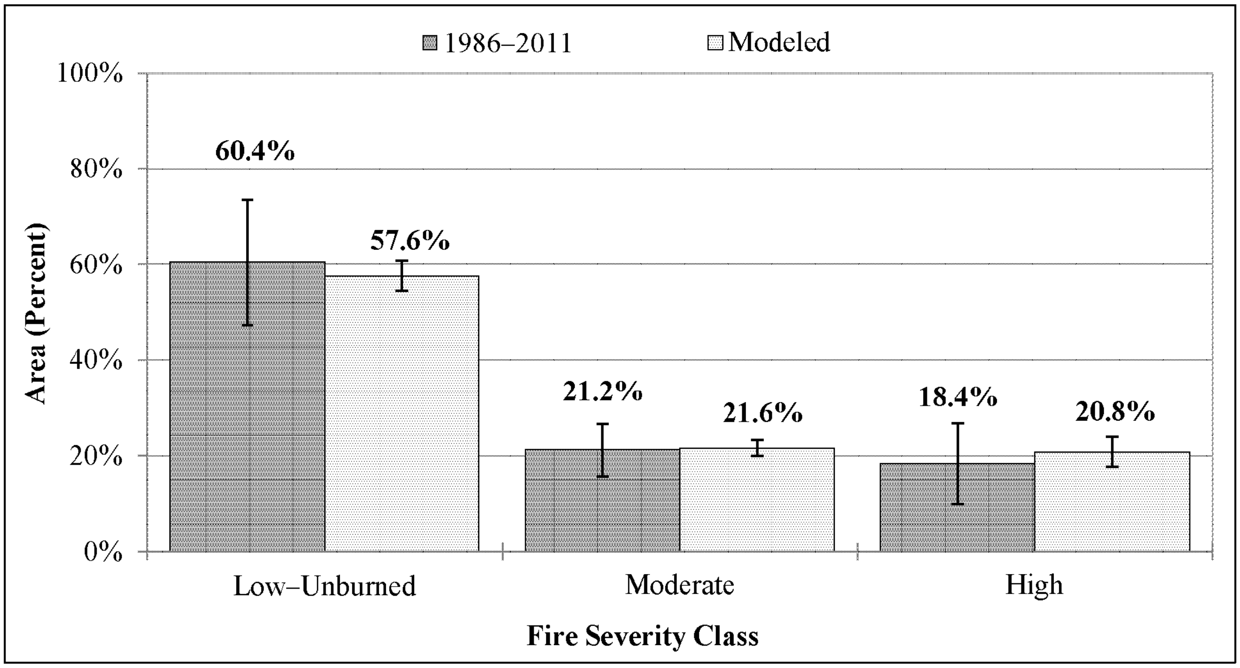


**Figure D-5.** Comparison of annual proportion of area burned by mapped fire severity from MTBS data from 1986 to 2011 with modeled severity based on a three quantile classification of the FIRESEV map for the five decadal models

Note: Labels show modeled estimates of proportion of area burned by severity class.

Finally, the BLM also examined the MTBS data for any obvious temporal trends in wildfire severity, but did not detect a strong signal (**Figure D-6**). Over the course of 25 years, there appears to be a slight increase in the percentage of area burned by low and moderate severity wildfire, and a slight decrease in the percent of area burned in high severity wildfire, although these trends are not statistically significant. Analysis also noted that the variability for area burned in the different severity classes has declined since about 2002, but it is not certain why this apparent smoothing has occurred. Given the non-significance of the observed trends and the uncertainty over whether these slight trends will continue into the future, the BLM did not attempt to model any fire severity trends in our framework.

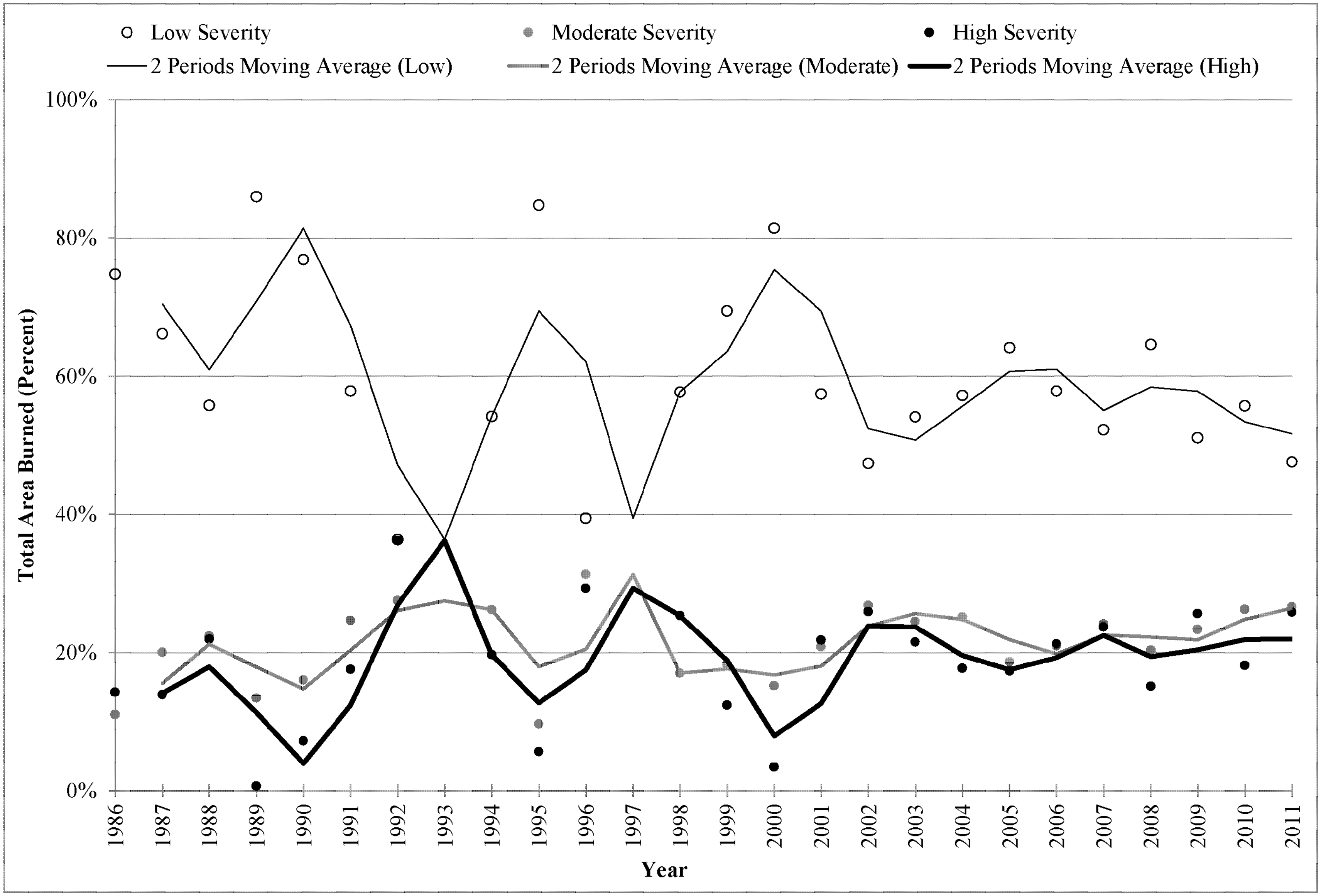


**Figure D-6.** Trends in area burned by fire severity class

# Results

The analysis resulted in five decadal maps of potential large wildfire 'footprints', including potential wildfire severities, over the entire range of the northern spotted owl. Given an average of 100 large wildfires per decade, the model estimated that approximately 4.4 million acres would burn within the range of the northern spotted owl over the next 50 years, with 10 percent of the area burning twice and 0.2 percent burning three times. On BLM-administered lands only, the model estimated that approximately 192,000 acres would burn, with 10 percent burning twice and no areas burning three times. In comparison, approximately 4.4 million acres have burned within the range of the northern spotted owl over the past 44 years (1970–2013), with 16 percent of the area burning twice and 1.6 percent burning three times. In that same time span, approximately 153,500 acres burned on BLM-administered lands, with 16 percent burning twice. Both spatially (**Figure D-7**) and from the burned area comparisons above, the model produced a plausible scenario based on recent observed wildfire history for potential future large wildfires both rangewide and on BLM-administered lands in western Oregon over the next five decades.

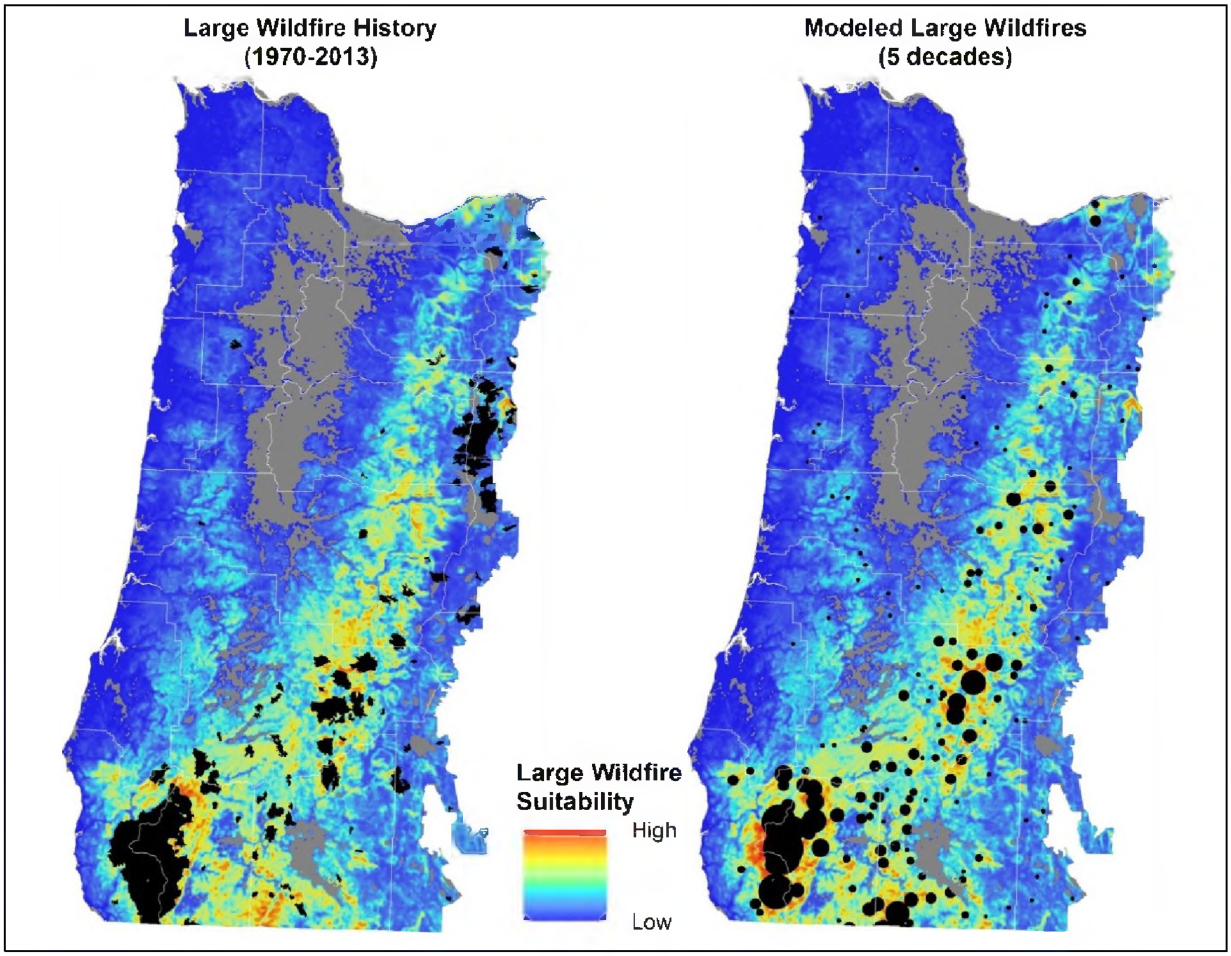


**Figure D-7.** Comparison of actual area burned (black shading) by large wildfires from 1970 to 2013 (left) with modeled large wildfires over 5 decades (right)

## Discussion

For the given analysis period (5 decades), the model projected relatively minor changes in potential burned area within the range of the northern spotted owl generally and on Oregon BLM-administered lands within that range. While the observed decadal trends suggest an increasing trend in the number of large fires over time (**Figure D-2**), it is not clear that this increasing trend will continue. The observed large wildfire history records contain a small number of anomalous years that may distort the data. Particular stand-out years are 1987, 2002, and 2008. The 1987 fire season was particularly severe in southwest Oregon and northwest California, while 2002 was particularly severe in southwest Oregon, and 2008 particularly severe in northwest California. An unusually high number of wildfire starts characterized all three years, and an unusually high number of acres burned. Miller *et al*. (2012) did find an trend of increasing numbers of large fires in the Klamath Mountains of northwestern California, but this same trend is not apparent in the analysis area as a whole (Littell *et al*. 2009, supplemental information). The BLM notes that the current decade (2010–2020) is not quite half over, yet 67 large wildfires have burned as of 2013. It is possible that future decades might incur more than the 100 large wildfires per decade used in this analysis; however, selection of a higher number would be speculative and the BLM instead based the analysis on observations from recent decades.

While several studies have indicated that high severity fires are increasing across the western United States (e.g., Westerling *et al*. 2006, Dillon *et al*. 2011a, Miller *et al*. 2012), no such trends were apparent in the observed record within the range of the northern spotted owl (**Figure D-6**). The observed trends in increasing fire severity in various studies appear to be scale-dependent in that these trends were typically for the western United States as a whole. Much of the observed change is either occurring in areas not encompassed by the range of the northern spotted owl or becomes apparent only when analyzing a larger area that provides a much larger sample size. In such cases, many small changes that are difficult to detect at finer scales can add up to larger, detectable changes for the aggregate area, reflective of how the aggregate number of small emissions of greenhouse gases cumulatively are affecting global climate. In part, trends for area burned as high severity is a function of total area burned – the more area burned, the greater the amount of high severity fire (Dillon *et al*. 2011a, Miller *et al*. 2012). In the absence of any clear trends, The 50-year projection, presented here, falls within a range of reasonably expected outcomes.

Given the uncertainty surrounding trends in frequency, size, and severity, model results may prove, with time, to either underestimate or overestimate potential fire sizes and severity because of several confounding factors not included in the model, such as extreme weather events and interactions with insect outbreaks, management affects to vegetation composition and structure, and climate change. Forest management in particular has potential to alter the outcomes of wildfires (Pollet and Omi 2002, Prichard *et al*. 2010, Kennedy and Johnson 2014, Wimberly and Liu 2014, Stevens-Rumann *et al*. 2013), although it is less clear if forest management can effectively alter the size distribution of large fires (Cochrane *et al*. 2012). Historically, extremely large wildfires have occurred outside of the areas modeled as highly suitable for large wildfires, consistently associated with either extreme weather events, such as the severe drought and east wind event that preceded the initial Tillamook Burn in 1933, or with heavy, continuous, dry fuels, such as following an insect outbreak (McClure 2005, Morris 1935). The large wildfires that do occur in areas of low suitability west of the Cascade crest tend to be infrequent, but extremely large and severe and typically associated severe drought and high winds (Agee 1993, Littell *et al*. 2009, Davis *et al*. 2011). The above management affects to vegetation, stochastic disturbance other than wildfire, extreme environmental variables, and fire occurrence datasets reflective of long fire return interval timelines were not included in this modeling effort.

It was far less clear how to incorporate projected climate changes into the model. The BLM can estimate how the large wildfire suitability area may change as climate changes (**Figure D-8**), based on ensemble climate model results, since LWSMs include climate parameters. However, to what extent these changes may influence the frequency of large wildfires is uncertain. Additionally, large wildfires, particularly in moist forests, in the Pacific Northwest, are at least modestly associated with the phase of the Pacific Decadal Oscillation (PDO) and not associated with the phase of El Niño-Southern Oscillation (ENSO) (Hessl *et al*. 2004, Gedalof *et al*. 2005). Interannual variability within a given PDO phase appears to have a stronger influence than the interdecadal variability, as well (Gedalof *et al*. 2005). Hessl *et al*. (2004) also found about a 5-year lag between PDO and regional fire years in eastern Washington. The period of record used for this large wildfire analysis includes the latter stages of a cool phase PDO that ended in about 1977 and a warm phase that began in 1977 and appears to have ended around 2005 with considerable interannual variability between circa 1998 and 2005 (Gedalof *et al*. 2005, http://www.jisao.washington.edu/pdo/). Given that PDO has apparently entered a cool phase, the number of fires and acres burned should be lower for one or two decades unless the current climate forcing from greenhouse gas emissions 'over-rides' the PDO signal. The apparent increase in number of fires and acres burned may be more a reflection of the combined influences of increasing fuel loadings due to land use changes, the PDO phase, and the sign of PDO in a given year than of a trend useful for predicting future losses of northern spotted owl habitat from wildfire.

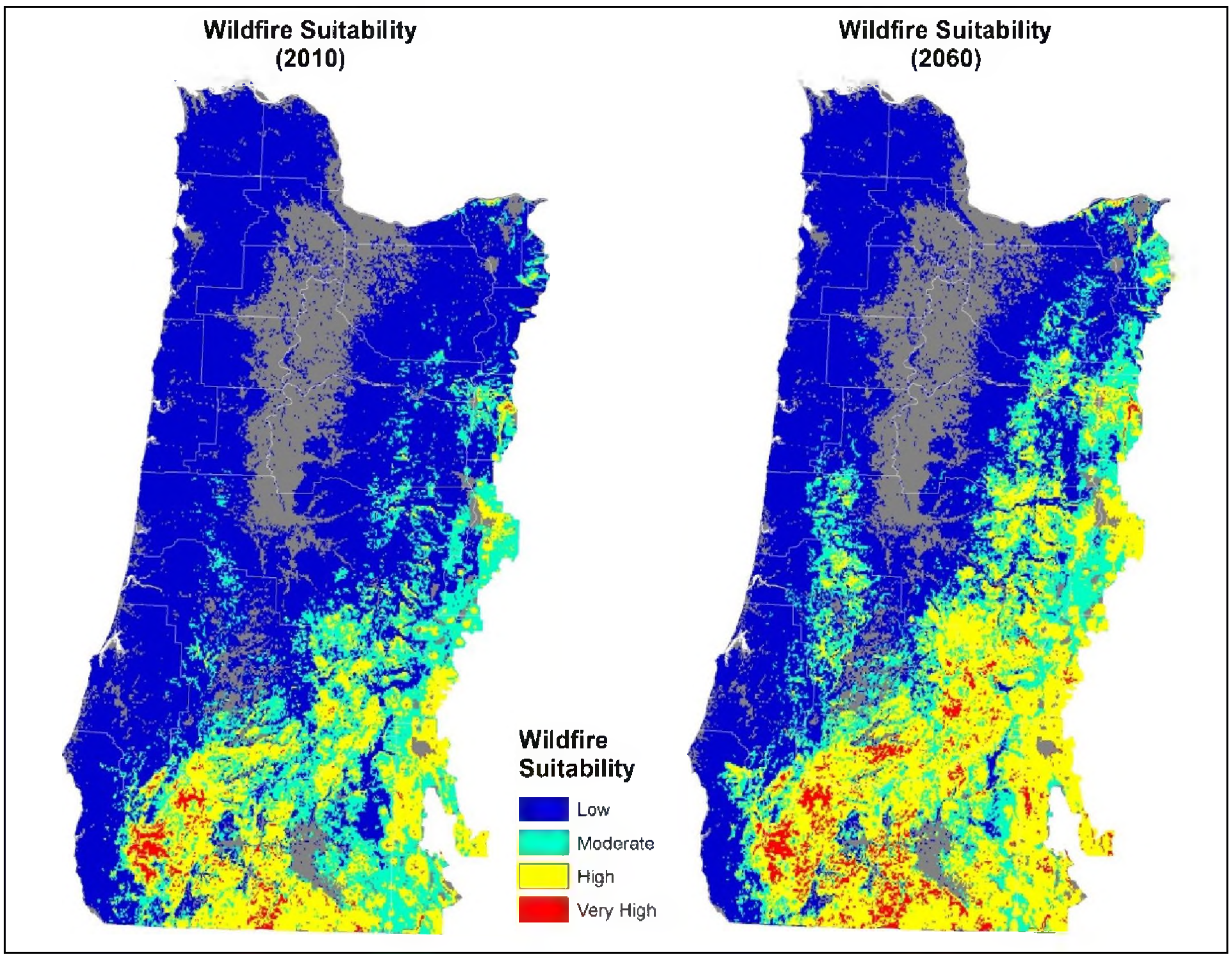


**Figure D-8.** Comparison of a large wildfire suitability model based on the current climate normal (left) with same model based on projected climate normal changes in temperature and precipitation by 2060 (right) (from Yang *et al*. in prep.)

Most climate change projections that discuss wildfire indicate that fires are expected to get larger and more severe. Several studies have found that as the climate warms in forested ecosystems, burned area increases (Westerling *et al.* 2006, Halofsky *et al.* 2011, Loudermilk *et al.* 2013) with large increases projected by mid-century within the range of the northern spotted owl (McKenzie *et al.* 2004, Spracklen *et al.* 2009, Littell *et al.* 2009 and 2010, Rogers *et al.* 2011). Many of these same studies indicate an increase in overall fire severity as well. However, projections in burned area do not inform how to adjust the potential number of fires, the relative distribution of the size classes, or the proportion burned in the different severity classes over time. If these projections are accurate, model results could underestimate the potential of adversely affected northern spotted owl habitat, particularly towards the end of the analysis period.

Lastly, climate change is not linear. Natural variability in the climate system is still an important factor. Thus, overall changes in burned area until mid-century would also not be linear. Experts expect to continue to experience considerable variability in fire season severity (number of fires, acres burned, and extent of high severity fire). Despite the inability to include these confounding factors, the model successfully predicted the locations of many of the large wildfires that occurred in 2013, which were included in the final analysis.

# Conclusions

Over the next 50 years, large wildfires will continue to affect suitable northern spotted owl nesting/roosting habitat on BLM-administered lands. However, wildfires do not always remove nesting/roosting habitat; often low to moderate severity wildfire alters habitat such that it may still be suitable for nesting and roosting. Some spotted owl studies show that low to moderate severity wildfire may actually benefit the owl, perhaps due to changes in prey species habitat (Bond *et al.* 2002, Ganey *et al.* 2014). However, extensive high severity wildfire usually removes nesting/roosting habitats, decreasing survival and occupancy rates related to loss and fragmentation of suitable nesting and roosting habitat (Clark *et al.* 2011 and 2013, Tempel *et al.* 2014).

Although the relationship between large wildfire frequency and severity on owl demography is not fully understood, habitat loss was the primary reason for the bird's decline and subsequent listing as threatened under the Endangered Species Act (USDI FWS 1990). The BLM used the underlying data for the maps produced from this modeling effort as input into the vegetation modeling process **(Appendix C)** to inform the effects of disturbance on habitat loss and recruitment over the next 5 decades. The BLM used the results of the vegetation modeling efforts in the northern spotted owl population analysis for these RMP revisions, which will inform management decisions on lands administered by the BLM in western Oregon.

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# Appendix E – Air Quality

## Estimating Emissions from Wildfires

Wildfire emissions are much more difficult to estimate compared to fuels treatments since there are no records of how much material any given fire consumes. Due to differences in the type of available data, BLM used two different methods for estimating particulate emissions from past and future wildfires.

### Past Wildfires

The BLM downloaded records of all wildfires for the Coos Bay, Eugene, Lakeview, Medford, Roseburg, and Salem Districts from the FAMWEB site (http://fam.nwcg.gov/fam-web/weatherfirecd/), imported them into FireFamily Plus 4.1, extracted all wildfires 100+ acres in size and exported this information to an Excel Spreadsheet. Using a variety of methods, the BLM deleted as many fires as could be identified that burned in the Lakeview Field Office to select just the data for the Klamath Falls Field Office. The BLM combined the data for Coos Bay, Eugene, and Salem into one group and the data for Medford and Roseburg into another group. Over the 34-year period of record (1980–2013), 7,763 acres burned in the Coos Bay-Eugene-Salem group, 277,605 acres in the Medford-Roseburg group, and 29,447 acres in Klamath Falls Field Office.

The BLM downloaded assessments of burn severity for individual large fires that originated on BLM-administered lands between 1984 and 2012, the latest year available, from the Monitoring Trends in Burn Severity website (http://mtbs.gov/data/individualfiredata.html). The BLM averaged acres burned in the difference categories of unburned to low, low, moderate, high, increased greenness, and mask, and calculated the proportion for each category. Mask areas consist of features such as clouds, water and rock as well as missing lines of image data. The BLM combined high, increased greenness, and mask into a single high severity category; and unburned to low and low into a single low severity category. The resulting proportions of area burned were 59.1 percent low severity, 21.8 percent mixed severity (i.e., moderate), and 19.0 percent high severity. Because the documented fire severity record is sparse, the BLM used these same severity proportions across the planning area.

Since preburn fuel loadings are not known, BLM used the Fuels Characteristic Class System (FCCS) module in Fuel & Fire Tools (FERA and UW 2014) to select representative fuelbeds (**Table E-1**). Since the BLM did not know the relative proportion of each fuelbed included in each analysis group, it weighted all fuelbeds equally. In order to assess emissions from the different burn severities, BLM multiplied the total number of acres burned in each group by the proportional amount in the low, mixed, and high severity classes and created separate units in Fuel & Fire Tools. For example, the group comprised of Coos Bay, Eugene, and Salem Districts had three units labeled low, mixed, and high with assigned acres equaling the proportion estimated for each severity class (**Table E-2**). Each unit consisted of the set of fuelbeds selected through FCCS. The Consume module in Fuel & Fire Tools used this information to calculate greenhouse gas emissions for $CO_2$ and $CH_4$. Since the Consume module only uses 1000-hour and duff fuel moisture to drive the consumption algorithms, the BLM could not fully meet the intent of adjusting the amount of live fuel consumed.

**Table E-1.** Fuels Characteristic Classification System fuelbeds used in each analysis group to estimate particulate emissions from wildfire

| District/ Field Office | Fuelbed Number | Fuelbed Name |
|---|---|---|
| Coos Bay – Eugene – Salem | 2 | Western hemlock – western redcedar – Douglas-fir |
| | 5 | Douglas-fir – white fir |
| | 8 | Western hemlock – Douglas-fir – western redcedar/vine maple |
| | 9 | Douglas-fir – western hemlock – western redcedar/vine maple |
| | 10 | Western hemlock – Douglas-fir – Sitka spruce |
| | 11 | Douglas-fir – western hemlock – Sitka spruce |
| | 18 | Douglas-fir/oceanspray |
| | 24 | Pacific ponderosa pine – Douglas-fir |
| | 52 | Douglas-fir – Pacific ponderosa pine/oceanspray |
| | 208 | Grand fir – Douglas-fir |
| | 322 | Sitka spruce – western hemlock |
| Klamath Falls | 20 | Western juniper/curl-leaf mountain mahogany |
| | 24 | Pacific ponderosa pine – Douglas-fir |
| | 25 | Pinyon – Utah juniper |
| | 53 | Pacific ponderosa pine |
| | 55 | Western juniper/sagebrush |
| | 58 | Western juniper/sagebrush |
| | 67 | Interior ponderosa pine – Douglas-fir |
| | 210 | Pinyon – Utah juniper |
| Medford – Roseburg | 2 | Western hemlock – western redcedar – Douglas-fir |
| | 4 | Douglas-fir/*Ceanothus* |
| | 5 | Douglas-fir – white fir |
| | 6 | Oregon white oak – Douglas-fir |
| | 7 | Douglas-fir – sugar pine – tanoak |
| | 15 | Jeffrey pine – red fir – white fir/greenleaf - snowbrush |
| | 16 | Jeffrey pine – ponderosa pine – Douglas-fir – California black oak |
| | 24 | Pacific ponderosa pine – Douglas-fir |
| | 37 | Ponderosa pine – Jeffrey pine |
| | 38 | Douglas-fir – madrone – tanoak |
| | 39 | Sugar pine – Douglas-fir – oak |
| | 208 | Grand fir – Douglas-fir |
| | 215 | Douglas-fir – madrone – tanoak |
| | 239 | Douglas-fir – sugar pine – tanoak |

**Table E-2.** Acres, fuel moistures, and targeted consumption rates for live woody fuels in each severity class for past wildfires

| Live Woody Fuels | Low Severity (Targeted Consumption Rate) | Mixed Severity (Targeted Consumption Rate) | High Severity (Targeted Consumption Rate) |
|---|---|---|---|
| 1,000-hour Fuel Moisture | 20% | 10% | 6% |
| Duff Moisture | 200% | 100% | 10% |
| Shrub Black | - | 50% | 100% |
| Crown Black | - | 50% | 100% |
| **District/ Field Office** | **Low Severity (Acres)** | **Mixed Severity (Acres)** | **High Severity (Acres)** |
| Coos Bay – Eugene – Salem | 1,475 | 1,692 | 4,588 |
| Klamath Falls | 5,595 | 6,419 | 17,403 |
| Medford – Roseburg | 52,745 | 60,518 | 164,065 |

Large fires that originate on BLM-administered lands typically burn onto other lands. However, the future wildfire acres burned applied only to BLM-administered lands. In order to provide an appropriate comparison, BLM had to adjust the emissions from past fires downward. BLM calculated the average number of acres burned using the data for fires that originated on BLM-administered lands and compared that to the average number of acres burned just on BLM-administered lands as reported in Davis *et al.* (2014, p. 7), resulting in a reduction of 62 percent.

### Future Wildfires

The Woodstock harvest model included wildfire under all alternatives and the Proposed RMP, with the number of polygons affected and the type of fire held constant. The BLM modeled only high- and mixed-severity fire. To estimate particulate emissions from future wildfires, the BLM used the estimated acres burned in mixed and high severity fires each period from the Woodstock model. Using the same set of FCCS fuelbeds from **Table E-1** and the same fuel moistures and targeted consumption rates from **Table E-2**, the BLM used Consume to estimate the per acre emissions for particulate matter. Since low-severity fire was not included in Woodstock under the assumption that there was no impact to volume, BLM assumed no change in the proportional relationship between low-, mixed-, and high-severity fire and used the acres burned in mixed and high severity combined to estimate the acres burned in low severity fire. The BLM summarized the results on an average annual basis for each decade analyzed.

## Estimating Emissions from Fuels Treatment

### Past Fuels Treatments

The BLM based estimates of particulate emissions from past prescribed burning on estimated tons of biomass consumed as reported to the Oregon Department of Forestry (ODF) under the State's smoke management plan (http://www.oregon.gov/odf/pages/fire/smp/smkmgtannualrpts.aspx). ODF's reports include prescribed burns on BLM-administered lands in the Other Federal category, which includes U.S. Fish and Wildlife Service and Bureau of Indian Affairs, and consolidates prescribed burns for both Lake and Klamath Counties into a single number. The BLM conducts most of prescribed burning in the Other Federal category, as indicated by the harvest records. The BLM calculated the particulates emitted from burning wood by multiplying the tons consumed with standardized emission factors for $PM_{10}$ and $PM_{2.5}$ (Hardy *et al.* 2001, p. 100).

## Future Fuels Treatments

The BLM used two different methods to estimate emissions from future prescribed burning. For pile burning (hand piles, machine piles, and landing piles), the BLM used a standard description for each type of pile (size, shape, and composition) and a standard estimate of the number of piles per acre to estimate emissions per acre using the pile utility in Consume. The BLM then multiplied these estimates by the number of acres treated by piling. The Woodstock model provided estimates of the acres treated by each type of piling method for harvest treatments and historical averages used for the hazardous fuels program. For broadcast and under burning, BLM selected a single representative fuel bed for each district that would result in the approximate number of tons consumed that had been estimated by past burning, as reported by the Interdisciplinary Team's Fuels Specialist.

## Uncertainty in Hazardous Fuels Emissions

The hazardous fuels program encompasses relatively wide interannual variability in emissions due to higher variability in the fuels treated. To estimate this variability, the BLM conducted two types of analyses to evaluate pile burning and broadcast burning. To estimate the variability in both hand pile and machine pile burning, the BLM used the online pile calculator provided by FERA (available at http://www.fs.fed.us/pnw/fera/research/smoke/piles/) to explore the potential differences in emissions arising from different pile shapes, pile sizes, and number of piles per acre. To explore the variability in underburns/broadcast burns, the BLM estimated emissions by assuming that all acres were the same fuelbed as estimated for Klamath Falls Field Office (low end) and the same fuelbed as estimated for Medford-Roseburg (high end). The BLM did not change the estimated acres burned for each treatment type.

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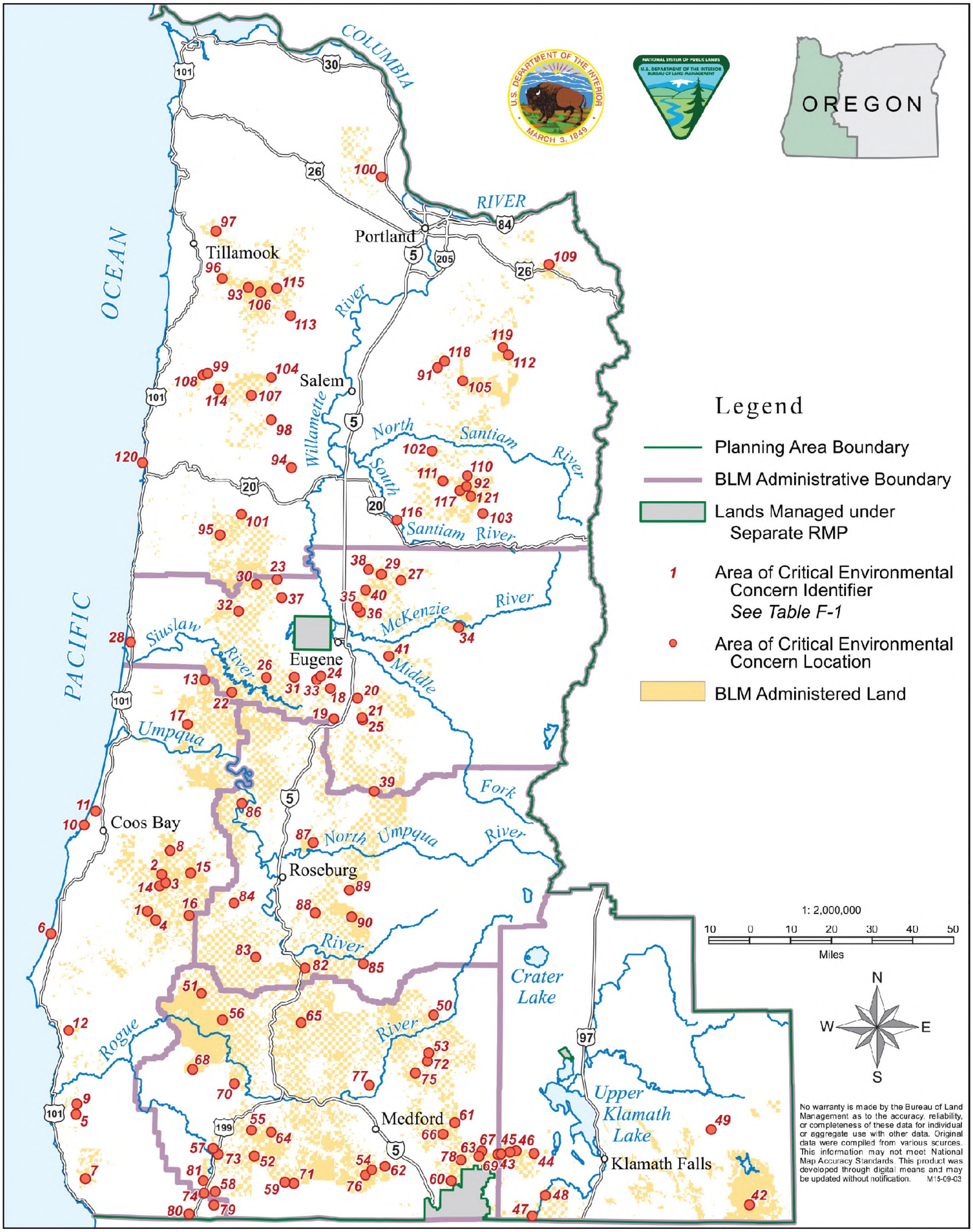
# Appendix F – Areas of Critical Environmental Concern

This appendix provides detailed information about Areas of Critical Environmental Concern (ACECs). **Table F-1** shows ACECs by alternative and the Proposed RMP, and includes the relevant and important value categories, acreages, and designations. For each action alternative and the Proposed RMP, the BLM assigned each potential ACEC to one following categories as shown in **Table F-1**:

- **Yes**, the BLM would designate the entire potential ACEC. The area requires special management to maintain relevant and important values and management would not preclude O&C sustained-yield timber harvest at the stand level in the Harvest Land Base, recreation management in Special Recreation Management Areas, or meeting the management objectives of underlying lands with special designations. Special management may condition, but not preclude, O&C sustained-yield timber production and recreation management.
- **Yes_a**, the BLM would designate a portion of the potential ACEC. The BLM removed portions of the potential ACEC where special management would conflict with O&C sustained-yield timber harvest or recreation management in Special Recreation Management Areas. The BLM determined that the remaining area still supports relevant and important values needing special management.
- **No**, the BLM would not designate the potential ACEC because the area does not require special management to maintain the relevant and important values. Other land designations or land use allocations provide management necessary to retain the relevant and important values.
- **No[1]**, the BLM would not designate the potential ACEC because of conflicts with other management pursuits.
- **No_a**, BLM would not designate the potential ACEC because the special management required to maintain the relevant and important values would preclude O&C sustained-yield timber harvest in the Harvest Land Base.

**Map F-1** displays the ACECs within the planning area by location number identified for each ACEC in **Table F-1**. **Table F-2** provides information about the special management direction that would be applied if the ACEC becomes designated. **Table F-3** contains specific information about the relevant and important values for each ACEC.




**Map F-1:** Areas of Critical Environmental Concern within the Decision Area

**Table F-1.** Areas of Critical Environmental Concern designations by alternative and the Proposed RMP

| District/ Field Office | Location Number on Map F-1 | ACEC Name | Total Area (Acres) | ACEC Designation Categories *(codes explained above)* | | | | | Relevant and Important Value Category |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Alt. A | Alt. B | Alt. C | Alt. D | PRMP | |
| Coos Bay | 1 | Brownson Ridge | 398 | Yes | Yes | Yes_a | Yes_a | Yes | Natural processes |
| Coos Bay | 2 | Cherry Creek RNA | 579 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| Coos Bay | 3 | China Wall | 304 | Yes | Yes | Yes | Yes_a | Yes | Historical, natural processes |
| Coos Bay | 4 | Euphoria Ridge | 241 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Coos Bay | 5 | Hunter Creek Bog | 721 | Yes | Yes | Yes | Yes | Yes | Cultural, fish and wildlife, natural processes |
| Coos Bay | 6 | New River | 1,135 | Yes | Yes | Yes | Yes | Yes | Historical, cultural, fish and wildlife, natural processes |
| Coos Bay | 7 | North Fork Chetco | 431 | Yes | Yes | Yes | Yes | Yes | Historical, cultural, fish and wildlife, natural processes |
| Coos Bay | 8 | North Fork Coquille River | 129 | Yes | Yes | Yes | Yes_a | Yes | Fish and wildlife, natural processes |
| Coos Bay | 9 | North Fork Hunter Creek | 1,924 | Yes | Yes | Yes | Yes | Yes | Historical, cultural, fish and wildlife, natural processes |
| Coos Bay | 10 | North Spit | 709 | Yes | Yes | Yes | Yes | Yes | Cultural, fish and wildlife, natural processes |
| Coos Bay | 11 | North Spit Addition | 45 | No | No | No | No | No | Natural processes |
| Coos Bay | 12 | Rocky Peak | 1,827 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Coos Bay | 13 | Roman Nose | 52 | Yes | Yes | Yes | Yes_a | Yes | Natural processes |
| Coos Bay | 74 | Rough and Ready* | 1,189† | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Coos Bay | 14 | Steel Creek | 1,091 | No | No | No | No | No | Fish and wildlife, natural processes |
| Coos Bay | 15 | Tioga Creek | 41 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| Coos Bay | 16 | Upper Rock Creek | 472 | Yes | Yes_a | Yes_a | Yes_a | Yes_a | Fish and wildlife, natural processes |
| Coos Bay | 79 | Waldo-Takilma | 1,757† | Yes | Yes | Yes | Yes | Yes | Historical, cultural, natural processes |
| Coos Bay | 17 | Wassen Creek* | 1,959 | Yes | Yes | Yes | Yes_a | Yes | Fish and wildlife, natural processes |
| Coos Bay | 80 | West Fork Illinois River RNA* | 1,284 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Eugene | 18 | Camas Swale RNA | 315 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Eugene | 19 | Cottage Grove Old Growth | 76 | No_a | No_a | No_a | Yes | Yes | Natural processes |
| Eugene | 20 | Cougar Mountain Yew Grove | 9 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Eugene | 21 | Dorena Prairie | 10 | Yes | Yes | Yes | Yes | Yes | Natural processes |

| District/ Field Office | Location Number on Map F-1 | ACEC Name | Total Area (Acres) | ACEC Designation Categories *(codes explained above)* | | | | | Relevant and Important Value Category |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Alt. A | Alt. B | Alt. C | Alt. D | PRMP | |
| | 22 | Esmond Lake | 351 | Yes | Yes | No_a | Yes_a | Yes | Fish and wildlife, natural processes |
| | 23 | Ferguson Creek | 23 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 24 | Fox Hollow RNA | 161 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 25 | Garoutte Prairie | 46 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 26 | Grandmother's Grove | 63 | Yes | Yes | Yes_a | Yes_a | Yes | Fish and wildlife, natural processes |
| | 27 | Grassy Mountain | 65 | Yes_a | Yes_a | Yes_a | Yes_a | Yes_a | Natural processes |
| | 28 | Heceta Sand Dunes | 210 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 29 | Horse Rock Ridge RNA | 377 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 30 | Hult Marsh | 167 | No[1] | Yes | Yes | No[1] | No[1] | Natural processes |
| | 31 | Jordan Creek | 21 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 32 | Lake Creek Falls | 54 | Yes | Yes | Yes | Yes | Yes | Cultural, historical, fish and wildlife, natural processes, natural hazards |
| | 33 | Lorane Ponderosa Pine | 106 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 34 | Low Elevation Headwaters of the McKenzie River | 4,360 | Yes_a | Yes_a | Yes_a | Yes_a | Yes | Fish and wildlife, natural processes |
| | 35 | McGowan Meadow | 71 | Yes_a | Yes_a | Yes_a | Yes_a | Yes_a | Fish and wildlife, natural processes |
| | 36 | Mohawk RNA | 289 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 37 | Nails Creek | 57 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 38 | Oak Basin Prairies | 224 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 39 | Upper Elk Meadows RNA | 214 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 40 | Upper Willamette Valley Margin* | 5,973 | Yes_a | Yes_a | Yes_a | Yes_a | Yes_a | Fish and wildlife, natural processes |
| | 41 | Willamette Valley Prairie Oak and Pine Area | 1,664 | Yes | Yes | Yes_a | Yes_a | Yes_a | Fish and wildlife, natural processes |
| Klamath Falls | 42 | Bumpheads | 113 | Yes | Yes | Yes | Yes | Yes | Cultural, natural processes |
| Klamath Falls | 43 | Old Baldy RNA | 355 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Klamath Falls | 44 | Spencer Creek | 137 | No | No_a | No_a | No_a | No | Fish and wildlife, natural processes |
| Klamath Falls | 45 | Surveyor | 182 | No | No | No | No | No | Fish and wildlife, natural processes |
| Klamath Falls | 46 | Tunnel Creek | 79 | Yes | Yes | Yes | Yes | Yes_a | Fish and wildlife, natural processes |

| District/ Field Office | Location Number on Map F-1 | ACEC Name | Total Area (Acres) | ACEC Designation Categories *(codes explained above)* | | | | | Relevant and Important Value Category |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Alt. A | Alt. B | Alt. C | Alt. D | PRMP | |
| | 47 | Upper Klamath River* | 5,206 | Yes | No_a | No_a | Yes | Yes_a | Historical, cultural, scenic, fish and wildlife |
| | 48 | Upper Klamath River Addition* | 874 | Yes | No_a | No_a | Yes | Yes_a | Cultural, scenic, fish and wildlife, natural processes |
| | 49 | Yainax Butte | 706 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Medford | 50 | Baker Cypress | 43 | Yes | Yes | Yes | Yes | Yes | Cultural, scenic, fish and wildlife, natural processes |
| | 51 | Bobby Creek RNA | 1,914 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 52 | Brewer Spruce RNA | 1,704 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 53 | Cobleigh Road | 1,096 | Yes | Yes | Yes | Yes | Yes | Cultural, natural processes |
| | 54 | Dakubetede | 1,781 | Yes_a | Yes_a | Yes_a | Yes_a | Yes_a | Cultural, natural processes |
| | 55 | Deer Creek | 4,090 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 56 | East Fork Whiskey Creek RNA | 3,135 | Yes_a | Yes_a | Yes_a | Yes_a | Yes_a | Natural processes |
| | 57 | Eight Dollar Mountain | 1,250 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 58 | French Flat | 652 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 59 | Grayback Glades RNA | 1,018 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 60 | Green Springs Mountain Scenic | 959 | No | No | No | No | No | Scenic |
| | 61 | Hole-in-the-Rock | 63 | Yes | Yes | Yes | Yes | Yes | Scenic, natural processes |
| | 62 | Holton Creek RNA | 421 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 63 | Hoxie Creek | 256 | No | No_a | No_a | No | No | Fish and wildlife, natural processes |
| | 64 | Iron Creek | 285 | No | No | No | No | No | Fish and wildlife, natural processes |
| | 65 | King Mountain Rock Garden | 67 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 66 | Lost Lake RNA | 386 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 67 | Moon Prairie | 27 | No | No_a | No | No | Yes_a | Natural processes |
| | 68 | North Fork Silver Creek RNA | 499 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 69 | Old Baldy RNA | 115 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 70 | Pickett Creek | 78 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 71 | Pipe Fork RNA | 516 | Yes | Yes | Yes | Yes | Yes | Natural processes |

| District/ Field Office | Location Number on Map F-1 | ACEC Name | Total Area (Acres) | ACEC Designation Categories *(codes explained above)* | | | | | Relevant and Important Value Category |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Alt. A | Alt. B | Alt. C | Alt. D | PRMP | |
| | 72 | Poverty Flat | 29 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 73 | Reeves Creek | 118 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 74 | Rough and Ready* | 1,189† | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 75 | Round Top Butte RNA | 606 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 76 | Sterling Mine Ditch | 143 | Yes | Yes | Yes | Yes | Yes | Cultural, natural processes |
| | 77 | Table Rocks | 1,282 | Yes | Yes | Yes | Yes | Yes | Cultural, scenic, fish and wildlife, natural processes |
| | 78 | Tin Cup | 82 | No | No | No | No | No | Fish and wildlife, natural processes |
| | 79 | Waldo-Takilma | 1,757† | Yes | Yes | Yes | Yes | Yes | Historical, cultural, natural processes |
| | 81 | Woodcock Bog RNA | 264 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| Roseburg | 82 | Bear Gulch RNA | 351 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 83 | Beatty Creek RNA | 1,235 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 84 | Bushnell-Irwin Rocks RNA | 1,089 | Yes | Yes | Yes | Yes | Yes | Scenic, fish and wildlife, natural |
| | 85 | Callahan Meadows RNA | 82 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 86 | Myrtle Island RNA | 20 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 87 | North Bank | 6,523 | Yes_a | Yes_a | Yes_a | Yes_a | Yes_a | Fish and wildlife, natural processes, cultural |
| | 88 | North Myrtle Creek RNA | 453 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 89 | Red Ponds RNA | 141 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 90 | Tater Hill RNA | 304 | Yes | Yes | Yes | Yes | Yes | Natural processes, natural hazard |
| Salem | 91 | Beaver Creek | 24 | No | No | No | No | No | Natural processes |
| | 92 | Crabtree Complex RNA | 1,251 | Yes | Yes | Yes | Yes | Yes | Scenic, fish and wildlife, natural processes |
| | 93 | Elk Creek* | 940 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 94 | Forest Peak RNA | 160 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 95 | Grass Mountain RNA | 1,305 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 96 | High Peak - Moon Creek RNA | 1,500 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 97 | Little North Fork Wilson River | 1,825 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 98 | Little Sink RNA | 80 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 99 | Lost Prairie | 60 | Yes | Yes | Yes | Yes | Yes | Natural processes |

| District/ Field Office | Location Number on Map F-1 | ACEC Name | Total Area (Acres) | ACEC Designation Categories *(codes explained above)* | | | | | Relevant and Important Value Category |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Alt. A | Alt. B | Alt. C | Alt. D | PRMP | |
| | 100 | Lower Scappoose Eagle | 314 | Yes | Yes | No_a | Yes | Yes | Fish and wildlife |
| | 101 | Mary's Peak ONA | 491 | Yes | Yes | Yes | Yes | Yes | Scenic, natural processes |
| | 102 | McCully Mountain | 102 | Yes | Yes | Yes | Yes | Yes | Scenic, fish and wildlife, natural processes |
| | 103 | Middle Santiam Terrace | 206 | Yes | Yes | Yes | Yes | Yes | Cultural, natural processes |
| | 104 | Mill Creek Ridge | 113 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 105 | Molalla Meadows | 144 | No | No | No | No | No | Scenic, fish and wildlife, natural processes |
| | 106 | Nestucca River* | 1,179 | Yes | Yes | Yes | Yes | Yes | Scenic, fish and wildlife |
| | 107 | Rickreall Ridge | 604 | Yes | Yes | No_a | Yes | Yes | Natural processes |
| | 108 | Saddle Bag Mountain RNA | 304 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 109 | Sandy River ONA* | 11,045 | Yes | Yes | Yes | Yes | Yes | Historical, scenic, fish and wildlife, natural processes |
| | 110 | Silt Creek | 118 | Yes | Yes | Yes | Yes | Yes | Historical, fish and wildlife, natural processes |
| | 111 | Snow Peak | 1,186 | Yes | Yes | Yes | Yes | Yes | Historical, fish and wildlife, natural processes |
| | 112 | Soosap Meadows | 343 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 113 | The Butte RNA | 41 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 114 | Valley of the Giants* | 1,667 | Yes | Yes | Yes | Yes | Yes | Scenic, fish and wildlife, natural processes |
| | 115 | Walker Flat | 10 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 116 | Waterloo | 8 | Yes | Yes | Yes | Yes | Yes | Natural processes |
| | 117 | White Rock Fen | 66 | Yes | Yes | Yes | Yes | Yes | Fish and wildlife, natural processes |
| | 118 | Wilhoit Springs | 136 | Yes_a | Yes_a | No_a | No_a | Yes_a | Historical, natural processes |
| | 119 | Williams Lake | 74 | Yes | No_a | No_a | Yes | No_a | Natural processes |
| | 120 | Yaquina Head ONA | 91 | No | No | No | No | No | Cultural, scenic, fish and wildlife, natural processes |
| | 121 | Yellowstone Creek* | 805 | Yes | Yes | Yes | Yes | Yes | Scenic, fish and wildlife, natural processes |

* ACEC designation acres would be less than the acres analyzed due to priority given to preservation designations, such as national designations, designated and suitable Wild and Scenic Rivers, the Pacific Crest Trail, Wilderness Study Areas, and District-Designated Reserve – Lands Managed for their Wilderness Characteristics.
† The Rough and Ready and Waldo-Takilma ACECs include acres on both the Coos Bay and Medford Districts.

**Table F-2.** Management direction for Areas of Critical Environmental Concern

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| Coos Bay | Brownson Ridge | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Low potential, withdrawal not necessary | Manage vegetation (including timber harvest) to promote late-successional structure in younger stands | N/A |
| Coos Bay | Cherry Creek | Limited | Open–No Surface Occupancy | Closed | Withdrawn in 1965 by PLO 3530 | No timber harvest | N/A |
| Coos Bay | China Wall | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Low potential, withdrawal not necessary | Manage vegetation to restore and maintain meadow habitat. | N/A |
| Coos Bay | Euphoria Ridge | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Low potential, withdrawal not necessary | N/A | N/A |
| Coos Bay | Hunter Creek Bog | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to restore and maintain bog habitat | N/A |
| Coos Bay | New River | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to restore and maintain meadow and plover habitats | N/A |
| Coos Bay | North Fork Chetco | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Recommend for withdrawal | Manage vegetation (including timber harvest) to promote late-successional structure in younger stands; conduct treatments to control sudden oak death disease | N/A |
| Coos Bay | North Fork Coquille River | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Low potential, withdrawal not necessary | No timber harvest | N/A |
| Coos Bay | North Fork Hunter Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to restore and maintain meadow, oak woodland, shrub, and Jeffery pine habitats | N/A |
| Coos Bay | North Spit | Limited | Open–No Surface Occupancy | Closed | Withdrawn in 2000 | Manage vegetation to restore and maintain wetland and plover habitats | N/A |
| Coos Bay | North Spit Addition | Limited | Open–No Surface Occupancy | Closed | Withdrawn in 2000 | N/A | N/A |
| Coos Bay | Rocky Peak | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to restore and maintain meadow habitat | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Roman Nose | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Manage vegetation to restore and maintain meadow habitat | N/A |
| | Steel Creek | Limited | Open–No Surface Occupancy | Closed | Geology not suitable | No timber harvest | N/A |
| | Tioga Creek | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Low potential, withdrawal not necessary | No timber harvest | N/A |
| | Upper Rock Creek | Limited | Open–No Surface Occupancy | Low Potential, Closure Not Necessary | Low potential, withdrawal not necessary | No timber harvest | N/A |
| | Wassen Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | West Fork Illinois River | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Eugene | Camas Swale | Closed | Open–No Surface Occupancy | Closed | N/A | N/A | |
| | Cottage Grove Old Growth | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | No timber harvest | |
| | Cougar Mountain Yew Grove | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | |
| | Dorena Prairie | Limited | Open–No Surface Occupancy | Closed | Previously withdrawn | N/A | |
| | Esmond Lake | Limited | Open–No Surface Occupancy | Closed | Geology not suitable | Manage young stands for late-successional forest; preclude harvest in existing late successional stands | N/A |
| | Ferguson Creek | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | Restoration management for prairie/oak/woodland | N/A |
| | Fox Hollow | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | Forest management for maintenance and restoration of R&Is | N/A |
| | Garoutte Prairie | Limited | Open–No Surface Occupancy | Closed | Previously withdrawn | N/A | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Grandmother's Grove | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | Maintain, protect, or restore natural processes or systems; Forest management for maintenance and restoration of R&Is | N/A |
| | Grassy Mountain | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management to maintain hydrological integrity of meadow/grassland | N/A |
| | Heceta Sand Dunes | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for restoration management of dunes | N/A |
| | Horse Rock Ridge | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is | N/A |
| | Hult Marsh | Limited | Open–No Surface Occupancy | Closed | Geology not suitable | Forest management to maintain scenic quality and hydrologic function | N/A |
| | Jordan Creek | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | Forest restoration management for pine/oak/woodland | N/A |
| | Lake Creek Falls | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | N/A | N/A |
| | Lorane Ponderosa Pine | Closed | Open–No Surface Occupancy | Closed | Geology not suitable | Forest management for maintenance and restoration of R&Is | N/A |
| | Low Elevation Headwaters of the McKenzie River | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal area originally identified as Marten Bald | Forest management for maintenance and restoration of R&Is | N/A |
| | McGowan Meadow | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage for meadow habitat. | N/A |
| | Mohawk | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is. | N/A |
| | Nails Creek | Limited | Open–No Surface Occupancy | Closed | Geology not suitable | Forest management for maintenance and restoration of R&Is | N/A |
| | Oak Basin Prairies | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is; enhance oak habitats | N/A |
| | Upper Elk Meadows | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is | N/A |
| | Upper Willamette Valley Margin | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Willamette Valley Prairie Oak and Pine Area | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is | N/A |
| Klamath Falls | Bumpheads | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | N/A | Maintain gap fence to exclude livestock |
| | Old Baldy | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | Closed |
| | Spencer Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Forest management for maintenance and restoration of R&Is | Closed |
| | Surveyor | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | Open with stipulations: fencing to control livestock grazing |
| | Tunnel Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | Open with stipulations: fencing to keep livestock out of sensitive wetland areas |
| | Upper Klamath River | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | Closed |
| | Upper Klamath River Addition | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | Closed |
| | Yainax Butte | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | Maintain current management |
| Medford | Baker Cypress | Closed | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Thin Baker's cypress stand and adjacent mixed-conifer stands, pile burn, and broadcast burn to stimulate Baker's cypress regeneration | N/A |
| | Bobby Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Brewer Spruce | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Cobleigh Road | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Manage vegetation to improve and maintain habitat for Gentner's fritillary | Open with stipulations: monitor important values and fence or implement other protection measures if needed |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Dakubetede | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to maintain natural communities and habitat for Gentner's fritillary and other rare plants | N/A |
| | Deer Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Ensure protection of cave system microclimate and water quality during vegetation management treatments | N/A |
| | East Fork Whiskey Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Eight Dollar Mountain | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to improve and maintain habitat for rare plants | N/A |
| | French Flat | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to improve and maintain habitat for Cook's lomatium | N/A |
| | Grayback Glades | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Green Springs Mountain Scenic | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Manage vegetation to maintain meadows and oak woodlands | Open with stipulations: monitor important values and fence or implement other protection measures if needed |
| | Hole-in-the-Rock | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Maintain no-harvest buffer around arch to protect from damage and to maintain scenic value | Current Condition |
| | Holton Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Hoxie Creek | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Limited treatments for restoration and fire resiliency, potentially resulting in commercial products | Open with stipulations: monitor important values and fence or implement other protection measures if needed |
| | Iron Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | N/A | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | King Mountain Rock Garden | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to maintain natural communities and rare plant habitat | N/A |
| | Lost Lake | Closed | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | No timber harvest | Closed |
| | Moon Prairie | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Use uneven-aged management to improve forest structure and fire resiliency while retaining legacy trees | Current Condition |
| | North Fork Silver Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Old Baldy | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | No timber harvest | Closed |
| | Pickett Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to improve and maintain habitat for Gentner's fritillary | N/A |
| | Pipe Fork | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Poverty Flat | Closed | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Conduct prescribed burns or other treatments to maintain vernal pool habitat | Closed: maintain existing fences |
| | Reeves Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to improve and maintain habitat for Cook's lomatium | N/A |
| | Rough and Ready | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to maintain natural communities and rare plant habitat | N/A |
| | Round Top Butte | Closed | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Manage vegetation to maintain natural communities | Closed: maintain existing fences |
| | Sterling Mine Ditch | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to maintain natural communities and rare plant habitat | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Table Rocks | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to maintain and enhance rare plant habitat, oak woodlands, and other vegetation communities | Closed |
| | Tin Cup | Limited | Open–No Surface Occupancy | Closed | Low potential, withdrawal not necessary | Limited treatments for restoration and fire resiliency, potentially resulting in commercial products | Open with stipulations: monitor important values and construct fencing or implement other protection measures if needed |
| | Waldo-Takilma | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to maintain natural communities and rare plant habitat | N/A |
| | Woodcock Bog | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation for fire resiliency and to maintain natural communities and rare plant habitat | N/A |
| Roseburg | Bear Gulch | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Roseburg | Beatty Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Roseburg | Bushnell-Irwin Rocks | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Roseburg | Callahan Meadows | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Roseburg | Myrtle Island | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Roseburg | North Bank | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to maintain oak and conifer woodlands according to the North Bank Habitat Management Area/ACEC Record of Decision, Habitat Management Plan and Monitoring Plan (USDI BLM 2001) | N/A |
| Roseburg | North Myrtle Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Red Ponds | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Tater Hill | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Salem | Beaver Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to maintain oak woodland and native prairie flora | N/A |
| Salem | Crabtree Complex | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Consistent with management direction for the LSR and RR, manage vegetation with limited silvicultural treatments of the Outstanding Natural Area to maintain and enhance the scenic quality and native plant communities | N/A |
| Salem | Elk Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation with selection harvests and variable retention to promote the development or maintenance of late seral habitat in previously entered stands | N/A |
| Salem | Forest Peak | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Salem | Grass Mountain | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Salem | High Peak - Moon Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| Salem | Little North Fork Wilson River | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to promote the development or maintenance of late seral habitat | N/A |
| Salem | Little Sink | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Lost Prairie | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Consistent with management direction for the O&C harvest land base MITA suballocation, design timber harvests with consideration to maintain the R&I values; manage vegetation to maintain and enhance the fen and meadow habitats, rare botanical species occurrences, mixed conifer species, and older forest structure; Management can include projects in young stands to promote the development of old-growth characteristics and to reduce fire hazards | N/A |
| | Lower Scappoose Eagle | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to maintain or enhance bald eagle habitat; consistent with management direction for the O&C harvest land base MITA suballocation, design timber harvests with consideration to maintain the R&I values | N/A |
| | Mary's Peak | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to enhance scenic, botanical, and wildlife habitat values | N/A |
| | McCully Mountain | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to maintain meadow and forest edge habitat | N/A |
| | Middle Santiam Terrace | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Consistent with management direction for the O&C harvest land base MITA suballocation, design timber harvests with consideration to maintain the R&I values | N/A |
| | Mill Creek Ridge | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation primarily to enhance oak and meadow habitats and to maintain botanical, wildlife and natural system values; consistent with management direction for the O&C harvest land base LITA suballocation, design timber harvests with consideration to maintain the R&I values | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Molalla Meadows | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to enhance oak woodland, native prairie flora and to maintain the scattered Oregon white oaks; vegetation management may include limited timber harvest with an emphasis on maintaining the R&I values | N/A |
| | Nestucca River | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to maintain and enhance scenic and wildlife values | N/A |
| | Rickreall Ridge | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Consistent with management direction for the O&C harvest land base LITA suballocation, design timber harvests with consideration to maintain the R&I values; manage vegetation (including timber harvests) to enhance the mosaic of special habitats and plant communities, with emphasis on protecting native plant communities and microclimate around the ridge in the northeastern corner | N/A |
| | Saddle Bag Mountain | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Sandy River | Limited | Open–No Surface Occupancy for most of the ACEC, minerals are owned by non-Federal entities in portions of parcels 14 and 33 | Closed for most of the ACEC, minerals are owned by non-Federal entities in portions of parcels 14 and 33 | Recommend for withdrawal for most of the ACEC, minerals are owned by non-Federal entities in portions of parcels 14 and 33 | Consistent with management direction for the O&C harvest land base MITA and LITA suballocations, design timber harvests with consideration to maintain the R&I values; forest management on the lands acquired with LWCF funding in T. 2 S., R. 5 E., Sections 9–16, that are also in the HLB, would comply with the LWCF Act; manage vegetation to maintain or restore native plant communities through invasive plant treatments and native plantings | N/A |
| | Silt Creek | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest: Active landslide area | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Snow Peak | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Consistent with management direction for the O&C harvest land base MITA suballocation, design timber harvests with consideration to maintain the R&I values; management for the R&I values would not preclude sustained-yield timber harvest | N/A |
| | Soosap Meadows | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Consistent with management direction for the O&C harvest land base MITA and LITA suballocations, design timber harvests to maintain existing hydrologic conditions and the natural ecology of the subalpine meadows. | N/A |
| | The Butte | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Valley of the Giants | Limited | BLM does not own sub-surface mineral rights, except for T. 7 S., R. 8 W., Section 31 NE¼ | Closed | Recommend for withdrawal | Consistent with management direction for the O&C harvest land base MITA and LITA suballocations, design timber harvests to not detract from the maintenance of the R&I values; manage vegetation with an emphasis on maintaining and restoring the R&I values | N/A |
| | Walker Flat | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest: manage vegetation to maintain meadow habitat | N/A |
| | Waterloo | Closed | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | White Rock Fen | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Wilhoit Springs | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | No timber harvest | N/A |
| | Williams Lake | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation, including uneven-age and variable retention timber harvests, with an emphasis on maintaining existing hydrologic conditions to protect the fragile lakeside native plant community | N/A |

| District/ Field Office | ACEC Name | Public Motorized Access Designation* | Leasable Mineral Entry | Salable Mineral Entry | Locatable Mineral Entry | Vegetation Management | Livestock Grazing Management |
|---|---|---|---|---|---|---|---|
| | Yaquina Head | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation management to enhance the multiple relevant and important values, with emphasis on protecting native plant communities and meadow habitat; as needed, thin thick stands of coastal pine | N/A |
| | Yellowstone Creek | Limited | Open–No Surface Occupancy | Closed | Recommend for withdrawal | Manage vegetation to promote old growth characteristics and reduce fire hazards | N/A |

* Public motorized access designations include either *closed* or *limited* designations. In ACECs designated as *closed* for public motorized access, all types of public motorized travel would be prohibited anywhere within the area. In ACECs designated as *limited* for public motorized access, public motorized travel activities would be restricted to existing routes and trails. Subsequent implementation-level travel management planning would refine *limited* designations to identify specific routes and trails appropriate for public motorized travel, and would apply restrictions to times/seasons of use and types of vehicles. The New River and North Spit ACECs and the North Spit Addition proposal in Coos Bay have previously had implementation-level travel management planning completed within their boundaries, which has designated specific roads and trails for appropriate public uses.

**Table F-3.** Specific relevant and important values

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category: Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
|---|---|---|---|---|---|---|
| Coos Bay | Brownson Ridge | Potential | | Marbled murrelet and northern spotted owl | Well-developed Port-Orford-cedar stand with all age classes; potential to fill ONHP cell for Port-Orford-cedar/Douglas-fir forest with dry shrubs/forbs; rare fungi: *Phaeocollybia attenuata*, *P. piceae*, *P. sipei*, and *Sparassis crispa* | |
| | Cherry Creek RNA | Existing | | Marbled murrelet and northern spotted owl | Mid 1700s birthdate with remnant 445-year-old Douglas-fir; fills (Western hemlock/oxalis; Western hemlock/rhododendron-Oregon grape) fills 3 ONHP cells; contains a rare plant (*Diplophyllum plicatum*) and rare fungi (*Phaeocollybia pseudofestiva*) | |
| | China Wall | Existing | Remnant of historic Brewster Trail; two prehistoric sites, all eligible National Register of Historic Places | Northern spotted owl | Unique plants associated with bald meadows; these meadows accounted for 72 percent of the botanical diversity of the area; a total of 170 species of vascular plants are documented, including 10 species of trees, 20 species of shrub, 12 species of grasses, sedges and rushes, and 122 species of forbs; Spring Phacelia (*Phacelia verna*) is located in 2 of the 8 meadows | |
| | Euphoria Ridge | Potential | | Marbled murrelet and northern spotted owl | Old-growth western red cedar stand series rare in Coast Range at this elevation (potential ONHP Coast Range cell) | |
| | Hunter Creek Bog | Existing | | | Fills ONHP Coast Range Ecoregion Cell; botany – large, diverse serpentine bog | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | New River | Existing | Prehistoric sites | Western snowy plover, northwestern pond turtle, coho and chinook salmon, cutthroat and steelhead trout | Fills 2 ONHP Coastal lowlands ecological cells; 17 rare species: *Calypogeia sphagnicola* , *Limbella fryei*, *Heterodermia leucomelos*, *Niebla cephalota*, *Ramalina pollinaria* , pink sandverbena (*Abronia umbellata* ssp. *breviflorus*), beach sagewort (*Artemesia pyconocephala*), dwarf brodiaea (*Brodiaea terrestris)*, short-stemmed sedge (*Carex brevicaulis*), timwort (*Cicendia quadrangularis*), coastal cryptantha (*Cryptantha leiocarpa*), russet cotton-grass (*Eriophorum chamissonis*), many-leaved gilia (*Gillia millifoliata*), whorled marsh pennywort (*Hydrocotyle verticillata*), silvery phacelia (*Phacelia argentea*), white beakrush (*Rhynchospora alba*), and humped bladderwort (*Utricularia gibba*) | |
| | North Fork Chetco | Existing | Undisturbed cultural site potentially eligible for addition to the National Register of Historic Places | Anadromous fish habitat - sea run cutthroat trout; marbled murrelet and northern spotted owl | Fills 2 ONHP Coast Range cells; riparian hardwood forest along a major river 4th order stream segment on coastal stream with California laurel riparian forest in the Klamath Mountains Province | |
| | North Fork Coquille River | Existing | | High-quality, extremely high-density coho salmon spawning; marbled murrelet and northern spotted owl | Old-growth riparian Douglas-fir/hardwood community on intact 4th order stream | |
| | North Fork Hunter Creek | Existing | Historic cabin sites/trail; prehistoric sites. | Important spawning and rearing habitat for chinook salmon, steelhead, sea-run and resident cutthroat trout | Fills 4 ONHP cells. Undisturbed old-growth Port-Orford-cedar, and oak/grass savannah; Hairy manzanita (*Arctostaphylos hispidula*); remnant Jeffrey pine (*Pinus jeffreyi*) savannah | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
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| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | North Spit | Existing | Scenic coastal landscapes comprised of dunes, deflation plain wetlands and Sitka Spruce forest islands; historic US Lifeguard Service sites and artifacts, and potential prehistoric site | Western snowy plover, marbled murrelet, northwestern pond turtle, purple martin, Newcomb's littorine snail | Numerous outstanding plant associations and wetlands; Special status plants: *Bryoria pseudocapillaris*, *Bryoria spiralifera,* Point Reyes bird's-beak (*Cordylanthes maritimus* ssp. *palustris), Heterodermia leucomela, Niebla cephalota* Natural Heritage Marine and Estuarine Special Species Cell, Coast Range Special Species Cell. | |
| | North Spit Addition | Potential | | | Potential to fill 3 ONHP Coast Range Special Species Cells; fills ONHP Ecological Cell (Sitka spruce-Port-Orford- cedar forest on sand [*Picea sitchensis/ Chamaecyparis lawsoniana*]). | |
| | Rocky Peak | Potential | Historic trail and lookout sites; panoramic views of coastline plains, foothills, and ocean | Habitat for northern spotted owl, fringed myotis, foothill yellow-legged frog, spotted tail-dropper; documented marbled murrelet | ONHP special species Siskiyou monardella (*Monardella purpurea)*; rare meadow, knob-cone pine plant communities | |
| | Roman Nose | Potential | Sweeping views of forest landscape from highest point in local region | | Rare example of Oregon Coast Range grassy bald system | |
| | Steel Creek | Potential | Portion of historic Brewster Trail | Sea-run and resident cutthroat trout, chinook and coho salmon, steelhead trout, Pacific lamprey, marbled murrelet and northern spotted owl | Large, structurally complex unmanaged and undisturbed late-successional forest community uncommon in Coast Range; one of the most productive spawning reaches in Coquille Basin | |
| | Tioga Creek | Existing | | High quality stream/riparian conditions and spawning habitat for coho, steelhead, and cutthroat trout; northern spotted owl | 400+ year old, old-growth riparian Douglas-fir/hardwood community on 4th order stream with high value as reference site | |

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| | Upper Rock Creek | Existing | | Marbled murrelet and northern spotted owl | Large red cedar dominated forest with sedge dominated wetlands; Fills Western red cedar-western hemlock/skunk cabbage ONHP Coast Range Ecological cell | |
| | Wassen Creek | Existing | Scenic: Large block of undisturbed mid-age forest dissected by creek with several waterfalls, plunge pools, and small palustrine lake | Pure strain of native cutthroat trout; northern spotted owl site | Fills ONHP Coast Range Ecoregion Palustrine Wetlands pond at mid to high elevation and 2 ONHP Western Hemlock association cells | |
| | West Fork Illinois River | Potential | | | Represents ONAP cells for serpentine fens, western white pine forest, knobcone pine forest, and Jeffrey pine savannah and woodlands; supports rare plants, Howell's mariposa lily (*Calochortus howellii*), Oregon willow-herb (*Epilobium oreganum*), Waldo gentian (*Gentiana setigera*), western bog violet (*Viola primulifolia* ssp. *occidentalis*) | |
| Eugene | Camas Swale RNA | Existing | | Provides habitat for wildlife species, but does not explicitly list distinct species | The site is an example of a dry-site, mature Douglas-fir forest in the Willamette Valley foothill, includes a small, xeric, meadow community; is included in the ONHP and is the best remaining example found for representing this plant community type in Oregon; it fills the natural heritage cell or element as: Douglas-fir/swordfern and Douglas-fir/Oregon grape forest | |

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| | Cottage Grove Old Growth | Existing | | This site is within the City Creek spotted owl pair home range and contains suitable nesting/roosting/foraging habitat | Douglas-fir old-growth stand; multiple canopy layers represent the late-successional stage of mesic Douglas-fir community with some existing older trees representing ages of 500+ years old | |
| | Cougar Mountain Yew Grove | Existing | | Good cavity nester habitat | One of the lowest elevation stands of Pacific Yew remaining in the Willamette Valley; an unique grove of record yew trees (70–500 years old) | |
| | Dorena Prairie | Potential | | | One of the few remaining representative examples of the less than 1 percent remaining native upland prairie plant community within the Willamette Valley | |
| | Esmond Lake | Potential | Esmond Lake is one of ten lakes in the Coast Range caused by landslides and can only be reached by foot, which has left the lake in an undisturbed state | Coho salmon and steelhead migrate through Esmond Lake and spawn in tributaries above the lake; this lake appears to contain one of the best coho rearing habitats in the Siuslaw Basin on BLM-administered lands | Esmond Lake has an uncommon geologic feature formed by a large deep-seated landslide; spawning counts indicate that coho numbers are increasing in Esmond Creek drainage; *Fissidens fontanus* was thought to be extinct in Oregon until being found in the lake, and remains extant since discovery | |
| | Ferguson Creek | Potential | | Bureau Special Status wildlife species may benefit from increasing oak woodland habitats; oak trees provide an important mast resource; the current oak habitat is not extensive enough to provide quality habitat | This unit contains one of the only remaining stands of mature oak trees in substantial numbers; however, it is at risk due to the encroachment of Douglas-fir forest resulting from fire suppression | |

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| | Fox Hollow RNA | Existing | | | The site fills the natural area cell or element described in the ONHP as Douglas-fir/swordfern and Douglas-fir/Oregon grape forest; mixed stand of Douglas-fir and ponderosa pine is found on the south slopes and ridge tops, with minor amounts of Oregon white oak and incense-cedar; site is the best remaining example that could be found for representing these plant community types for Oregon | |
| | Garoutte Prairie | Potential | | | Relic Willamette Valley prairie plant community currently occupying about 1% of its historic extent; invasive non-native plants are now displacing native plant species | |
| | Grandmother's Grove | Potential | | | Low elevation, unmanaged mature and late successional forest providing interior habitat and adjacent mid-seral stands contribute to these values; unique location above the valley floor | |
| | Grassy Mountain | Existing | Highly visible grassy bald | Provides wildlife habitat, but no species explicitly documented | Site fills natural heritage cell or element as Blue wildrye or red fescue grass bald communities; vernal seepage slopes on low-mid elevation rocky bald communities, with monkey flower, saxifrages and moss; one of the finest undisturbed representative examples of a grassy bald on the western margin of the Cascades | |

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| | Heceta Sand Dunes ONA | Existing | Scenic dune system; the widest dune sheets along the Oregon Coast; the coastline by Florence (Heceta region) extended outward four times farther than areas to the south; this wider shelf provided abundant fine sand for eolian transport from the south through northward littoral drift | Area potentially supports Bureau Special Status wildlife species including: marbled murrelet, California brown pelican, white-tailed kite, American peregrine falcon, bald eagle, fringed myotis, Oregon plant bug, western bumble bee, horary elfin butterfly, insular blue butterfly | Seashore bluegrass association; red fescue association; shore pine/slough sedge association; shore pine/bearberry association; shore pine/hairy manzanita association; site is identified in the ONHP; several coastal endemic Bureau Special Status Species and the supporting plant communities are now rare along the coast | |
| | Horse Rock Ridge RNA | Existing | Highly visible grassy bald and exemplary with views of the Cascade Mountains | Provides wildlife habitat, but no species explicitly documented | The site fills a natural area cell or element in the Oregon Natural Areas Plan (ONAP 2015) and is one of the best remaining examples of West Cascades Ecoregion/shrub and Grassland type blue wildrye or Roemer's fescue grass bald communities | |
| | Hult Marsh | Existing | Hult Marsh is situated in a peaceful, often serene and placid setting | | The site is the result of a manmade millpond; however, this large forested wetland/marsh > 35 acres is classified as significant under the Oregon Forest Practices Act; the site supports two Bureau Sensitive plants *Utricularia gibba* and *Lycopodiella inundata*. | |
| | Jordan Creek | Potential | | This 38-acre stand contains northern spotted owl dispersal habitat; releasing the oak habitat could run counter to management strategies for the northern spotted owl | Willamette oak woodland; a declining oak habitat; represents just 10 percent of the original footprint observed pre-1850 | |

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| | Lake Creek Falls | Existing | Lake Creek Falls is the only waterfall of its size in the Siuslaw Field Office; Numerous cultural and historic points of interest | Species that potentially utilize the habitat or could be viewed from this ACEC: northern spotted owl, marbled murrelet, black swift, bald eagle, purple martin, Oregon red tree vole, Townsend's big-eared bat, fisher, fringed myotis, Cascades axetail slug, Roth's blind ground beetle, western bumble bee, Johnson's hairstreak butterfly | Large natural waterfalls are uncommon on higher order streams and rivers like Lake Creek | Popular swimming area with dangerous rocks/logs often submerged. The algae that creates a slippery rock slide also creates a very unstable walking surface in the stream. Sharp, poorly visible, underwater boulders in pools present hazards to divers. Unstable logs tend to jam up in the pools following winter floods and present hazards to swimmers. |
| | Loranc Ponderosa Pine | Potential | | | Willamette Valley Ponderosa Pine; This population of ponderosa pine is considered a separate and distinct population from other ponderosa pine populations within Oregon. Decline of *Pinus ponderosa* var. *willamettensis* stands both within the Willamette Valley and on Federal lands, less than 1 percent remain. | |
| | Low Elevation Headwaters of the McKenzie River | Potential | McKenzie River segment A (11 miles) suitable for inclusion in National Wild and Scenic System as a Recreational Segment | Bull trout, Upper Willamette spring chinook, cutthroat trout, northern spotted owl, tailed frog, Harlequin duck | Unique large continuous block of native forest; Minimally disturbed blocks of land under 2,000 feet on the east side of Willamette Valley | |
| | McGowan Meadow | Potential | Proposed Celebrating Wildflower Site | | Wet meadow with flora of both the Cascades and Willamette Valley ecoregions | |
| | Mohawk RNA | Existing | | Provides wildlife habitat, but no species explicitly documented; possible habitat for northern spotted owl | Fills a ONAP cell or element as: Douglas-fir/western hemlock/Oregon grape and salal forest; old-growth Douglas-fir and western hemlock within low elevation Willamette Valley foothills; site contains small marsh | |

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| | Nails Creek | Potential | | Northern spotted owl dispersal habitat; releasing the oak habitat could run counter to management strategies for the northern spotted owl | Willamette oak woodland; a declining oak habitat; represents just 10% of the original footprint observed pre-1850 | |
| | Oak Basin Prairies | Potential | | Fender's blue butterfly, Taylor's checkerspot butterfly | Portions of a large upland prairie complex on the west side of the Coburg hills; Kincaid's lupine (*Lupinus sulphureous* ssp. *kincaidii*), Hitchcock's blue-eyed grass | |
| | Upper Elk Meadows RNA | Existing | | | Four distinct plant communities: open, wet sedge meadow; wet red alder/willow/hawthorn thickets; open forest dominated by old-growth silver and grand fir; and closed forest dominated by old-growth Douglas-fir; has been selected as a part of an interagency network of sites to be retained and managed primarily for research and educational purposes | |
| | Upper Willamette Valley Margin | Potential | Proximity to large waterbodies, McKenzie, Willamette, Row Rivers; Cottage Grove, Dorena, Fall Creek Reservoirs; adjacent to major travel corridors (Interstate 5, Highways 58 and 126) and popular recreation destinations | Contribute to regional population viability and recovery, including a key raptor area and bald eagle habitat areas | Low-elevation, unmanaged mature and late-successional forest providing interior habitat and adjacent mid-seral stands; unique location above the valley floor | |
| | Willamette Valley Prairie Oak and Pine Area | Potential | | | Some of the few remaining upland red fescue prairies and oak habitats in the Willamette Valley Province | |

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| Klamath Falls | Bumpheads | Potential | Numerous undisturbed prehistoric cultural artifacts/sites; will be nominated for inclusion in the National Register of Historic Places in 2016; rare views of natural landscape from high elevation | | Western juniper/Idaho fescue (*Juniperus occidentalis/Festuca idahoensis*) plant community that has been naturally somewhat isolated from livestock grazing | |
| Klamath Falls | Old Baldy RNA | Existing | Scenic viewing opportunities from a section of Pacific Crest Trail | | ONHP cells: high elevation white fir communities with Shasta red fir, mountain hemlock, Pacific silver fir, and Western white pine; Southern Oregon Cascades chaparral | |
| Klamath Falls | Spencer Creek | Potential | | Upper Klamath redband trout, Pacific giant salamander, future anadromous salmonid species (when Klamath River dams are removed or passage restored) | Intact, functioning, low-gradient floodplain meadow habitat important for several aquatic species; floodplain provides critical riparian processes important to filtering fine sediments; inundation during moderate to high flood events provide refuge for aquatic organisms | |
| Klamath Falls | Surveyor | Potential | Native forest unique to surrounding area with short educational trail providing a scenic opportunity in old-growth forest | Designated critical habitat for northern spotted owl | Native old-growth forest community of large Douglas fir and other mixed conifer species; several Bureau Sensitive fungi species | |
| Klamath Falls | Tunnel Creek | Potential | | Oregon spotted frog | High altitude lodgepole pine swamp with bog blueberry (*Vaccinium uliginosum*) and high diversity of sedge species; several Bureau Sensitive plants: *Carex capitata, Utricularia minor, Tomentypnum nitens,* and *Gentiana newberryi* var. *newberryi*, *Carex lasiocarpa* var. *americana* | |

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| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Upper Klamath River | Existing | Historic road, prehistoric cultural artifacts/sites; the Klamath River Canyon holds great spiritual and religious significance for the Klamath Tribe and the Shasta Nation; has a unique landform, diverse vegetation, water, and a low level of adverse cultural modifications | Lost River and shortnose suckers, Klamath large scale sucker, native inland redband trout, bald eagle nests, Townsend's big-eared bat, northern spotted owl critical habitat | Unique plant communities bisecting the Cascade Mountains, which range from montane conifer forest communities to high desert communities, and from riparian communities to oak savannah communities; Red-root yampah (*Perideridia erythrorhiza*), *Astragalus californicus*, *Carex comosa* | |
| | Upper Klamath River Addition | Potential | Historic road, prehistoric cultural artifacts/site; the Klamath River Canyon holds great spiritual and religious significance for the Klamath Tribe and the Shasta Nation; has a unique landform, diverse vegetation, water, and a low level of adverse cultural modifications | Lost River and shortnose suckers, Klamath largescale sucker, native inland redband trout, and bald eagle nests, northern spotted owl critical habitat | Unique plant communities bisecting the Cascade Mountains, and that range from montane conifer forest communities to high desert communities, and from riparian communities to oak savannah communities; Red-root yampah (*Perideridia erythrorhiza*), *Astragalus californicus*, *Carex comosa* | |
| | Yainax Butte | Existing | Considered an important place in the traditional beliefs of the Klamath Tribes; may be eligible for inclusion to the National Register of Historic Properties as a Traditional Cultural Property | | Unusual variation of bitterbrush/bluebunch wheatgrass plant community; blue-leaved penstemon (*Penstemon glaucinus*) | |
| Medford | Baker Cypress | Existing | | | Most northern Baker cypress (*Hesperocyparis bakeri*) stand in North America | |
| Medford | Bobby Creek RNA | Existing | | Northern spotted owl critical habitat | Intact Port-Orford-cedar stands; Represents Oregon Natural Areas Plan cells for western hemlock and tanoak-bigleaf maple-canyon live oak communities; late-successional forest; paired-watershed study catchments; long-term vegetation monitoring site | |

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| | Brewer Spruce RNA | Existing | | Northern spotted owl critical habitat | Unique conifer assemblage with Brewer spruce, Port-Orford-cedar, and Alaska yellow cedar (rare inland); ONAP cells for mid/high-elevation marsh/pond and white fir forest with Brewer spruce; long-term vegetation monitoring site | |
| | Cobleigh Road | Potential | Prehistoric cultural sites | | Oak woodland, oak savannah, and chaparral, supporting Gentner's fritillary (*Fritillaria gentneri*); Gentner's fritillary recovery management area | |
| | Dakubetede | Potential | | | Gentner's fritillary (*Fritillaria gentneri*); western-most stands of western juniper, rare water birch (*Betula occidentalis*), intact native grasslands; Gentner's fritillary recovery management area | |
| | Deer Creek | Potential | | Cool water refugia for juvenile coho salmon | Limestone cave system supporting bats and rare invertebrates, including a new species of spider (*Trogloraptor marchingtoni)* | |
| | East Fork Whiskey Creek RNA | Potential | | | Rogue River stonecrop (*Sedum moranii*); represents ONAP cells for late-successional tanoak-Douglas-fir communities, stands of knobcone pine | |
| | Eight Dollar Mountain | Existing | | Coronis fritillary butterfly (*Speyeria coronis coronis*) | Serpentine fens and Jeffrey pine savannahs and associated rare plants, including Howell's mariposa lily (*Calochortus howelli*), Oregon willow-herb (*Epilobium oreganum*), Waldo gentian (*Gentiana setigera*), western bog violet (*Viola primulifolia* ssp. *occidentalis*) | |

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| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | French Flat | Existing | Historic mining values, including Logan Cut (National Register of Historic Places) | Coronis fritillary butterfly | Jeffrey pine savannahs and California oatgrass-tufted hairgrass grasslands and associated rare plants, including Cook's lomatium (*Lomatium cookii*), Howell's adder's tongue (*Erythronium howellii*), slender meadow foam (*Limnanthes gracilis* ssp. *gracilis*); Cook's lomatium critical habitat | |
| | Grayback Glades RNA | Existing | | | Represents ONAP cells for high elevation white fir forest and Siskiyou alder glades; large Port-Orford-cedar trees, mostly uninfected by Port-Orford-cedar root rot | |
| | Green Springs Mountain Scenic | Potential | Contains a particularly scenic segment of the Pacific Crest Trail | | | |
| | Hole-in-the-Rock | Existing | | | Unique geological feature, a natural basalt arch, created by natural weathering and erosional processes | |
| | Holton Creek RNA | Existing | | | Represents ONAP cells for low-elevation late-successional white fir-Douglas-fir forest; long-term vegetation monitoring site | |
| | Hoxie Creek | Existing | | | Remnant late-successional white fir-Douglas-fir-ponderosa pine forest | |
| | Iron Creek | Existing | | | Late-successional dry Douglas-fir-sugar pine-ponderosa pine forest | |
| | King Mountain Rock Garden | Existing | High scenic value | | High-elevation serpentine community | |

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| | Lost Lake RNA | Existing | | | Represents ONAP cell for a mid-montane lake surrounded by mixed-conifer forest. Example of a landslide-dammed lake; long-term vegetation monitoring plots | |
| | Moon Prairie | Existing | | | Late-successional, multi-layered stand of Douglas-fir and white fir with Pacific yew, ponderosa pine and sugar pine | |
| | North Fork Silver Creek RNA | Existing | | | Represents ONAP cells for Port-Orford-cedar-western hemlock and white fir forests; includes serpentine fens; long-term vegetation monitoring plots; wildfire burned area reference site (1987 and 2002) | |
| | Old Baldy RNA | Existing | | | Represents ONAP cells for chinquapin/manzanita chaparral and high-elevation white fir-Shasta red fir forest; long-term vegetation monitoring site | |
| | Pickett Creek | Potential | | | Large populations of Gentner's fritillary (*Fritillaria gentneri*); Gentner's fritillary recovery management area | |
| | Pipe Fork RNA | Existing | | | Represents ONAP cells for Port-Orford-cedar-white fir and Port-Orford-cedar-tanoak communities | |
| | Poverty Flat | Existing | | | Rare Rogue River grassland and vernal pool community supporting Bellinger's meadow foam (*Limnanthes floccosa* ssp. *bellingeriana*) | |

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| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Reeves Creek | Potential | | | Cook's lomatium (*Lomatium cookii*), slender meadowfoam (*Limnanthes gracilis* ssp. *gracilis*); Cook's lomatium recovery management area | |
| | Rough and Ready | Existing | | | Ultramafic alluvial deposits and serpentine soil support unique plant community and rare plants including Cook's lomatium (*Lomatium cookii*), large-flowered rush lily (*Hastingsia bracteosa* var. *bracteosa*), Howell's mariposa lily (*Calochortus howellii*), Howell's adder-tongue (*Erythronium howellii)*, slender meadowfoam (*Limnanthes gracilis* ssp. *gracilis)*; Cook's lomatium critical habitat | |
| | Round Top Butte RNA | Existing | | | Represents ONAP cells for seasonally flooded bottomland prairie, dry grasslands, and Oregon white oak savannah; long-term vegetation monitoring site; designated National Natural Landmark | |
| | Sterling Mine Ditch | Existing | Historic ditch used for hydraulic gold mining (National Register of Historic Places) | | | |
| | Table Rocks ACEC | Existing | Native American refuge and ceremonial site | Vernal pool fairy shrimp | Example of remnants of an andesite lava flow, vernal pools, oak woodlands, and upland grass-lands; rare plants include dwarf woolly meadowfoam (*Limnanthes pumila* ssp. *pumila*), Austin's plagiobothrys (*Plagiobothrys austiniae*), Greene's popcornflower (*Plagiobothrys greenei*), southern Oregon buttercup (*Ranunculus austrooreganus*) | |

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| | Tin Cup | Existing | | | Late-successional white fir community | |
| | Waldo-Takilma | Potential | Intact historic mining sites (National Register of Historic Places) | | Serpentine plant communities supporting rare plants, Cook's lomatium (*Lomatium cookii*), Howell's mariposa lily (*Calochortus howellii*), clustered lady's-slipper (*Cypripedium fasciculatum*), Howell's adder-tongue (*Erythronium howellii*), slender meadowfoam (*Limnanthes gracilis* ssp. *gracilis*); Cook's lomatium critical habitat | |
| | Woodcock Bog RNA | Existing | | | Serpentine fens and Jeffrey pine savannah supporting rare plants Oregon willow-herb (*Epilobium oreganum*), Waldo gentian (*Gentiana setigera*), large-flowered rush-lily (*Hastingsia bracteosa* var. *bracteosa*), western bog violet (*Viola primulifolia* ssp. *occidentalis*); long-term vegetation monitoring site | |
| Roseburg | Bear Gulch RNA | Existing | | | Douglas-fir/canyon live oak woodland with poison oak and dwarf Oregon grape; and Douglas-fir/canyon live oak forest | |
| | Beatty Creek RNA | Existing | | | Jeffrey pine community on serpentine; Wayside aster (*Eucephalus vialis*), California sword fern (*Polystichum californicum*) | |
| | Bushnell-Irwin Rocks RNA | Existing | Scenic | Northern spotted owl | Oregon white oak savanna; Oregon white oak/Douglas-fir/poison oak woodland; Thompson's mistmaiden (*Romanzoffia thompsonii*), California sword fern | |

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| | Callahan Meadows | Potential | | | Kincaid's lupine (*Lupinus oreganus*), serpentine meadow, Umpqua mariposa lily (*Calochortus umpquaensis*) | |
| | Myrtle Island RNA | Existing | | | Old-growth stand of California bay laurel and Douglas-fir (riparian hardwood forest along a major river) | |
| | North Bank | Existing | Important cultural site | Columbian white-tailed deer | Koehler's rock cress (*Arabis koehleri* var. *koehleri*), Red-rooted yampah (*Perideridia erythrorhiza*), rough popcorn flower (*Plagiobothrys hirtus*) | |
| | North Myrtle Creek RNA | Existing | | | Douglas-fir/ponderosa pine forest; white fir/dwarf Oregon grape; Douglas-fir/bigleaf maple forest | |
| | Red Ponds RNA | Existing | | Northern spotted owl, western pond turtle | Low elevation permanent pond; dotted water-meal (*Wolffia borealis*), *Phaeocollybia californica* | |
| | Tater Hill RNA | Existing | | | Western hemlock/oceanspray community | Active landslide |
| Salem | Beaver Creek | Potential | | | Intact mid-elevation oak meadow and native prairie flora rare along the western slopes of the northern Oregon Cascades | |
| Salem | Crabtree Complex RNA/ONA | Existing | Scenic qualities such as forest cover type, complex of habitats and geologic features considered exceptional within the Salem District | Several Bureau Special Status wildlife species and northern spotted owl; cliffs provide unique habitat with potential for raptor use | Relatively undisturbed old-growth forest; fills several West Cascades Ecosystem elements identified in the ONAP; area has a population of Alaska-cedar that is fairly uncommon in this region | |

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| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Elk Creek | Existing | | Inland bald eagle forage and roosting habitat, marbled murrelet, red tree vole; historic nest sites for bald eagle and northern spotted owl; coho and chinook salmon, summer and winter steelhead, sea-run and resident cutthroat trout, Pacific lamprey | Contiguous block of old forest is a rare example of a fully functional natural system in the north Oregon Coast Range as evidenced by the extensive list of late-successional forest-dependent species that occur; area abuts the 360,000-acre 'Tillamook Burn' | |
| | Forest Peak RNA | Existing | | Undisturbed Willamette Valley margin meadows adjacent to old growth forests; meadow may provide habitat for several at risk butterfly species and declining Willamette valley songbirds, including common nighthawk, Oregon vesper sparrow, western bluebird, and acorn woodpecker | Willamette Valley Ecosystem Elements: Willamette Valley Douglas-fir-bigleaf maple forest with some grand fir; Douglas-fir/poison oak forest; Lemmon's needlegrass-moss bald; represents an intact and natural 3rd order stream system located on the fringes of the Willamette Valley | |
| | Grass Mountain RNA | Existing | Visible from the Willamette Valley and has remnants of the lookout once stationed on the summit; the cement foundation, disposal area, and pieces of metal roofing for the lookout, still remain onsite; in the early 1900s, Grass Mountain was a stopping place for grazing livestock as they were moved between Alsea Valley and Mary's Peak | A high elevation grassy bald habitat juxtaposed with mature noble fir and forest that offers undisturbed refugia for rare and endemic invertebrate species including Roth's blind ground beetle; nesting habitat for northern spotted owl and marbled murrelet | The area represents the Coast Range Ecoregion's Noble fir-western hemlock forest and the Grass bald on Coast Range mountain ecosystem elements; represents a natural 3rd order stream system and old growth conifer habitat | |
| | High Peak - Moon Creek RNA | Existing | | Large contiguous block of late-successional forest habitat found in north Oregon coast range; relatively inaccessible and undisturbed; potential northern spotted owl and marbled murrelet; high quality spawning habitat for anadromous fish, including Oregon coho salmon and steelhead trout | This area is a rare example of a northern Oregon Coast Range old-growth forest with an intact, functioning, late-successional forest system; adjacent to the 'Tillamook Burn'; Coast Range Ecoregion ecosystem elements: Western hemlock/swordfern, Western hemlock/vine maple-salal | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Little North Fork Wilson River | Potential | | Large contiguous blocks of late-successional forest habitat found in north Oregon coast range; relatively inaccessible and undisturbed; supports substantial salmon populations (Chinook, coho, chum, steelhead, sea run cutthroat) | Intact old-growth conifer riparian habitat is especially rare in coastal ecosystems; relict plant community of 450-year-old Douglas-fir, Sitka spruce, Western hemlock, and Western red cedar | |
| | Little Sink RNA | Existing | | Provides an excellent example of a low elevation coast range old-growth forest adjacent to the Willamette Valley; northern spotted owls, red tree voles and great blue heron rookery; the ponds are important breeding sites for native amphibians | Fulfills the following Willamette Valley Ecoregion Ecosystem Elements: Douglas-fir – grand fir/vine maple-salal; slump pond at margin of valley, with aquatic beds and marshy shore; designated Instant Study (wilderness) Area; rare botany species include Dotted water-meal, and lichen *Calicium adspersum* | The past slumping soils or unstable ground at Little Sink has created at least 3 distinct ponds within a coniferous forest habitat |
| | Lost Prairie | Existing | | Lost Prairie supports a large Sphagnum/sedge rich fen and wetland habitat, which supports a diverse assemblage of uncommon invertebrate species; also offers nesting habitat for songbirds, and high quality forage for deer and elk | Coast Range Ecoregion Ecosystem Element: Mid- to high-elevation sedge and sphagnum fens and a beaver marsh; the most outstanding botanical feature is the presence of a complex of sphagnum species and fen-associated bryophytes and vascular plants. Rare vascular plants include the *Erythronium elegans*, *Fritillaria camschatcensis*, and *Anenome oregana* var. *felix;* many uncommon bryophyte species | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Lower Scappoose Eagle | Potential | | Includes an active and productive bald eagle communal winter roost site and nest; the consistent, high eagle usage of the area is due to its proximity to Sauvie Island where the eagles forage on the very rich, unique resource of large concentrations of waterfowl | The area is included in the final integrated portfolio within The Nature Conservancy's Pacific Northwest Coast Ecoregional Assessment (Vander Schaaf *et al.* 2006) | |
| | Mary's Peak | Existing | Mary's Peak is the highest mountain in the Oregon Coast Range Mountains north of Coquille; the summit of Mary's Peak has distant views of the Willamette Valley, Oregon Coast Range Mountains and the Cascades | The mature noble-fir forest, high elevation grassy bald, rocky outcrops, wet meadows, seeps, springs, and Douglas-fir old-growth provide a refuge for a minimum of 10 rare or endemic invertebrates including Haddock's rhyacophilan caddisfly and Roth's blind ground beetle; nesting habitat for northern spotted owl and marbled murrelet | Highly diverse assemblage of native plant communities; special habitats or natural values include high-elevation grass meadows, noble fir community, and shallow soils with 'rock garden' plants | |
| | McCully Mountain | Potential | | Potential for nesting raptors, use by neotropical migratory birds, and occurrence of other wildlife species | Natural system associated with mid-elevation oak meadow and native prairie flora seldom seen along the western slopes of the northern Cascades in Oregon adjacent to the Willamette Valley | |
| | Middle Santiam Terrace | Existing | Includes a Native American cultural site that is one of few in the region on public lands | | Old-growth fir and hemlock forest at a relatively low elevation river terrace with an increased value for research; represents several native plant community types in the Western hemlock zone in the western slopes of the Cascades | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Mill Creek Ridge | Potential | | Mill Creek Ridge supports a great diversity of uncommon or endemic invertebrate species, and provide nesting habitat for Willamette Valley songbirds, including common nighthawk, western bluebird, and white-breasted nuthatch | Oregon white oak community located in northwest Oregon on the eastern slopes of the Coast Range Mountains; contains uncommon plant species known from adjacent coniferous forests; many of the species are more common in the Cascades Mountains and from Southern Oregon; several plant species extend the northern range of these species | |
| | Molalla Meadows | Potential | The Molalla River has been found to be both eligible and suitable for inclusion into the National Wild and Scenic River System for outstandingly remarkable values that include geology, scenic, and recreation. | Nesting raptors, use by Neotropical Migratory birds and occurrence of wildlife species associated with older forest; harlequin ducks | The meadows represent a unique ecotype with natural systems and geologic features; the oak meadows represent a rare transition from valley oak savannas to upland conifer forests; these large meadows contribute to the regional oak meadow network | |
| | Nestucca River | Existing | Designated State scenic waterway and BLM backcountry byway; the Upper Nestucca River is eligible for inclusion in National Wild and Scenic River system (recreational designation); the river corridor is designated VRM I | The Nestucca River corridor includes high quality habitat for bald eagle, northern spotted owl, marbled murrelet, and red tree vole; area is the only known site Oregon Coast Range breeding site for harlequin ducks; also a high quality anadromous fish stream for coho, chinook, summer and winter steelhead, sea-run and resident cutthroat trout | | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Rickreall Ridge | Existing | | Rickreall Ridge provides for unique high elevation rocky outcrops and adjoining older forests, which support a diversity of rare or endemic invertebrate species. Western grey squirrels and California ground squirrels common to lower elevations are found at this higher elevation. | A rocky 'hogback' ridge with steep talus slopes, with unique vegetation and is located within the Oregon Coast Range; has a disjunct flora in which the vegetation is similar to vegetation known from the southern Cascades; includes some older forest stands and associated coniferous-forest species; contains many uncommon mesic bryophytes species. | |
| | Saddle Bag Mountain RNA | Existing | | Old-growth western hemlock supporting mistletoe in the Coast Range provides habitat for Johnson's hairstreak butterflies; potential nesting habitat for northern spotted owl and marbled murrelet. | Old-growth Pacific silver fir and western hemlock community; may be the last remaining mature naturally occurring Pacific silver fir stand in the Oregon Coast Range. Rare botanical species include *Erythronium elegans*, several Bureau Sensitive fungi species, and a collection of uncommon lichen and bryophyte species. | |
| | Sandy River ONA | Existing | Cultural: Barlow Road and Rock Corral are National Register sites; prehistoric site eligible for the National Register also exists; Scenic: The inner gorge has steep canyon walls, deep, trench-like pools, waterfalls and cliff-dwelling plant communities; The Mt. Hood corridor (Highway 26) has a VRM I classification and congressionally designated as the Mt. Hood Scenic Corridor | Stocks of Lower Columbia River chinook, winter steelhead, coho and cutthroat trout ; Peregrine falcons, bald eagles, and harlequin ducks have been known to use the Sandy River Gorge, migratory birds such as the willow flycatcher have been documented | Diverse vegetative communities and low elevation old-growth forest ecosystems; riparian old-growth forests in the Middle Sandy are rare in the watershed downstream from Marmot Dam | Precipitous slopes and canyon walls line the inner gorge |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Silt Creek | Potential | | | Active, natural landslide with an old-growth forest and unique habitat related to the slow but continual mass earth movement; host to an abnormally large population of *Pseudocyphellaria rainierensis*. | Large scale, active natural landslide |
| | Snow Peak | Potential | | High quality natural ecosystem supporting considerable biological diversity; northern spotted owl; various migratory bird species | Elevation of 4,280 ft. very close to the Willamette Valley; A variety of special habitats in close proximity, including wet meadows, dry meadows, rock outcrops/crevice habitat, talus slopes, mature to old-growth forests, headwater streams with adjacent riparian and brushy thickets; rare botanical fungi, lichens, and vascular plants, including several Bureau Sensitive species; deer cabbage, a wetland botanical species (*Fauria crista-galli*), found nowhere else in Oregon | |
| | Soosap Meadows | Existing | | | These meadows are the only large, undisturbed expanse of natural Cascadian subalpine meadows in the Salem District. Streams that have cut through the glacial moraine have left behind a unique and diverse remnant of subalpine habitat. | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | The Butte RNA | Existing | | | The area represents the Willamette Valley Douglas-fir-bigleaf maple forest with some grand fir and the Oregon white oak/grass savanna ecosystem elements. It represents an uncommon transitional ecotone involving Willamette Valley margin plant communities and upland Coast Range forested communities. | |
| | Valley of the Giants | Existing | Educational organizations often visit the area for informal studies; The area also provides for scenic values and excellent opportunities for photography | Nesting habitat for one of the largest concentrations of breeding marbled murrelet in Oregon; northern spotted owls, bald eagles, and Oregon Coastal steelhead trout; invertebrate species closely associated with older forest conditions. | Well-studied remnant old-growth western hemlock plant association and the largest contiguous stand of ancient old-growth forest in the northern Oregon Coast Range (over 800 acres, 400+ years old); rare or uncommon botanical species reported from this location include *Schistostega pennata*, *Filipendula occidentalis*, and *Tetraphis geniculata* | |
| | Walker Flat | Existing | | | One of the few natural occurrences of *Sidalcea nelsonia* in the Coast Range | |
| | Waterloo | Potential | | | Naturally occurring Ponderosa pine and historically part of a large oak-fir-pine savanna, with prairie located just to the east; is an integral part of a larger system of target conservation areas for the oak-pine-fir habitats | |
| | White Rock Fen | Existing | | Nesting and foraging potential for neotropical migratory birds and other wildlife species | Four poor fens are unique to the region and are fragile; streams that have cut through the glacial moraine have left behind a unique and diverse remnant of subalpine habitat for botanical, wildlife, and aquatic species. | |

| District/ Field Office | ACEC Name | Status | Relevant and Important Value Category | | | |
|---|---|---|---|---|---|---|
| | | | Historic, Cultural, Scenic | Fish and Wildlife | Natural Process or System | Natural Hazard |
| | Wilhoit Springs | Existing | | | A rare community with regional significance as an intact low-elevation old-growth conifer forest | |
| | Williams Lake | Existing | | | Cascade lake and bog habitats with lakeside plant community that is unique and fragile. William's Lake and its bog ecosystem is a great example of a Cascadian massive seep formed lake undergoing peat bog/quaking bog succession. | |
| | Yaquina Head ONA | Existing | Yaquina Head occurs at a headland on the shores of the eastern Pacific Ocean, area is known as a cultural site for past Native Americans use and as a historical site with an operating lighthouse; he lighthouse located at Yaquina Head is one of the most highly visited areas in the Oregon coast | Yaquina Head includes a diverse assemblage of coastal habitats such as; tide pools, rocky islands, cliffs, coniferous forest, and upland meadows, which provide for a high diversity of marine invertebrates, nesting seabirds, and marine mammals; adjacent to one of the largest nesting populations of common murres and other colonial nesting seabirds in North America; foraging for Bald Eagles in the area; quarry cliffs provide nesting habitat for Peregrine Falcons | This headland on the eastern Pacific Ocean provides for several unique habitats including: Sitka spruce forest, lodgepole forest, headland grass/shrub communities, wildlife roosts, and nesting habitat, tide pools and associated ocean organisms; rare bryophyte species *Eucladium verticillatum* is reported from the Yaquina Head ONA. Botanically unique and distinct | There are naturally occurring and man-made cliffs from past quarry operations and both provide safety concerns from falling rocks and dangerous, steep slopes |
| | Yellowstone Creek | Potential | The creek contains numerous waterfalls and cascades in a steep, v-shaped canyon surrounded by old-growth forest, lower portions are in the Quartzville Creek Wild and Scenic River; the diversity and old age of the vegetation combined with geologic features creates high intrinsic quality scenery | Northern spotted owl | This tributary to Quartzville Creek is an undisturbed area of low elevation (1,200-3,100 feet), high-quality, contiguous, old growth forest; supports a broad diversity of overstory tree species including Douglas-fir, western hemlock, western redcedar, Pacific yew, Pacific silver-fir, noble fir, western white pine, sugar pine, bigleaf maple, red alder and black cottonwood | |

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# Appendix G – Climate Change

## Carbon Storage Modeling

### Analysis of Net Carbon Storage

The analysis of net carbon storage estimated the amount of carbon stored in the forest and in harvested wood products as well as carbon stored in non-forest portions of the decision area. The analysis divided carbon into three pools:

- Live and dead vegetation
- Soil to 1 m depth (3.3 ft.)
- Harvested wood

The BLM summed the carbon in these three pools to estimate the total net carbon stored by alternative and the Proposed RMP. The BLM assumed carbon stored in soil and in non-forest portions of the planning area was constant through time, largely due to the lack of information about how these pools change over time.

#### Net Carbon Storage in Live Trees

The BLM estimated net carbon storage in live trees for each alternative and the Proposed RMP, and included a No Timber Harvest reference analysis, using the following process:

1. Obtain estimates of standing tree volumes for each period from the Woodstock model. See Appendix C – Vegetation Modeling for more detail on how the BLM estimated volume over time.
2. Convert live tree volume in thousand board feet (Mbf) to cubic feet using the following formula: $ft^3 = (Mbf \div 6.0) \times 1000$.
3. Estimate the composite density of wood (lb./ft.$^3$) based on specific gravity at 12 percent moisture content for several species, but primarily Douglas-fir {Forest Products Laboratory, 2010 #76}
4. Convert cubic foot volume to pounds using the following formula:
$$pounds = ft^3 \times 33.5\frac{lb}{ft^3}$$
5. Multiply pounds of wood by 0.5 to estimate pounds of carbon {Smith, 2006 #61}.
6. Estimate megagrams of carbon (Mg C) for whole trees (branches, roots, and bark) using the following formula:
$$Mg\ C = (lb\ C \times 1.85) \div 2200$$

The BLM based initial tree volumes on the total gross volume, or the estimated volume per acre multiplied by the number of acres. This estimate avoided the need to convert from acres to hectares for live tree carbon storage.

#### Net Carbon Storage in Forest Vegetation Other than Live Trees

Forest vegetation other than live trees includes snags, understory vegetation, downed wood, and the forest floor (litter and duff). The BLM downloaded tables of carbon stock estimates using the Carbon OnLine Tool version 3.0 (COLE 3.0), available at http://www.ncasi2.org/GCOLE3/gcole.shtml. The BLM generated reports using the county or counties that comprise most of the individual districts. The BLM applied a filter consisting of Federal lands within the county. Although the BLM could have filtered for just BLM-administered lands, the data used to generate the estimates did not include enough plots on BLM-administered lands for statistically sound estimates. The analysis used Table 1 of the report, which consists of estimates of carbon stocks by age class for years 0 through 100, subtracting out the estimates for soil and live trees. Since many stands are older than age 100, the BLM needed to estimate understory carbon beyond year 100. Using the COLE Table 1, the BLM plotted the understory carbon stock estimates for every decade between year 10 and year 100 in an Excel spreadsheet and then used the trendline tool to create a regression equation for each district. The BLM then used the resulting equation to estimate understory carbon stocks for every decade between year 110 and 210, assuming that after year 210, understory carbon reaches equilibrium between input and decay.

### Net Carbon Storage in Soil

Little is actually known about carbon storage in soils due to the difficulties and expense in studying this carbon pool (Johnson and Curtis 2001). The scientific community knows even less about how soil carbon changes over time following natural disturbances and management, although some studies have attempted to understand soil carbon dynamics better. Decreases in soil carbon have generally been low and of relatively short duration (Smith *et al.* 2006, McKinley *et al.* 2011). For that reason, the BLM assumed no changes in soil carbon over time. The BLM used the soil column from Table 1 of each COLE 3.0 output and multiplied that value by the number of hectares analyzed on each district to estimate the Mg C stored in soils.

### Net Carbon Storage in Harvested Wood

Carbon stored in harvested wood depends on the volume of wood harvested, the resulting wood product, and the amount of carbon in that wood emitted through harvesting, processing, waste, disposal, and decomposition. Earles *et al.* (2012) developed decay equations for harvested wood based on the above factors for various parts of the world. Although the BLM was unable to obtain copies of the actual equations, the BLM developed a regression function based on the graphs for the U.S. Pacific Northwest provided in the supplemental information for the study:

$$Percent\ C\ remaining = (-0.0026 \times years\ since\ harvest) + 0.4989$$

This regression accounts for the life expectancy of different wood products such as paper, fiberboard, and lumber.

For the existing condition, the BLM used annual harvest records from the Oregon Department of Forestry (http://www.oregon.gov/odf/Pages/state_forests/frp/RP_Home.aspx#Annual_Timber_Harvest_Report) to estimate the volume harvested over time from BLM-administered lands within the planning area. The BLM converted the volume in thousands of board feet (Mbf) to carbon using the conversion factor of 0.443 Mg C per Mbf (Smith *et al.* 2006, p. 35). Total carbon remaining equaled the percent carbon remaining multiplied by the total carbon initially in the harvested wood.

To estimate the effects of the alternatives and the Proposed RMP, the BLM multiplied the estimated volume harvested per decade by the same conversion factor to carbon and the same regression function as for the existing condition. The BLM added these results to the estimated carbon stored in previously harvested wood products as of 2013.

### Carbon in Polygons with No Data

A certain portion of each district consisted of polygons for which there was no vegetation information. For the purposes of this analysis, the BLM assumed vegetation was present but that the predominant vegetation was not forest. To estimate aboveground carbon, the BLM used biomass information based on the Fuels Characteristic Class System (FCCS) version 3.0 for savanna, shrubland and grassland types considered representative of typical non-forest plant communities for each district or group of districts. Since the BLM did not know the relative abundance of the non-forest plant communities, it used a simple average of the estimated aboveground carbon for the selected FCCS fuelbeds. The BLM multiplied the result by the estimated number of hectares in non-forest community types to estimate aboveground carbon stored in each district and assumed these carbon stocks did not change over time.

### Effects of Wildfire on Carbon Storage

The Woodstock model included occurrence of high- and mixed-severity wildfire on each district in each decade based on historical occurrence levels. Following high-severity wildfire, the model reset stand age to zero in the decade in which the fire occurred. To mimic the effects of burning on aboveground carbon in a high-severity wildfire, the BLM estimated the remaining carbon to equal 25 percent of the carbon at age zero in the COLE tables. The BLM based this reduction on a combination of experience in assessing post-fire effects following fires considered high severity and the standard definition of high severity used by LANDFIRE (high severity equals greater than 75 percent mortality of the dominant plant life form). Thereafter, the BLM based carbon on stand age.

The BLM did not reset stand age following a mixed-severity wildfire. The BLM assumed 50 percent of the carbon associated with the stand age at the time of the fire was lost, based on the standard definition of mixed severity used by LANDFIRE (mixed severity equals 25–75 percent mortality of the dominant plant life form). The BLM assumed subsequent ages to contain only 75 percent of the carbon that would have been present in the absence of fire. While full recovery to carbon likely does occur, at some point, there is no scientific basis for determining when full recovery would occur. Further, recovery rates differ widely across the planning area.

### Sources of Uncertainty in Carbon Estimates

There are a large number of sources of uncertainty in estimating the amount of carbon stored on the BLM-administered lands within the planning area. These include the quality of the inventory data used, estimation methodology selected, and reliability of the data. Inventory data for live trees is generally the highest quality and most accurate, but the amount of time since the inventory and subsequent disturbance types and severities affect the accuracy of that data. Further, BLM does not have a comprehensive vegetation database that includes direct information for species, extent, and biomass for litter and duff, dead wood, herbaceous vegetation, shrubs, and non-commercial tree species.

There are several methodologies available for estimating the amount of carbon in a given unit of land and in harvested wood products; the likelihood of obtaining the same answer using different methodologies is low. Estimating soil carbon is particularly problematic due to the lack of data and different authors have generated estimates to differing depths in the soil profile. The BLM did not locate any studies that estimated time to full recovery of carbon to the equivalent of an unburned stand of the same age and general species composition following a mixed-severity wildfire.

Since many of the sources used to estimate carbon do not include measures of uncertainty, variance, or error, the level of uncertainty is not known, but likely large and could well exceed 50 percent. As such, the potential error in the estimate for any one alternative or the Proposed RMP likely exceeds the amount of variance between the alternatives and the Proposed RMP.

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# Greenhouse Gas Emissions Estimation

## Analysis of Greenhouse Gas Emissions

For this planning effort, the BLM estimated greenhouse gas emissions from four sources:

- Enteric fermentation from permitted livestock grazing on BLM-administered lands
- Timber harvest operations
- Prescribed burning
- Wildfires

The BLM summed emissions for each alternative and the Proposed RMP, although emissions from livestock grazing, the hazardous fuels program, and wildfires would not vary.

Greenhouse gases emitted by activities on BLM-administered lands include carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). Both $CH_4$ and $N_2O$ emissions have a greater global warming potential than $CO_2$ so the BLM multiplied the estimates by 25 and 298, respectively, to estimate carbon dioxide equivalents ($CO_2e$). The BLM converted all greenhouse gas emissions to the standard megagrams of carbon dioxide equivalent (Mg $CO_2e$) used for reporting greenhouse gas emissions nationally and globally.

## Enteric Fermentation (Livestock Grazing)

The BLM based livestock grazing emissions on the number of permitted animal unit months on BLM-administered lands in the planning area. Although the actual number of cow-calf pairs are less than the permitted number for the past several years, this analysis used the permitted number. The BLM derived the formula used to estimate livestock grazing emissions from IPCC guidelines (Eggleston *et al.* 2006, Chapter 10):

$$\left(AUMs \times \left(\frac{4.4\ kg\ CH4}{month}\right) \div 1000\right) \times 25 = Mg\ CO2e$$

The $CH_4$ emissions factor of 4.4 kg $mo^{-1}$ equals the annual emission factor in North America for beef cattle divided by 12 (EPA 2014).

## Harvest Operations

Greenhouse gas emissions from harvest operations are based on the study by Sonne (2006) in the Oregon Coast Range for private industrial lands and on harvest records maintained by the Oregon Department of Forestry (ODF) for all lands in western Oregon and for Klamath County in eastern Oregon (available at: http://www.oregon.gov/odf/pages/pubs/publications.aspx#agency_annual_reports). The BLM first converted harvest records in thousands of board feet to millions of board feet and divided by six to estimate millions of cubic feet. From Sonne (2006), BLM used the expected greenhouse gas emissions based on planting 1,235 trees per acre, and applying a pre-commercial thinning, commercial thinning, and fertilization prior to final harvest:

$$\left(\left(\frac{1.38\ Mg\ Co2e}{100\ m^3}\right) \times \left(\frac{100\ m^3}{3531.467\ ft^3}\right) \times 1{,}000{,}000 = 390.77\ \frac{Mg\ CO2e}{MMcf}\right)$$

The BLM then multiplied the number of million cubic feet harvested by 390.77 to estimate Mg $CO_2e$. This emission factor is based on a shorter rotation and more intensive management practices than BLM typically uses and, therefore, may somewhat overestimate emissions from harvest activities on BLM-administered lands as well as on other Federal lands.

### Prescribed Burning

Greenhouse gas emissions from past prescribed burning are based on estimated tons of biomass consumed as reported to the Oregon Department of Forestry (ODF) under the State's smoke management plan (available at http://www.oregon.gov/odf/pages/fire/smp/smkmgtannualrpts.aspx). ODF's reports include prescribed burns on BLM-administered lands in the Other Federal category, which includes U.S. Fish and Wildlife Service and Bureau of Indian Affairs, and consolidates prescribed burns for both Lake and Klamath Counties into a single number. The BLM conducts most of the prescribed burning in the Other Federal category, as indicated by the harvest records. The BLM calculated the various greenhouse gas types emitted from burning wood ($CO_2$, $CH_4$, and $N_2O$) using two different processes. The BLM obtained estimates of $CO_2$ and $CH_4$ from Consume 3.0 and the estimate of $N_2O$ by multiplying the tons consumed with EPA-provided emission factors (EPA 2014, Table 1). For $N_2O$, the BLM used an emission factor for burning wood and wood residuals for power generation. Since power generation typically consumes all material, the BLM may have overestimated emissions as compared to open burning where larger pieces of wood may not be completely consumed.

The BLM used two different methods to estimate emissions from future prescribed burning. For pile burning (hand piles, machine piles, and landing piles), the BLM used a standard description for each type of pile (size, shape, and composition) and a standard estimate of the number of piles per acre to estimate emissions per acre using the pile utility in Consume. The BLM multiplied these estimates by the number of acres treated by piling. The Woodstock model provided estimates of the acres treated by each type of piling method for harvest treatments and historical averages used for the hazardous fuels program. For broadcast and under burning, BLM selected a single representative fuel bed for each district that would result in the approximate number of tons consumed that had been estimated by past burning, as reported by the Interdisciplinary Team's Fuels Specialist.

### Wildfires

Wildfire emissions are much more difficult to estimate since there are no records of how much material any given fire consumes. The BLM used the following procedures to estimate greenhouse gas emissions from past wildfires.

The BLM downloaded records of all wildfires for Coos Bay, Eugene, Lakeview, Medford, Roseburg, and Salem Districts from the FAMWEB site (http://fam.nwcg.gov/fam-web/weatherfirecd/), imported the records into FireFamily Plus 4.1, extracted all wildfires 100+ acres in size, and exported the results into an Excel Spreadsheet. Using a variety of methods, the BLM deleted as many fires as could be identified that burned in the Lakeview Field Office to select just the data for the Klamath Falls Field Office. The BLM combined the data for Coos Bay, Eugene, and Salem into one group and the data for Medford and Roseburg into one group. Over the 34-year period of record (1980–2013), 7,763 acres burned in the Coos Bay-Eugene-Salem Districts group, 277,605 acres in the Medford-Roseburg Districts group, and 29,447 acres in Klamath Falls Field Office.

The BLM downloaded assessments of burn severity for individual large fires that originated on BLM-administered lands between 1984 and 2012, the latest year available, from the Monitoring Trends in Burn Severity website (http://mtbs.gov/data/individualfiredata.html). The BLM averaged acres burned in the difference categories of unburned to low, low, moderate, high, increased greenness, and mask and calculated the proportion for each category. Mask areas consist of features such as clouds, water and rock as well as missing lines of image data. The BLM combined high, increased greenness, and mask into a single high severity category; and unburned to low and low into a single low severity category. The resulting proportions of area burned were 59.1 percent low severity, 21.8 percent mixed severity (i.e., moderate), and 19.0 percent high severity. Because the documented fire severity record is sparse, the BLM used these same severity proportions across the planning area.

Since preburn fuel loadings are not known, the BLM used the Fuels Characteristic Class System (FCCS) module in Fuel & Fire Tools (FERA and UW 2014) to select representative fuelbeds (**Table G-1**). Because the BLM did not know the relative proportion of each fuelbed included in each analysis group, it equally weighted all fuelbeds. In order to assess emissions from the different burn severities, the BLM multiplied the total number of acres burned in each group by the proportional amount in the low, mixed, and high severity classes and created separate units in Fuel & Fire Tools. For example, the group comprised of Coos Bay, Eugene, and Salem Districts had three units labeled low, mixed, and high with assigned acres equaling the proportion estimated for each severity class (**Table G-2**). Each unit consisted of the set of fuelbeds selected through FCCS. The Consume module in Fuel & Fire Tools used this information to estimate greenhouse gas emissions for $CO_2$ and $CH_4$. Since the Consume module only uses 1000-hour and duff fuel moisture to drive the consumption algorithms, the BLM could not fully meet its intent of adjusting the amount of live fuel consumed.

**Table G-1.** Fuels Characteristic Classification System fuelbeds used in each analysis group to estimate greenhouse gas emissions from wildfire

| District/ Field Office | Fuelbed Number | Fuelbed Name |
|---|---|---|
| Coos Bay – Eugene – Salem | 2 | Western hemlock – western redcedar – Douglas-fir |
| | 5 | Douglas-fir – white fir |
| | 8 | Western hemlock – Douglas-fir – western redcedar/vine maple |
| | 9 | Douglas-fir – western hemlock – western redcedar/vine maple |
| | 10 | Western hemlock – Douglas-fir – Sitka spruce |
| | 11 | Douglas-fir – western hemlock – Sitka spruce |
| | 18 | Douglas-fir/oceanspray |
| | 24 | Pacific ponderosa pine – Douglas-fir |
| | 52 | Douglas-fir – Pacific ponderosa pine/oceanspray |
| | 208 | Grand fir – Douglas-fir |
| | 322 | Sitka spruce – western hemlock |
| Klamath Falls | 20 | Western juniper/curl-leaf mountain mahogany |
| | 24 | Pacific ponderosa pine – Douglas-fir |
| | 25 | Pinyon – Utah juniper |
| | 53 | Pacific ponderosa pine |
| | 55 | Western juniper/sagebrush |
| | 58 | Western juniper/sagebrush |
| | 67 | Interior ponderosa pine – Douglas-fir |
| | 210 | Pinyon – Utah juniper |
| Medford – Roseburg | 2 | Western hemlock – western redcedar – Douglas-fir |
| | 4 | Douglas-fir/*Ceanothus* |
| | 5 | Douglas-fir – white fir |
| | 6 | Oregon white oak – Douglas-fir |
| | 7 | Douglas-fir – sugar pine – tanoak |
| | 15 | Jeffrey pine – red fir – white fir/greenleaf - snowbrush |
| | 16 | Jeffrey pine – ponderosa pine – Douglas-fir – California black oak |
| | 24 | Pacific ponderosa pine – Douglas-fir |
| | 37 | Ponderosa pine – Jeffrey pine |
| | 38 | Douglas-fir – madrone – tanoak |
| | 39 | Sugar pine – Douglas-fir – oak |
| | 208 | Grand fir – Douglas-fir |
| | 215 | Douglas-fir – madrone – tanoak |
| | 239 | Douglas-fir – sugar pine – tanoak |

**Table G-2.** Acres, fuel moistures, and targeted consumption rates for live woody fuels in each severity class for past wildfires

| Live Woody Fuels | Low Severity (Targeted Consumption Rate) | Mixed Severity (Targeted Consumption Rate) | High Severity (Targeted Consumption Rate) |
|---|---|---|---|
| 1,000-hour Fuel Moisture | 20% | 10% | 6% |
| Duff Moisture | 200% | 100% | 10% |
| Shrub Black | - | 50% | 100% |
| Crown Black | - | 50% | 100% |
| **District/ Field Office** | **Low Severity (Acres)** | **Mixed Severity (Acres)** | **High Severity (Acres)** |
| Coos Bay – Eugene – Salem | 1,475 | 1,692 | 4,588 |
| Klamath Falls | 5,595 | 6,419 | 17,403 |
| Medford – Roseburg | 52,745 | 60,518 | 164,065 |

Large fires that originate on BLM-administered lands typically burn onto other lands. However, the future wildfire acres burned applied only to BLM-administered lands. In order to provide an appropriate comparison, the BLM had to adjust the emissions from past fires downward. The BLM calculated the average number of acres burned using the data for fires that originated on BLM-administered lands and compared that to the average number of acres burned just on BLM-administered lands as reported in Davis *et al*. (2014, p. 7), resulting in a reduction of 62 percent.

Consume does not estimate $N_2O$. However, the amount of $N_2O$ emitted by wood is relatively small (EPA 2014, Table 1). In addition, since the consumption algorithms in Consume are largely based on data collected during prescribed burning of logging debris, the program typically over-predicts consumption of natural fuels (Prichard *et al*. no date).

To estimate greenhouse gas emissions from future wildfires, BLM used the estimated acres burned in mixed- and high-severity fires each period from the Woodstock model. Using the same set of FCCS fuelbeds from **Table G-1** and the same fuel moistures and targeted consumption rates from **Table G-2**, BLM used Consume to estimate the per acre emissions for methane and carbon dioxide and converted the mass measure of pounds per acre to megagrams per acre. Because Consume does not include an estimate for nitrous oxide, BLM used the EPA (2014) emission factor for $N_2O$ for wood products of 63 g per short ton. Since low-severity fire was not included in Woodstock under the assumption that there was no impact to timber volume, the BLM assumed maintenance of the proportional relationship between low-, mixed-, and high-severity fire and used the acres burned in mixed and high severity combined to estimate the acres burned in low-severity fire.

## Uncertainties in Greenhouse Gas Emissions

Several factors can affect the actual greenhouse gas emissions from the different sectors analyzed in this document. Generally, limited input data, measurement errors associated with the available data, the need to simplify complex systems, and creating or using models based on limited data are the main sources of uncertainty in emissions estimation (Eve *et al*. 2014, p. 8-4).

Emissions from livestock grazing account only for the emissions from the animals and not for emissions from the soil that can arise based on grazing system, stocking rate, utilization levels, and season of grazing (Eve *et al*. 2014). Further, greenhouse gas emissions from grazing also depend on animal size and growth rate, which the BLM does not know for this analysis and likely varies from year-to-year. Thus, the estimation method the BLM used in this analysis has an estimated uncertainty of ± 50 percent (Eggleston *et al*. 2006, p. 10.33).

Emissions from harvest operations used in this analysis are based on a life cycle analysis conducted by Sonne (2006), which attempted to account for emissions from fuel used by vehicles and equipment, electricity, and fertilizer production in order to harvest trees; prepare sites for planting using prescribed fire or herbicides; produce, transport and plant seedlings; fertilize the site, and conduct one or more thinning operations before the final harvest of the subsequent stand. Although Sonne (2006) examined several different rotation ages, this analysis used age 60, the longest. The BLM typically manages stands on longer rotations than other landowners in the planning area and, under the 1995 RMPs, conducts far more thinning operations than final harvests, affecting actual greenhouse gas emissions. Further, the BLM conducts some uneven-aged management in the drier forests, which likely results in different emissions levels than even-aged management, although whether uneven-aged management produces less or greater emissions than even-aged management is not known. The BLM does not know the uncertainty associated with harvest operations, but expects that it is greater than 50 percent.

Greenhouse gas emissions from fire are particularly large. Estimates of preburn biomass and the amount of biomass consumed vary widely and the BLM does not know this information in sufficient detail for wildfires. Various estimating tools are available for prescribed fires, such as the debris prediction module in the Forest Vegetation Simulator (Rebain 2014) and the pile calculator in Fuel & Fire Tools (FERA and UW 2014). However, the districts may or may not use these tools in a given situation, and the BLM does not know the consistency of use. The tons recorded by ODF are simply those reported by the people who conducted the burn, who do not have effective methods for estimating actual consumption. Canopy consumption in wildfires of both trees and shrubs is particularly difficult to estimate, with high variability both within and between wildfires. As with harvest operations, the BLM does not know the uncertainty associated with emissions from fire, but expects that it varies by a factor of two (between half and twice as much as the estimate).

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# Appendix H – Fire and Fuels

## Issue 1 – Assumptions and Methods

### Methods

#### Study Area

The Nature Conservancy, under an agreement with the BLM, assessed forest vegetation restoration needs across five million acres of forest across southwestern Oregon **(Figure H-1)**, including 1.2 million acres of BLM-administered lands (**Figure H-2**). This geography generally includes the extent of forests with historically frequent fires within SW Oregon. These forests cover very broad climatic, edaphic, and topographic gradients with varying natural disturbance regimes.

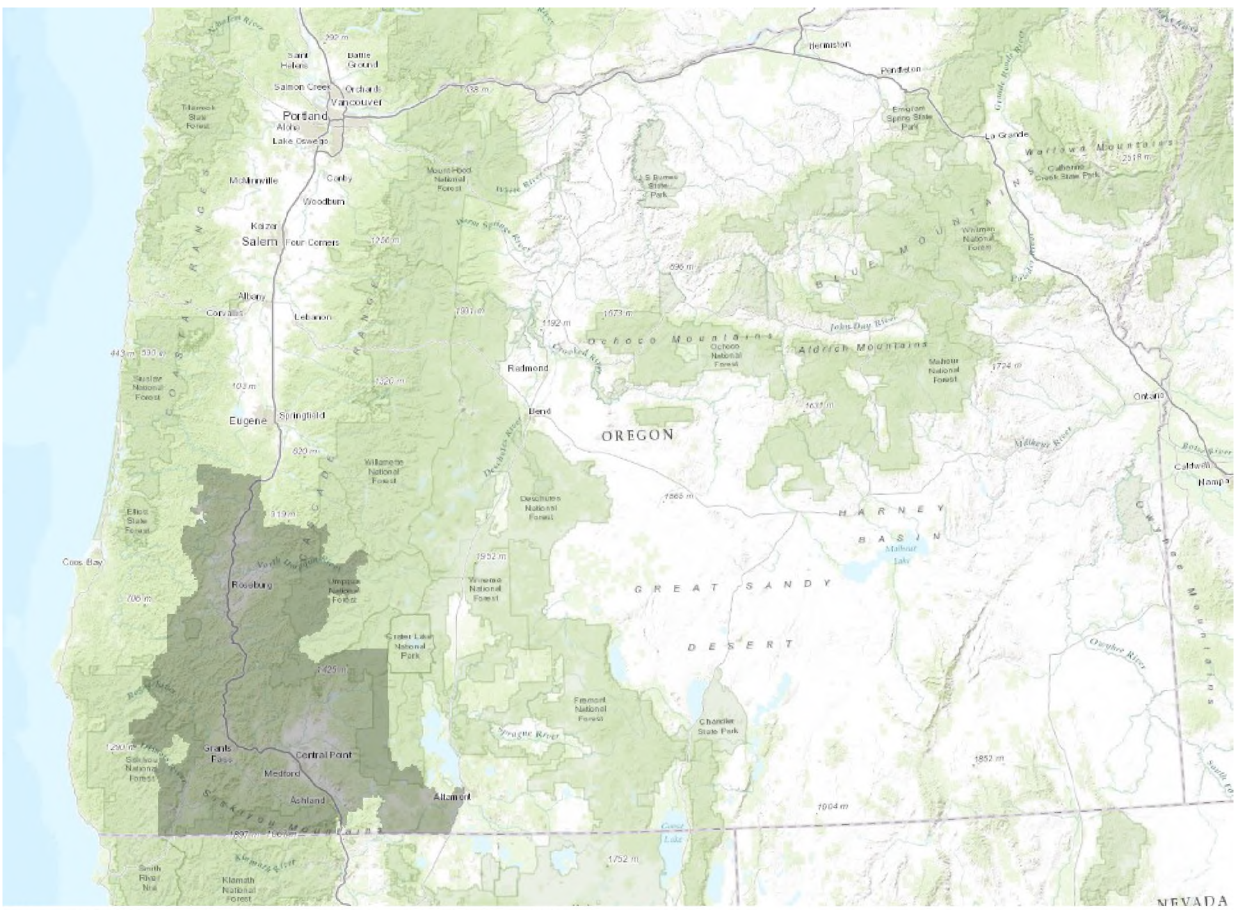


**Figure H-1.** Analysis area within the State of Oregon

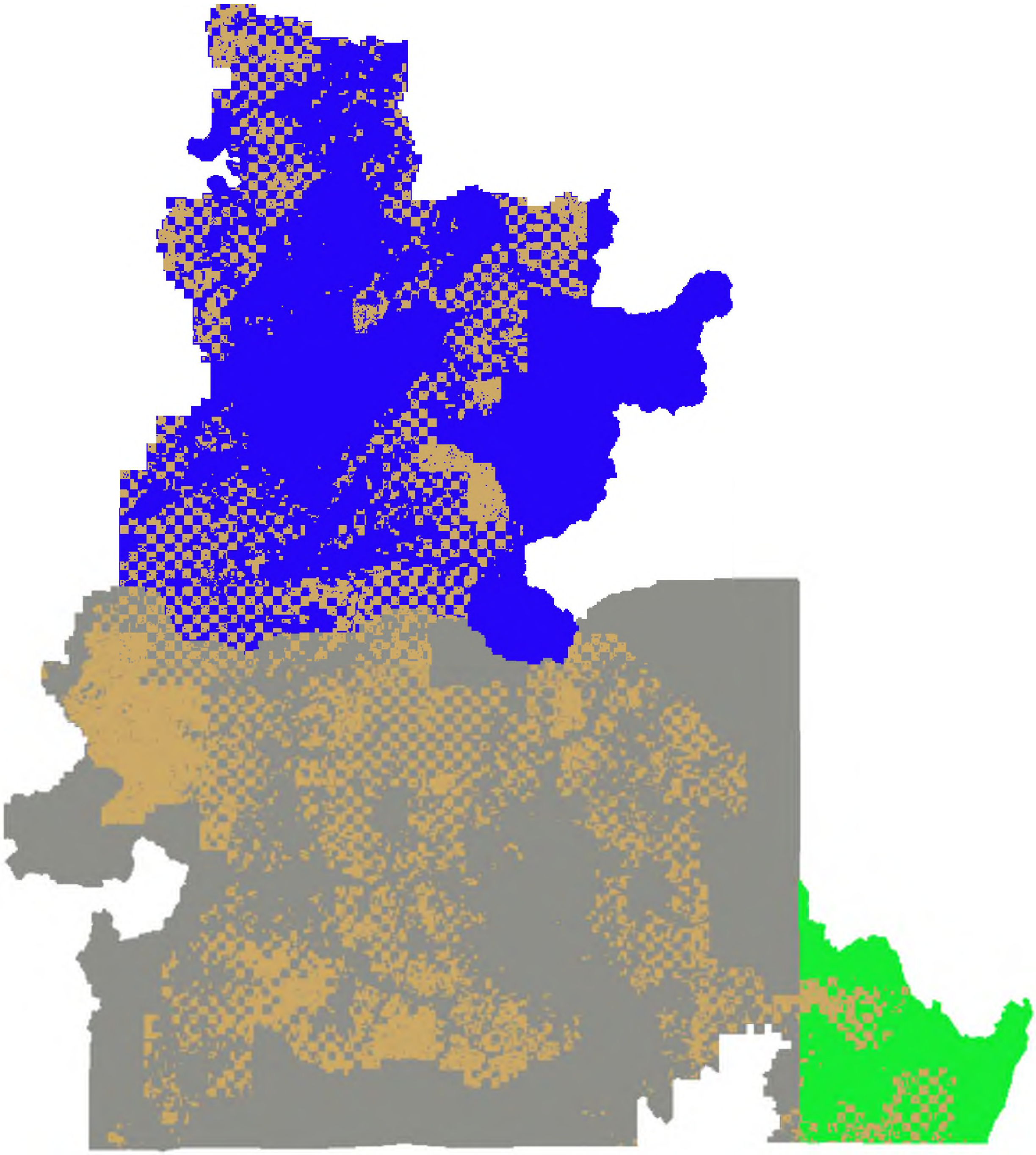

**Figure H-2.** BLM-administered lands within the analysis area
Note: Brown is BLM, blue is the Roseburg District, grey is the Medford District, and green is the western half of Klamath Falls Field Office.

### *Core Concepts and Data Sources*

The Nature Conservancy built upon the conceptual framework of the LANDFIRE and Fire Regime Condition Class (FRCC) programs (Barrett *et al*. 2010, Rollins 2009) and incorporated Oregon and BLM specific datasets. The Nature Conservancy's assessment of forest vegetation departure is based on four primary data inputs: (1) a classification and map of forested biophysical settings, (2) natural range of variability (NRV) reference conditions for each biophysical setting, (3) a delineation of 'landscape units' for each biophysical setting, and (4) a map of present day forest vegetation structure.

### *Mapping Forested Biophysical Settings*

Biophysical settings are potential vegetation units associated with characteristic land capabilities and disturbance regimes (Barrett *et al.* 2010). Many different forested biophysical settings are found across Washington and Oregon based on vegetation, soils, climate, topography, and historic disturbance regimes (Keane *et al.* 2007, Pratt *et al.* 2006, Rollins 2009). They provide the framework for describing fire regimes. The Nature Conservancy mapped biophysical settings using the 30 m pixel Integrated Landscape Assessment Projects' Potential Vegetation Type (PVT) dataset (Halofsky *et al.* 2014), which compiled previous potential forest vegetation classification and mapping efforts including Simpson (2007) and Henderson *et al.* (2011). The Nature Conservancy also incorporated subsequent refinements to Potential Vegetation Type mapping in southwestern Oregon by Henderson (2013).

A biophysical setting model from either the LANDFIRE Rapid Assessment or the later LANDFIRE National program (Rollins 2009, Ryan and Opperman 2013) was assigned to each Potential Vegetation Type mapping unit (**Table H-1**). Assignments were made by staff in the U.S. Forest Service Pacific Northwest Region Ecology Program based upon the geographic, environmental, and biological characteristics of the biophysical setting models and the Potential Vegetation Type mapping units. The Nature Conservancy defined forests across our study area as 'forest' or 'forest and woodland' land cover class in the biophysical setting model. U.S. Forest Service National Forest System lands are typically considered 'forest' if they have > 10 percent tree canopy cover, and this generally coincides with forest, and forest and woodland land cover classes (USDA FS 2004).

**Table H-1.** ILAP PVTs in the analysis area to LANDFIRE BpS model crosswalk

| Integrated Landscape Assessment Project Potential Vegetation Type (ILAP PVT) | LANDFIRE Biophysical Settings (BpS) |
|---|---|
| Douglas-fir-White oak | 0210290 |
| Douglas-fir–Dry | 0710270 |
| Western hemlock | R#DFHEwt |
| Mixed Conifer–Warm/Dry | R#MCONdy |
| Mixed Conifer–Moist | R#MCONms |
| Douglas-fir–Moist | R#MCONsw |
| Tan oak-Douglas-fir–Ultramafic | R#MEVG |
| Oregon white oak–Ponderosa pine | R#OAPI |
| Lodgepole pine | R#PICOpu |
| Ponderosa pine-Lodgepole pine | R#PIPOm |
| Ponderosa pine–Xeric | R#PIPOxe |
| Shasta red fir–Moist | R#REFI |
| Tan oak-Douglas-fir–Moist | R#TAOAco |
| Jeffery Pine | R#PIJEsp |
| Mixed Conifer–Cold | R#SPFI |

### ***Natural Range of Variability Reference Conditions***

Each biophysical setting model is composed of a suite of 3–5 successional/structural stages (s-classes). These classes typically include: (1) Early Development, (2) Mid-development Closed Canopy, (3) Mid-development Open Canopy, (4) Late Development Open Canopy, and (5) Late Development Closed Canopy. The definition of each s-class in terms of species composition, stand structure, and stand age is unique for each biophysical setting (**Table H-2** and **Table H-3**). The percentage of a biophysical setting in each s-class will differ depending on disturbance frequencies and/or intensities. The LANDFIRE and FRCC conceptual framework assumes that, given natural processes, a biophysical setting will have a characteristic range of variation in the proportion in each s-class and that an effective indicator of 'ecological condition' for a given landscape is the relative abundance of each s-class within biophysical settings (Barrett *et al.* 2010, Keane *et al.* 2011).

**Table H-2.** BLM-administered lands by s-class in terms of species composition, stand structure, and stand age for each biophysical setting

| | LANDFIRE BpS | Included in BLM Dry Extent | Early Seral (A) | | | | Mid-seral Closed (B) | | | | Mid-seral Open (C) | | | | Late-seral Open (D) | | | | Late-seral Closed (E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Size Class* | | Canopy Closure | | Size Class* | | Canopy Closure | | Size Class* | | Canopy Closure | | Size Class* | | Canopy Closure | | Size Class* | | Canopy Closure | |
| | | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Standard LANDFIRE 5-Box Models | 0210290 | x | 1 | 2 | 0 | 100 | 3 | 4 | 31 | 100 | 3 | 4 | 0 | 31 | 5 | 5 | 0 | 30 | 5 | 5 | 31 | 100 |
| | 0710270 | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |
| | R#DFHEwt | x | 1 | 2 | 0 | 100 | 3 | 4 | 61 | 100 | 3 | 4 | 0 | 60 | 5 | 5 | 0 | 60 | 5 | 5 | 61 | 100 |
| | R#MCONdy | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |
| | R#MCONms | x | 1 | 2 | 0 | 100 | 3 | 4 | 56 | 100 | 3 | 4 | 0 | 55 | 5 | 5 | 0 | 55 | 5 | 5 | 56 | 100 |
| | R#MCONsw | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |
| | R#MEVG | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |
| | R#OAPI | x | 1 | 2 | 0 | 100 | 3 | 4 | 31 | 100 | 3 | 4 | 0 | 30 | 5 | 5 | 0 | 30 | 5 | 5 | 31 | 100 |
| | R#PICOpu | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |
| | R#PIPOm | x | 1 | 2 | 0 | 100 | 3 | 4 | 31 | 100 | 3 | 4 | 0 | 30 | 5 | 5 | 0 | 30 | 5 | 5 | 31 | 100 |
| | R#PIPOxe | x | 1 | 2 | 0 | 100 | 3 | 4 | 26 | 100 | 3 | 4 | 0 | 25 | 5 | 5 | 0 | 25 | 5 | 5 | 26 | 100 |
| | R#REFI | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |
| | R#TAOAco | x | 1 | 2 | 0 | 100 | 3 | 4 | 61 | 100 | 3 | 4 | 0 | 60 | 5 | 5 | 0 | 60 | 5 | 5 | 61 | 100 |
| | R#PIJEsp | x | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 40 | 5 | 5 | 41 | 100 |

| LAND-FIRE BpS | Included in BLM Dry Extent | Early Seral (A) | | | | Mid-seral Closed (B) | | | | Mid-seral Open (C) | | | | Late-seral Open (D) | | | | Late-seral Closed (E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | |
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| F#SPFI | x* | 1 | 2 | 0 | 10 | 1 | 2 | 11 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 5 | 0 | 100 |

* BLM size-class values are numeric representations of structure classes used to categorize early, stand establishment, young, mature, and older complex structural stages (see Vegetation Modeling – Forest Structural Stage Classification **Appendix C**). The BLM used vegetation-modeling canopy cover to determine open and closed status.
Note: The term canopy closure in this table is synonymous with canopy cover, and is based on modeled cover and not field based closure measurements.

**Table H-3.** Non-BLM-administered lands by s-class in terms of species composition, stand structure, and stand age for each biophysical setting

| | LANDFIRE BpS | Early Seral (A) | | | | Mid-seral Closed (B) | | | | Mid-seral Open (C) | | | | Late-seral Open (D) | | | | Late-seral Closed (E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | |
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Standard LANDFIRE 5-Box Models | 0210290 | 1 | 2 | 0 | 100 | 3 | 5 | 31 | 100 | 3 | 5 | 0 | 31 | 6 | 7 | 0 | 30 | 6 | 7 | 31 | 100 |
| | 0710270 | 1 | 2 | 0 | 100 | 3 | 6 | 41 | 100 | 3 | 6 | 0 | 40 | 7 | 7 | 0 | 40 | 7 | 7 | 41 | 100 |
| | R#DFHEwt | 1 | 2 | 0 | 100 | 3 | 5 | 61 | 100 | 3 | 5 | 0 | 60 | 6 | 7 | 0 | 60 | 6 | 7 | 61 | 100 |
| | R#MCONdy | 1 | 2 | 0 | 100 | 3 | 5 | 41 | 100 | 3 | 5 | 0 | 40 | 6 | 7 | 0 | 40 | 6 | 7 | 41 | 100 |
| | R#MCONms | 1 | 2 | 0 | 100 | 3 | 5 | 56 | 100 | 3 | 5 | 0 | 55 | 6 | 7 | 0 | 55 | 6 | 7 | 56 | 100 |
| | R#MCONsw | 1 | 2 | 0 | 100 | 3 | 5 | 41 | 100 | 3 | 5 | 0 | 40 | 6 | 7 | 0 | 40 | 6 | 7 | 41 | 100 |
| | R#MEVG | 1 | 2 | 0 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 7 | 0 | 40 | 5 | 7 | 41 | 100 |
| | R#OAPI | 1 | 2 | 0 | 100 | 3 | 3 | 31 | 100 | 3 | 3 | 0 | 30 | 4 | 7 | 0 | 30 | 4 | 7 | 31 | 100 |
| | R#PICOpu | 1 | 2 | 0 | 100 | 3 | 5 | 41 | 100 | 3 | 5 | 0 | 40 | 6 | 7 | 0 | 40 | 6 | 7 | 41 | 100 |
| | R#PIPOm | 1 | 2 | 0 | 100 | 3 | 4 | 31 | 100 | 3 | 4 | 0 | 30 | 5 | 7 | 0 | 30 | 5 | 7 | 31 | 100 |
| | R#PIPOxe | 1 | 2 | 0 | 100 | 3 | 5 | 26 | 100 | 3 | 5 | 0 | 25 | 6 | 7 | 0 | 25 | 6 | 7 | 26 | 100 |
| | R#REFI | 1 | 2 | 0 | 100 | 3 | 5 | 41 | 100 | 3 | 5 | 0 | 40 | 6 | 7 | 0 | 40 | 6 | 7 | 41 | 100 |
| | R#TAOAco | 1 | 2 | 0 | 100 | 3 | 4 | 61 | 100 | 3 | 4 | 0 | 60 | 5 | 7 | 0 | 60 | 5 | 7 | 61 | 100 |
| | R#PIJEsp | 1 | 2 | 0 | 100 | 3 | 5 | 41 | 100 | 3 | 5 | 0 | 40 | 6 | 7 | 0 | 40 | 6 | 7 | 41 | 100 |
| | | | | | | | | | | | | | | | | | | | | | |
| | LAND-FIRE BpS | Early Seral (A) | | | | Mid-seral Closed (B) | | | | Mid-seral Open (C) | | | | Late-seral Open (D) | | | | Late-seral Closed (E) | | | |
| | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | | Size Class | | Canopy Closure | |
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| | R#SPFI | 1 | 2 | 0 | 10 | 1 | 2 | 11 | 100 | 3 | 4 | 41 | 100 | 3 | 4 | 0 | 40 | 5 | 7 | 0 | 100 |

Note: The term canopy closure in this table is synonymous with canopy cover, and is based on modeled cover percent and not field based closure measurements.

The Natural Range of Variability (NRV) reference models describe how the relative distribution of s-classes for a biophysical setting were shaped by succession and disturbance prior to European settlement and provide a comparison to present-day forest conditions (Keane *et al.* 2009, Landres *et al.* 1999). LANDFIRE biophysical setting models are used to develop NRV estimates using state-and-transition models incorporating pre-European settlement rates of succession and disturbance. Rates were determined through an intensive literature and expert review process (Keane *et al.* 2002, Keane *et al.* 2007, Pratt *et al.* 2006, and Rollins 2009).

The distribution of s-classes for each biophysical setting, which results from running state-and-transition models for many time-steps (**Table H-4**) does not represent a specific historical date, but instead approximates characteristic conditions that result from natural biological and physical processes operating on a landscape over a relatively long time. The NRV is frequently represented by a single value, the mean relative abundance of each s-class from a collection of Monte Carlo state-and-transition model simulations (e.g., Low *et al.* 2010, Shlisky *et al.* 2005, and Weisz *et al.* 2009). However, The Nature Conservancy developed and used ranges for each s-class resulting from the stochastic variation within the state-and-transition models. The Nature Conservancy ran 10 simulations for each biophysical setting state-and-transition model over 1,000 pixels and 1,000 annual time steps. Simulations were started with an equal portion in each s-class and it took 200–400 years for the initial trends to stabilize. The Nature Conservancy calculated the range for each s-class as ± 2 standard deviations from the mean abundance from the last 500 time steps (Provencher *et al.* 2008). Simulations were modeled using the Vegetation Dynamics Development Tool (ESSA Technologies 2007).

**Table H-4.** Reference condition range by Potential Vegetation Type (PVT)/Biophysical Setting (BpS)

| LANDFIRE BpS | BpS Name | Early Seral (A) | | | | Mid-seral (B) | | | | Mid-seral (C) | | | | Late-seral Open (D) | | | | Late-seral Closed (E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LAND FIRE RC | VDDT Mean | HRV Low | HRV High | LAND FIRE RC | VDDT Mean | HRV Low | HRV High | LAND FIRE RC | VDDT Mean | HRV Low | HRV High | LAND FIRE RC | VDDT Mean | HRV Low | HRV High | LAND FIRE RC | VDDT Mean | HRV Low | HRV High |
| 0210290 | Mediterranean California Mixed Oak Woodland | 10 | 9.3 | 7 | 11 | 1 | 1.1 | 0 | 2 | 20 | 21.2 | 19 | 24 | 64 | 64.9 | 62 | 68 | 5 | 3.5 | 2 | 5 |
| 0710270 | Mediterranean California Dry-Mesic Mixed Conifer Forest and Woodland | 10 | 9.0 | 7 | 11 | 5 | 6.3 | 5 | 8 | 20 | 20.1 | 18 | 22 | 40 | 42.3 | 40 | 45 | 25 | 22.3 | 20 | 25 |
| R#DFHEwt | Douglas-fir Hemlock–Wet Mesic | 5 | 4.6 | 3 | 6 | 15 | 17.0 | 15 | 19 | 1 | 0.6 | 0 | 1 | 4 | 3.5 | 2 | 5 | 75 | 74.3 | 71 | 77 |
| R#MCONdy | Mixed Conifer–Eastside Dry | 15 | 14.0 | 12 | 16 | 1 | 0.7 | 0 | 1 | 30 | 31.6 | 29 | 34 | 40 | 41.5 | 38 | 45 | 14 | 12.3 | 10 | 14 |
| R#MCONms | Mixed Conifer–Eastside Mesic | 15 | 14.5 | 12 | 17 | 40 | 44.4 | 42 | 47 | 15 | 12.5 | 10 | 15 | 10 | 9.6 | 8 | 11 | 20 | 18.9 | 17 | 21 |
| R#MCONsw | Mixed Conifer–Southwest Oregon | 15 | 14.6 | 12 | 17 | 5 | 2.9 | 2 | 4 | 10 | 12.6 | 11 | 14 | 50 | 51.9 | 49 | 55 | 20 | 18.1 | 16 | 20 |
| R#MEVG | California Mixed Evergreen North | 15 | 16.6 | 14 | 19 | 10 | 7.5 | 6 | 9 | 50 | 51.6 | 48 | 55 | 20 | 20.5 | 18 | 23 | 5 | 3.8 | 3 | 5 |
| R#OAPI | Oregon White Oak/Ponderosa Pine | 25 | 25.1 | 22 | 28 | 5 | 3.8 | 3 | 5 | 20 | 19.2 | 17 | 22 | 47 | 48.7 | 45 | 52 | 3 | 3.2 | 2 | 4 |
| R#PICOpu | Lodgepole Pine–Pumice Soils | 20 | 21.6 | 19 | 24 | 15 | 13.9 | 12 | 16 | 50 | 47.7 | 45 | 51 | 10 | 10.9 | 9 | 13 | 5 | 5.9 | 4 | 7 |
| R#PIJEsp | Pine Savannah–Ultramafic | 15 | 15.0 | 13 | 17 | 0 | 1.0 | 0 | 3 | 45 | 44.0 | 41 | 47 | 40 | 39.0 | 36 | 42 | 0 | 1.0 | 0 | 2 |
| R#PIPOm | Dry Ponderosa Pine–Mesic | 10 | 10.8 | 9 | 13 | 10 | 6.9 | 5 | 8 | 35 | 37.2 | 34 | 40 | 40 | 42.4 | 39 | 45 | 5 | 2.8 | 2 | 4 |
| R#PIPOxe | Ponderosa Pine–Xeric | 25 | 23.6 | 21 | 26 | 5 | 5.8 | 4 | 7 | 25 | 22.4 | 20 | 25 | 40 | 43.2 | 41 | 46 | 5 | 4.9 | 4 | 6 |
| R#REFI | Red Fir | 10 | 6.9 | 5 | 8 | 20 | 22.5 | 20 | 25 | 15 | 13.2 | 11 | 15 | 20 | 21.9 | 19 | 24 | 35 | 35.5 | 33 | 39 |
| R#TAOCco | Oregon Coastal Tanoak | 10 | 9.7 | 8 | 12 | 10 | 12.5 | 10 | 15 | 50 | 47.4 | 44 | 51 | 25 | 26.2 | 23 | 29 | 5 | 4.2 | 3 | 5 |
| R#SPFI | Spruce-Fir | 3 | 3.0 | 2 | 4 | 22 | 22.3 | 19 | 25 | 30 | 24.6 | 22 | 27 | 20 | 20.6 | 18 | 23 | 25 | 29.4 | 27 | 32 |

## *Landscape Units*

Following the LANDFIRE and FRCC conceptual framework, The Nature Conservancy defined discrete landscape units to compare present-day forests to modeled Natural Range of Variability reference conditions (Barrett *et al*. 2010, Pratt *et al*. 2006). Landscape units were chosen that would adequately represent the scale of disturbance of a particular Potential Vegetation Type and were composed of forested lands within a BLM management district. This would allow summarization in an accurate and usable way for managers **(Figure H-3)**.

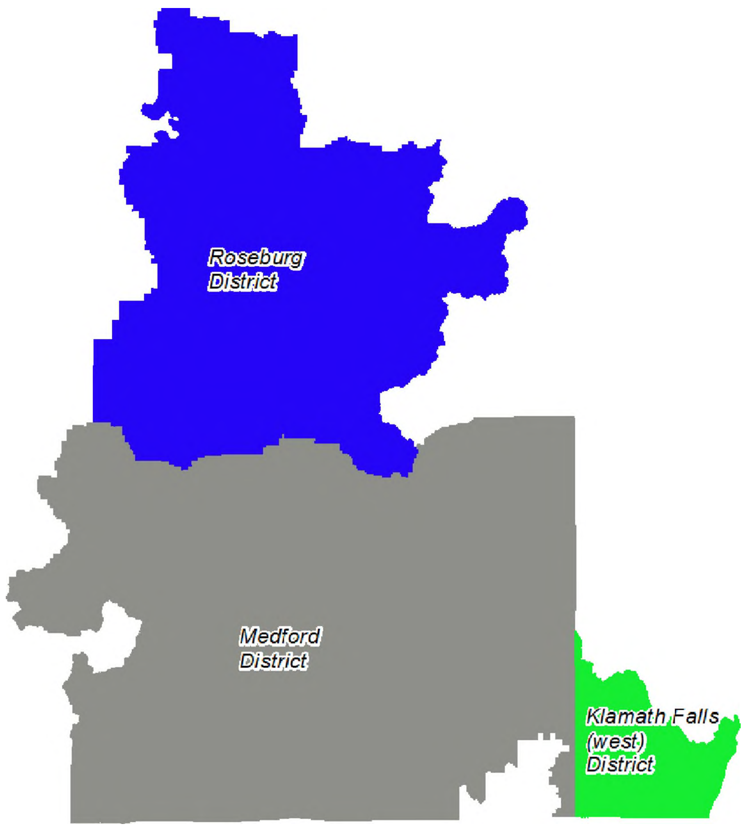


**Figure H-3.** Landscape units

## *Present-Day Forest Structure and Composition*

The Nature Conservancy characterized present-day forest vegetation with the gradient nearest neighbor imputation (GNN, Ohmann and Gregory 2002, Figure 3) datasets produced by the U.S. Forest Service Pacific Northwest Research Station and Oregon State University Landscape Ecology, Modeling, Mapping, and Analysis research group (www.fsl.orst.edu/lemma) and outputs from the BLM vegetation modeling process (**Appendix C**).

All lands that are outside of BLM ownership used the GNN data for current conditions; the BLM-administered lands used the RMP data.

To compare present-day forest vegetation to the Natural Range of Variability reference conditions, The Nature Conservancy mapped the current distribution of s-classes for each biophysical setting using BLM Proposed RMP and alternatives' data for the BLM-administered lands and GNN data for all other ownerships. S-class mapping was based upon tree canopy cover and tree size thresholds provided for each s-class in the biophysical setting model descriptions (**Table H-2** and **Table H-3**).

### *Departure Analysis*

Departure in this project is defined as the difference between a modeled reference condition and the current conditions in acres (**Figure H-4**). In an effort to frame ecological departure appropriately, The Nature Conservancy chose to look at the whole landscape and summarize departure for each analysis area (district) by alternative and the Proposed RMP. This meant that the BLM s-class by alternative and the Proposed RMP (**Figure H-5**) was mosaicked with the base GNN data (**Figure H-6**) to create a landscape s-class layer that combined both the BLM data and the GNN data (**Figure H-7**).

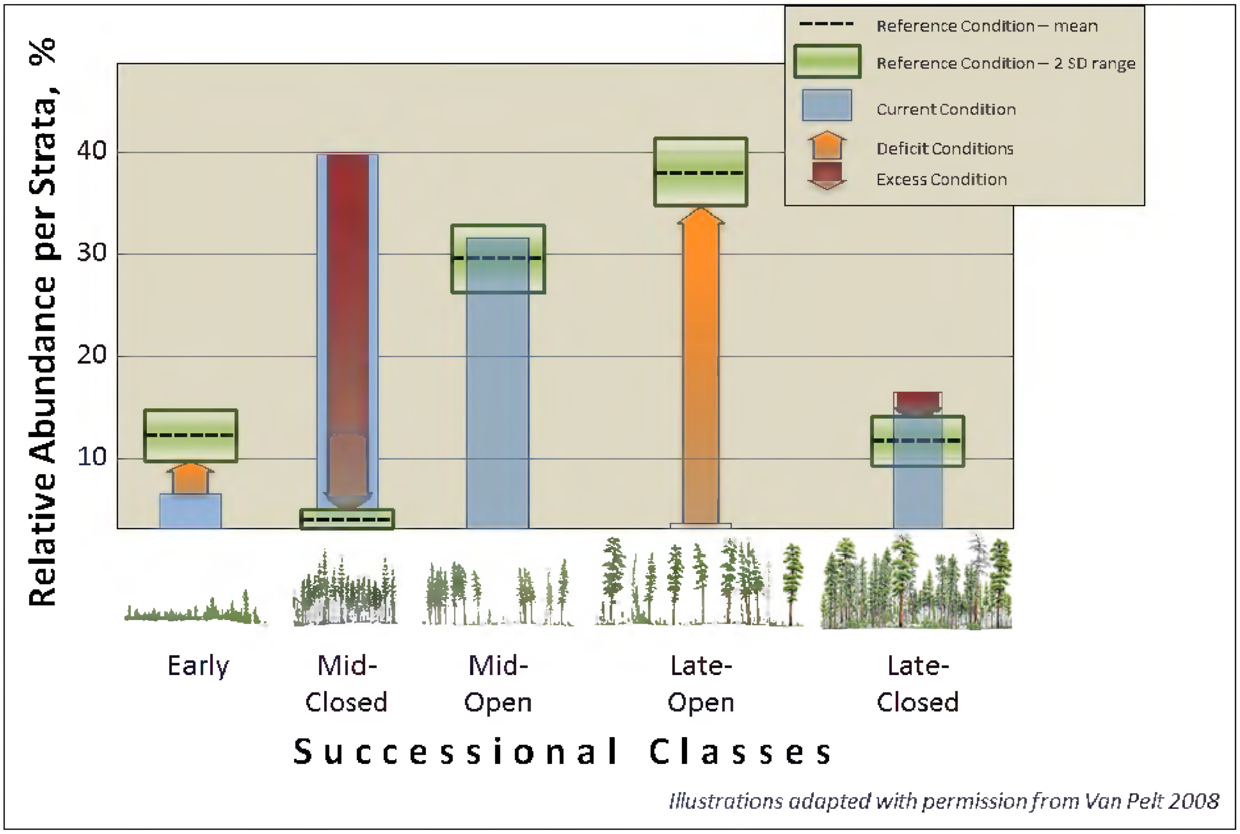


**Figure H-4.** Example landscape unit (strata) departure summary calculation

**Figure H-5.** BLM successional/structural stage (s-class) data for BLM-administered lands in the analysis area

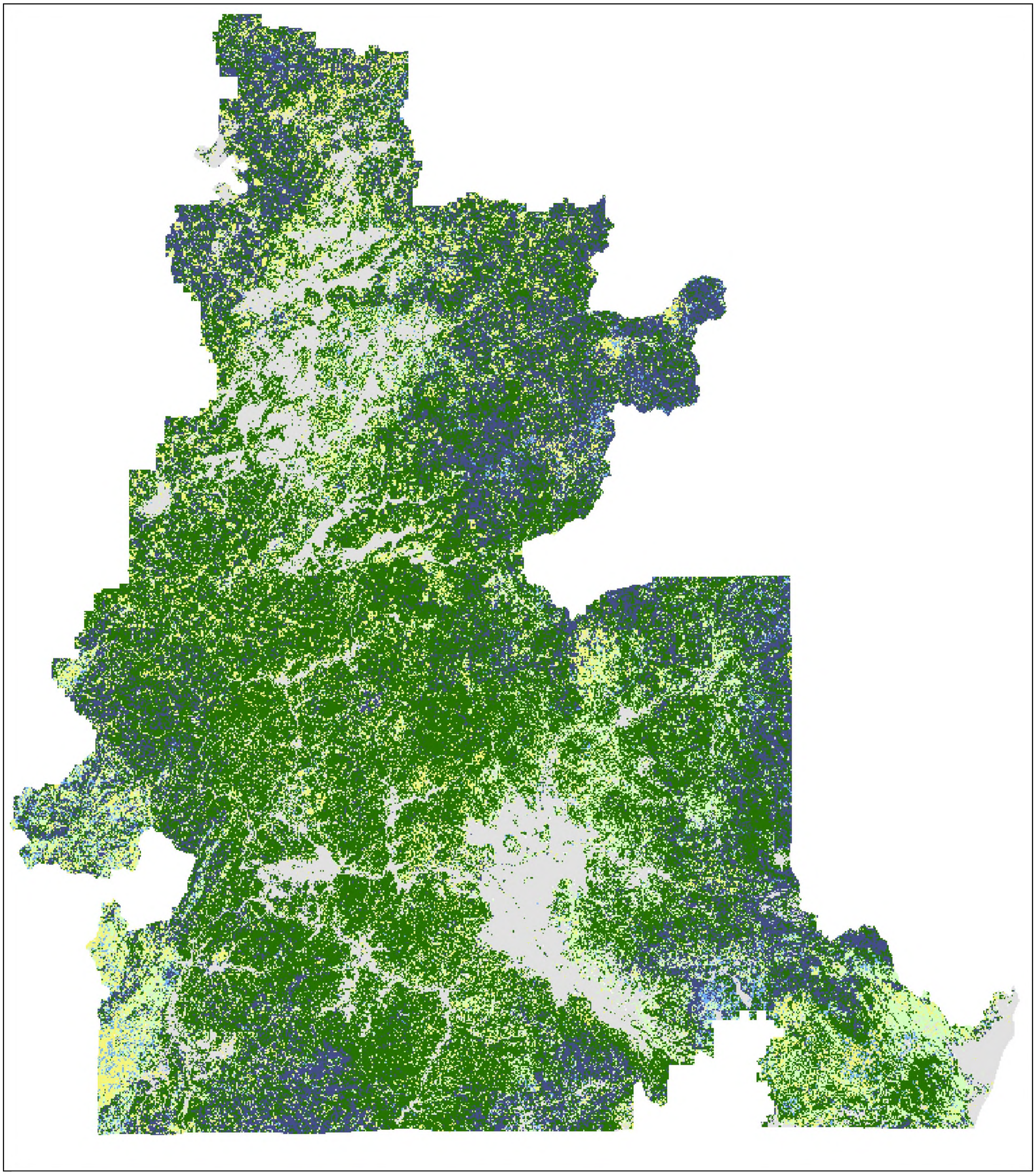

**Figure H-6.** Gradient nearest neighbor (GNN) s-class data for the analysis area

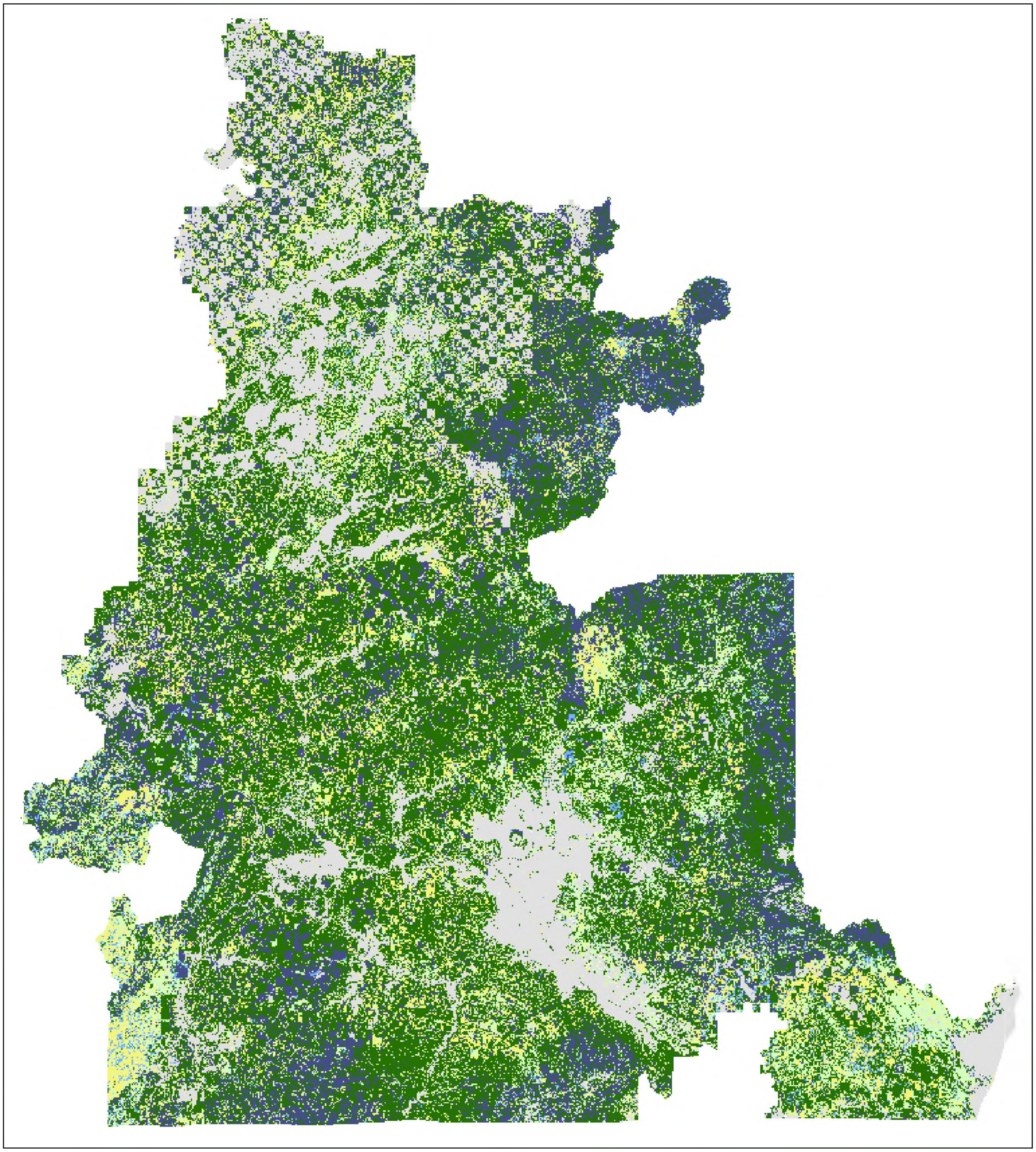
**Figure H-7.** BLM and GNN s-class data combined

This process of combining BLM data and GNN data was completed for each alternative and the Proposed RMP and departure was calculated for each of these mosaicked datasets. Eight different landscape s-class layers were developed: Current Condition, No Action alternative, Alternative A, Alternative B, Alternative C, Alternative D, the Proposed RMP, and the No Timber Harvest reference analysis.

Departure was calcuated for each combination of Potential Vegetation Type and landscape unit (strata) and summarized as an acre value. Departue can be summarized in a deficit or excess acres of s-class or in a combined overall departure acres; both were summarized in this analysis.

All the results were summerized by alternative and analysis unit in Excel, as well as summarys of s-class by alternative to help frame the conversation and discussion in the RMP.

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# Issues 2 and 3 – Assumptions and District-specific Results

### *Issue 2*
*How would the alternatives affect fire resistance in the fire-adapted dry forests at the stand level?*

### *Issue 3*
*How would the alternatives affect fire hazard at the stand – level within close proximity to developed areas?*

## Common Analytical Assumptions
The results of this analysis do not include effects from non-commercial hazardous fuels work taking place in forested or non-forested lands (**Table H-5**). These types of treatments would contribute toward improving fire resistance and reducing fire hazard similarly among all alternatives and the Proposed RMP.

**Table H-5.** Acres of current condition forested and non-forested BLM-administered lands within the planning area

| District/ Field Office | Forest (Acres) | Non-Forest (Acres) | Totals (Acres) |
|---|---|---|---|
| Coos Bay | 304,030 | 20,206 | 324,236 |
| Eugene | 297,222 | 13,841 | 311,063 |
| Klamath Falls | 46,773 | 167,312 | 214,084 |
| Medford | 740,110 | 66,565 | 806,675 |
| Roseburg | 399,163 | 24,477 | 423,640 |
| Salem | 374,392 | 24,765 | 399,157 |

## Assumptions of General Stand Structural Stages and Fire Interactions

- Vegetation community structure is an important factor affecting potential fire behavior, post-fire effects, fire resistance, and fire hazard.

### Early Successional
The BLM assumes that although Early Successional communities have less than 30 percent canopy cover—resulting in somewhat discontinuous surface fuel loading—this structural stage is typically comprised of highly flammable vegetation (Agee 1993). When combined with open conditions that can increase surface wind speeds and flames lengths (Pollet and Omi 2002, Rothermel 1983), in general, this structural stage presents relatively moderate resistance to replacement fire and moderate fire hazard.

## Stand Establishment and Young High-density Stands

The Stand Establishment and Young High-density stand structural stages maintain low canopy base heights and a combination of highly flammable Early Successional vegetation, along with increased cover. In general, these structural stages present relatively low resistance to replacement fire and high fire hazard (Odion *et al.* 2004, Weatherspoon and Skinner 1995).

## Young Low-density Stands

Although, the canopy base height may be low in Young Low-density stands, in general, there is greater separation between crowns (vertically and horizontally). This discontinuity in the fuel profile, results in relatively lower canopy bulk densities, moderate fire hazard, and moderate resistance to replacement fire within both the younger and structural legacy components of the stand.

## Structural Legacies

The Stand Establishment and Young High-density stand structural stages maintain low canopy base heights and a combination of highly flammable Early Successional vegetation, along with increased cover. In general, these structural stages present relatively low resistance to replacement fire and high fire hazard (Odion *et al.* 2004, Weatherspoon and Skinner 1995). However, both Early Successional and Stand Establishment phases with Structural Legacies would have some separation of crown layers between legacy trees and understory vegetation, resulting in somewhat discontinuous ladder fuels and increased fire resistance in Structural Legacies. Pockets of heavy surface and ladder fuels may result in potential mortality to Structural Legacies from cambial damage (trees < 20" DBH have 35–70 percent mortality, USDI BLM 2008) or passive torching. This potential for cambial damage to overstory legacy structures increases along with understory vegetative cover and height (Peterson *et al.* 2005). Despite some potential separation in crown layers, in general, young high-density stands have high continuous surface and ladder fuel loading, low canopy fuel base heights, and taller vegetation, relative to Early Successional and Stand Establishment vegetation. This fuel profile in the Young High-density stands increases crown fire potential of the young stand component and structural legacies (Odion *et al.* 2004), resulting in lower relative resistance to replacement fire and higher fire hazard.

Overstory canopy cover from Structural Legacies could also partially shelter the stand, reducing surface winds and slowing the drying of fuels (NWCG 2014), and thus help moderate fire behavior. Alternatively, open stand conditions have the potential to increase drying and surface winds and thus flame lengths (Pollet and Omi 2002, Rothermel 1983). Increased winds in combination with low canopy base heights can increase torching potential and fire hazard, therefore no distinction is made between Early Successional, Stand Establishment, and Young stands with Structural Legacies in regards to fire hazard.

## Mature Single-layered Canopy

In general, Mature Single-layered Canopy stands have low surface fuel loading (due to closed canopy shading inhibiting understory growth), higher canopy base heights, and thus a lower probability of torching and crown fire initiation within the stand, creating a low stand-level fire hazard condition (Jain *et al.* 2012). Although, continuous canopy cover of high canopy bulk density is susceptible to crown fire spread from adjacent stands (Scott and Reinhardt 2001, Jain and Graham 2007, Jain *et al.* 2012).

## Mature Multi-layered Canopy and Structurally-complex

Mature Multi-layered Canopy and Structurally-complex forests have the potential to exhibit the full range of fire behavior (surface to crown fire). In general, these structural stages have heterogeneous composition, which can alter fire spread (Jain *et al.* 2012, Finney 2001); and a larger number of large diameter (> 20" DBH) trees with thick bark, which improve stand-level fire resistance and reduce stand-level fire hazard (Agee and Skinner 2005), potentially increasing the likelihood of burning at low- to moderate-severity (Alexander *et al.* 2006). Multi-aged closed-forest conditions can potentially create a vertical fuel ladder for surface fire to reach the canopy (North *et al.* 2009) and support accumulations of continuous heavy surface and ladder fuels, and increase the potential for torching and crown fire, significantly reducing resistance to control. Alternatively, these structural types can create influential microclimates and shelter surface winds, harboring conditions that are more likely to result in lowered fire severity (Odion *et al*. 2004), particularly in topographic locations with low fire probability.

Ultimately, fire behavior in these structural stages will result from several factors, including weather, fuel moisture, and topographic influences, along with the vertical and horizontal continuity of the fuel profile.

## Fire Resistance and Fire Hazard Ratings

- General assumptions regarding vegetation structural stage classification and the probable fire behavior based on vertical and horizontal fuel profile were used to generate relative stand-level resistance to replacement fire and fire hazard ratings (**Table H-6** and **Table H-7**).

**Table H-6.** BLM-defined structural stages and subdivisions, relative stand-level resistance to replacement fire ratings, and assumptions regarding overall fuel profile continuity, and vertical and horizontal fuel continuity

| Structural Stages | Subdivisions | Resistance to Replacement Fire | Assumptions Behind Resistance Ratings | | |
|---|---|---|---|---|---|
| | | | Entire Fuel Profile Continuity | Horizontal Fuel Profile Continuity | Vertical Fuel Profiie Continuity |
| Early Successional | with Structural Legacies | Moderate | Semi-discontinuous | Semi-discontinuous | Semi-discontinuous |
| | without Structural Legacies | Moderate | Semi-discontinuous | Continuous | Semi-discontinuous |
| Stand Establishment | with Structural Legacies | Moderate | Semi-discontinuous | Semi-discontinuous | Continuous |
| | without Structural Legacies | Low | Continuous | Continuous | Continuous |
| Young High-density | with Structural Legacies | Low | Continuous | Continuous | Continuous |
| | without Structural Legacies | Low | Continuous | Continuous | Continuous |
| Young Low-density | with Structural Legacies | Moderate | Semi-discontinuous | Continuous | Semi-discontinuous |
| | without Structural Legacies | Moderate | Semi-discontinuous | Continuous | Semi-discontinuous |
| Mature | Single-layered Canopy | High | Discontinuous | Discontinuous | Continuous |
| | Multi-layered Canopy | Mixed | Mixed continuity | Mixed continuity | Mixed continuity |
| Structurally-complex | Developed Structurally-complex | Mixed | Mixed continuity | Mixed continuity | Mixed continuity |
| | Existing Old Forest | Mixed | Mixed continuity | Mixed continuity | Mixed continuity |
| | Existing Very Old Forest | Mixed | Mixed continuity | Mixed continuity | Mixed continuity |

**Table H-7.** BLM-defined structural stages and subdivisions, relative stand-level fire hazard ratings and assumptions regarding surface fuel loading, canopy base height, and canopy fuel bulk density (continuity) as the basis for the hazard rating

<table>
<tr><th rowspan="2">Structural Stages</th><th rowspan="2">Subdivisions</th><th rowspan="2">Fire Hazard Rating</th><th colspan="3">Assumptions Behind Hazard Ratings</th></tr>
<tr><th>Surface Fuel Loading</th><th>Canopy Base Height</th><th>Canopy Fuel Bulk Density (Continuity)</th></tr>
<tr><td rowspan="2">Early Successional</td><td>with Structural legacies</td><td>Moderate</td><td rowspan="8">Low</td><td rowspan="8">Low</td><td rowspan="2">Moderate</td></tr>
<tr><td>without Structural Legacies</td><td>Moderate</td></tr>
<tr><td rowspan="2">Stand Establishment</td><td>with Structural Legacies</td><td>High</td><td rowspan="4">High</td></tr>
<tr><td>without Structural Legacies</td><td>High</td></tr>
<tr><td rowspan="2">Young Stands–High Density</td><td>with Structural Legacies</td><td>High</td></tr>
<tr><td>without Structural Legacies</td><td>High</td></tr>
<tr><td rowspan="2">Young Stands–Low Density</td><td>with Structural Legacies</td><td>Moderate</td><td rowspan="3">Moderate</td></tr>
<tr><td>without Structural Legacies</td><td>Moderate</td></tr>
<tr><td rowspan="2">Mature</td><td>Single-layered Canopy</td><td>Low</td><td>Moderate</td><td>High</td></tr>
<tr><td>Multi-layered Canopy</td><td>Mixed</td><td colspan="3" rowspan="4">Mixed</td></tr>
<tr><td rowspan="3">Structurally-complex</td><td>Developed Structurally-complex</td><td>Mixed</td></tr>
<tr><td>Existing Old Forest</td><td>Mixed</td></tr>
<tr><td>Existing Very Old Forest</td><td>Mixed</td></tr>
</table>

In general, stands with higher fire resistance have reduced surface fuel loading, lower tree density, large diameter trees of fire-resistant species, increased height to live crown (Brown *et al.* 2004, Peterson *et al.* 2005, USDI BLM 2008), and discontinuous horizontal and vertical fuels.

Fire hazard refers to the ease of ignition, potential fire behavior, and resistance to control of the fuel complex, defined by the volume and arrangement of several strata, including surface, ladder, and canopy fuels (Calkin *et al.* 2010). The primary fuel characteristics associated with potential fire behavior and crown fire potential are canopy base height, canopy bulk density, and surface fuel loading (Scott and Reinhardt 2001, Jain and Graham 2007).

## Issue 2 – Stand-level Fire Resistance in the Harvest Land Base by District

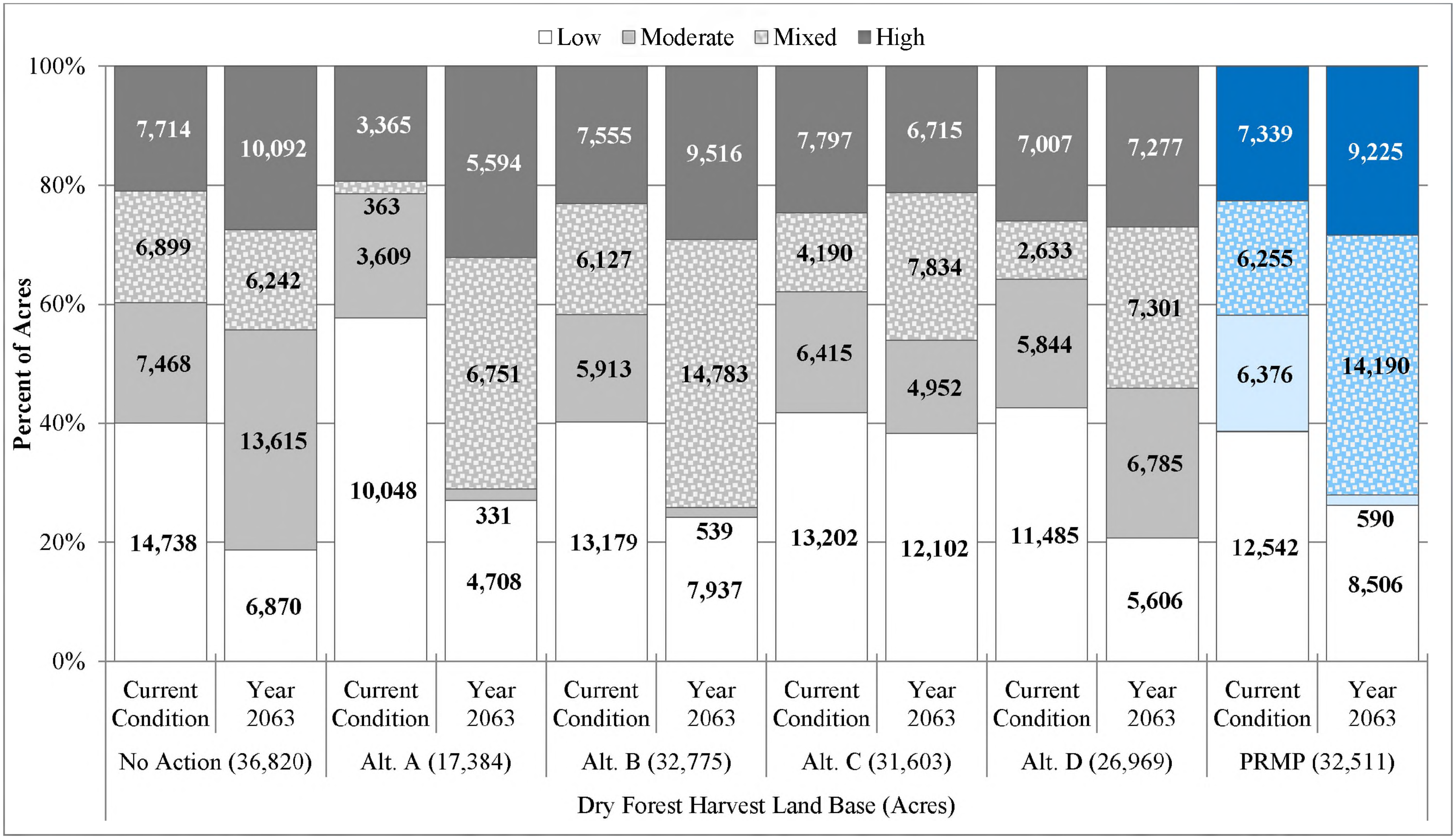


**Figure H-8.** Stand-level fire resistance categories in the Harvest Land Base in the dry forest in the Klamath Falls Field Office for the current condition in 50 years

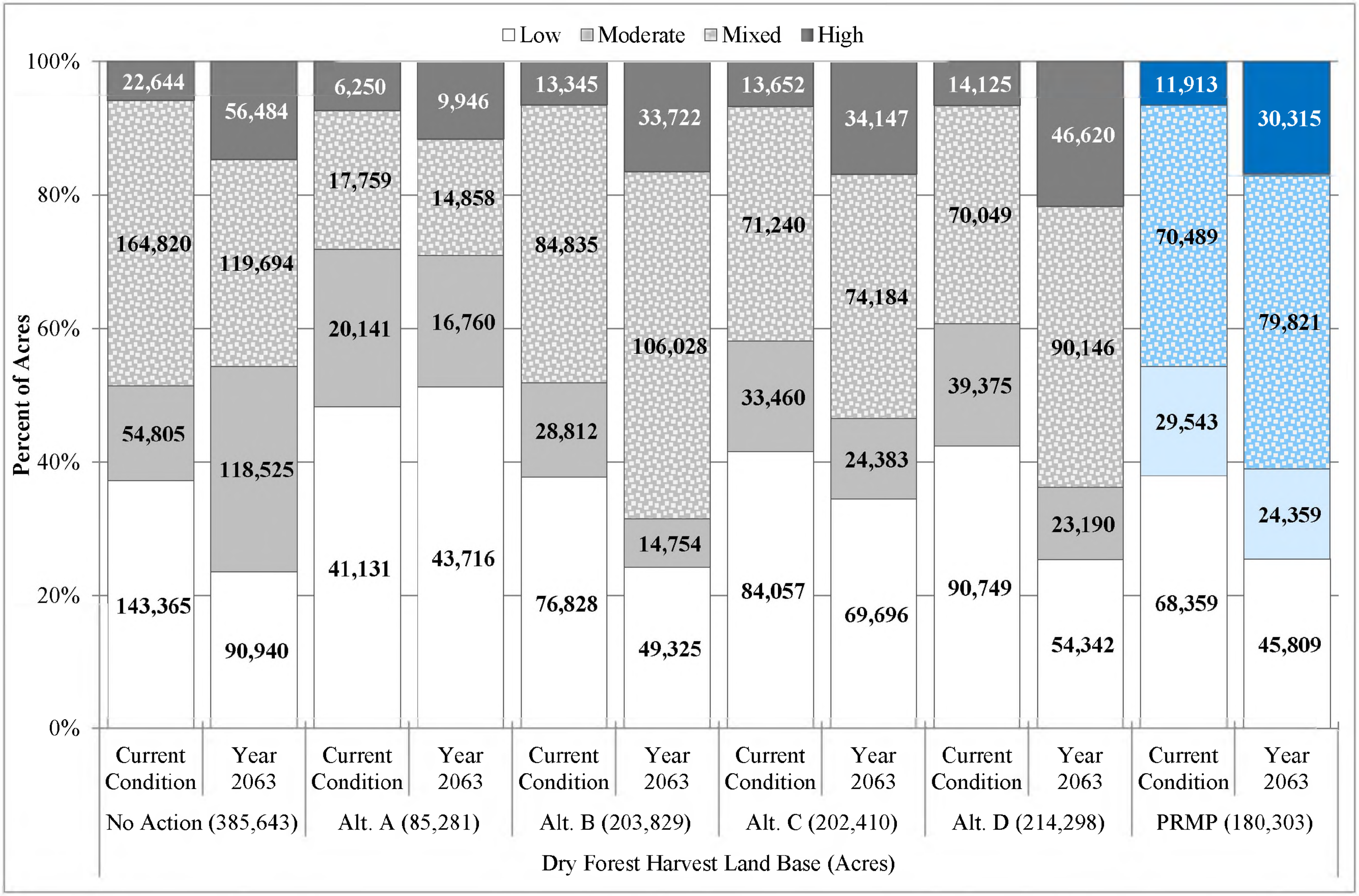


**Figure H-9.** Stand-level fire resistance categories in the Harvest Land Base in the dry forest on the Medford District for the current condition in 50 years

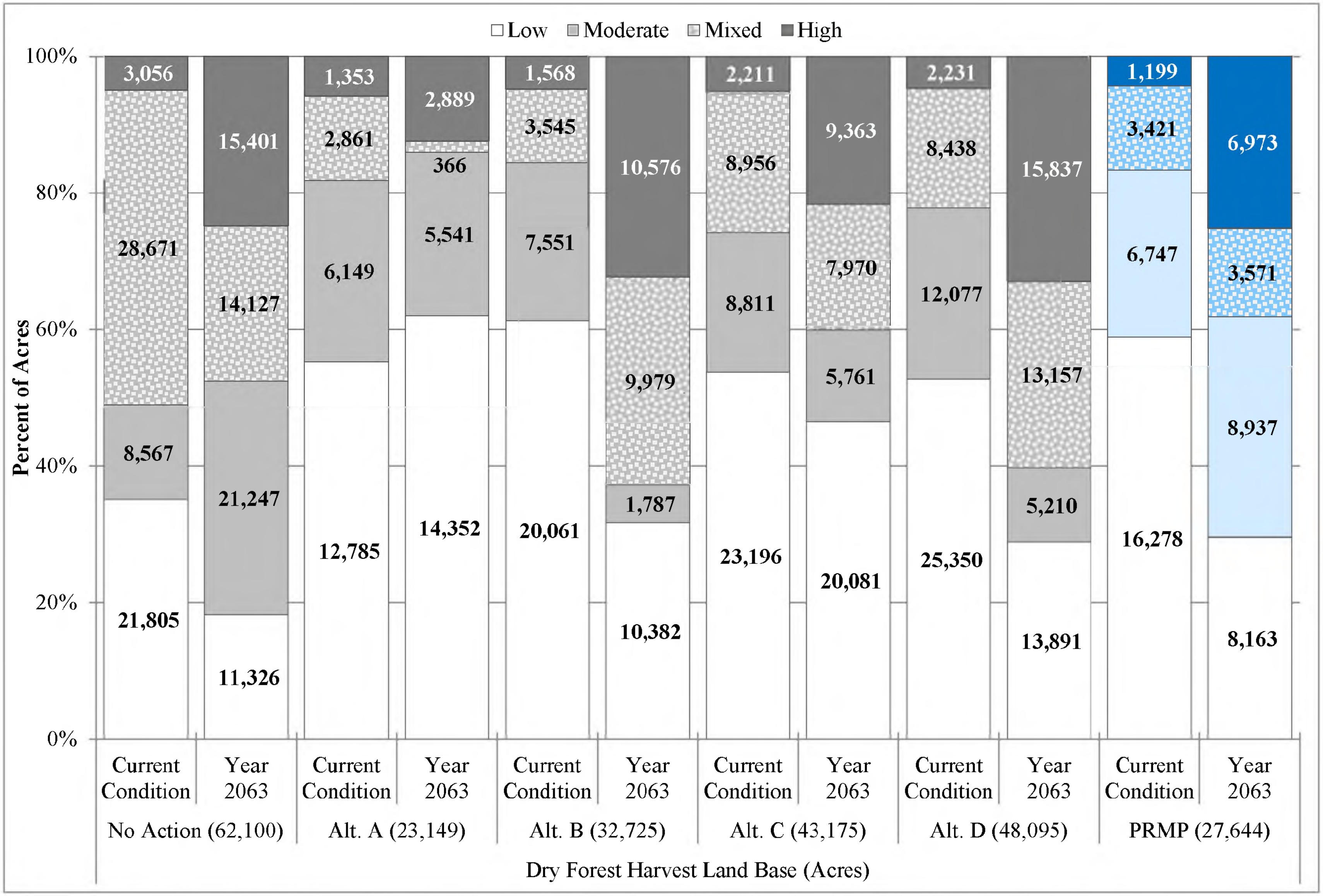


**Figure H-10.** Stand-level fire resistance categories in the Harvest Land Base in the dry forest on the Roseburg District in 50 years

## Issue 3 – Stand-level Fire Hazard Within Wildland Developed Areas by District

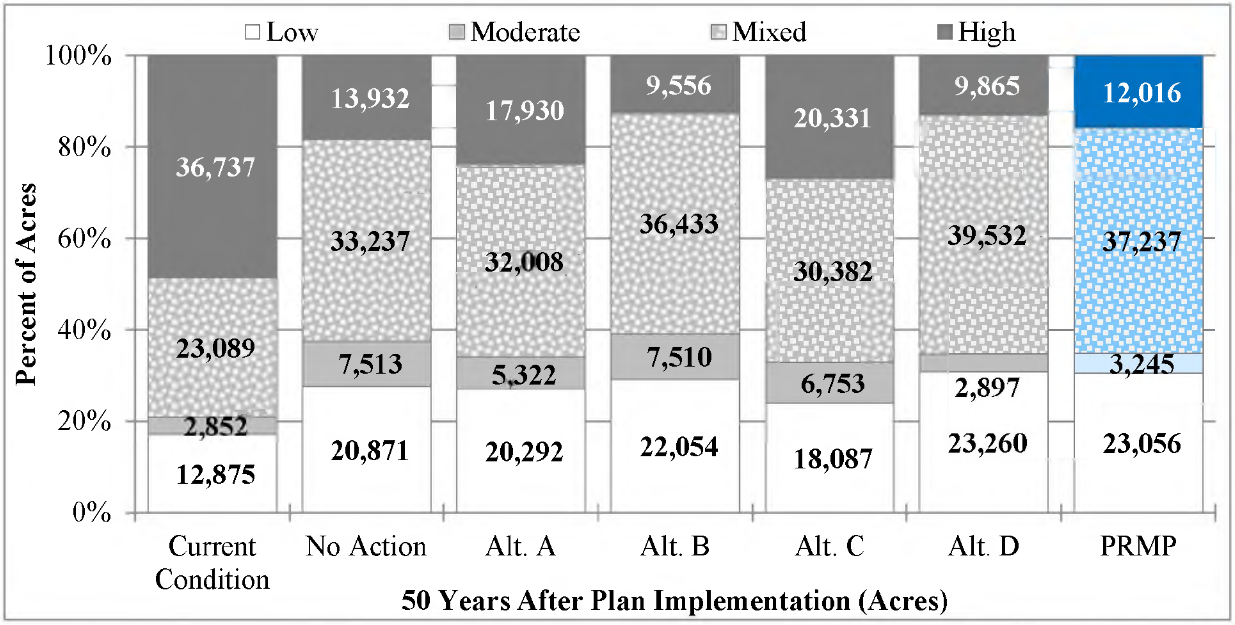


**Figure H-11.** Stand-level fire hazard for all BLM-administered lands on the Coos Bay District within the WDA in 2063

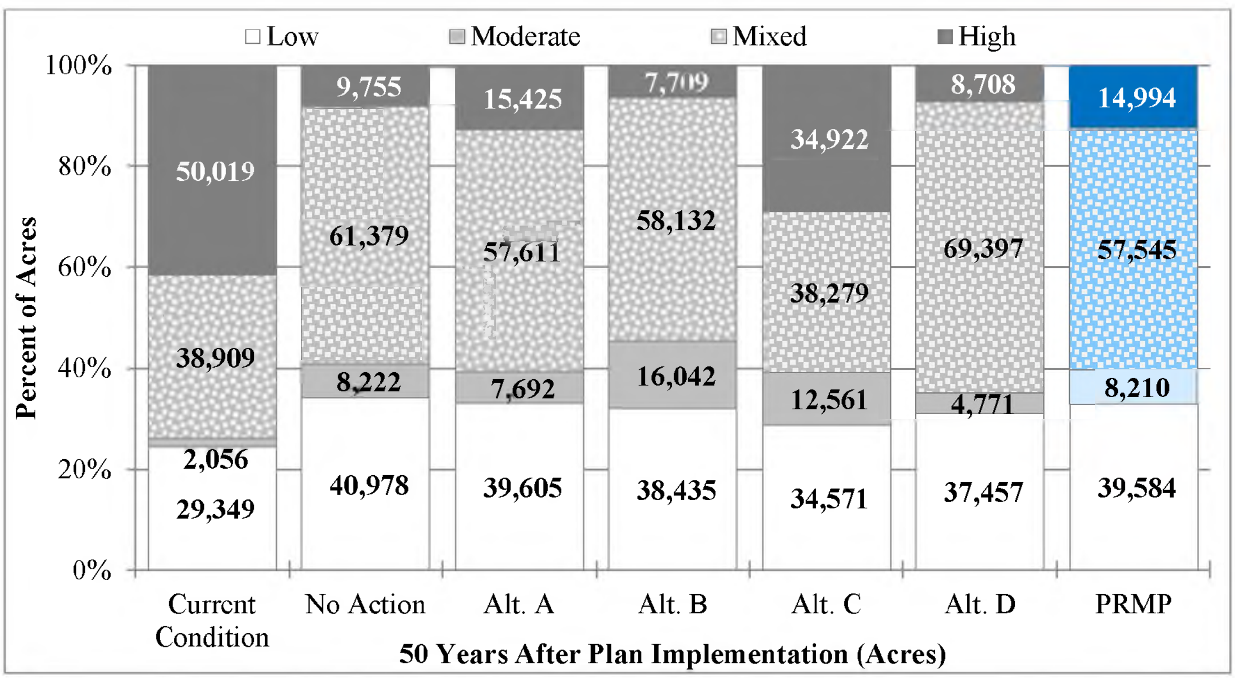


**Figure H-12.** Stand-level fire hazard for all BLM-administered lands on the Eugene District within the WDA in 2063

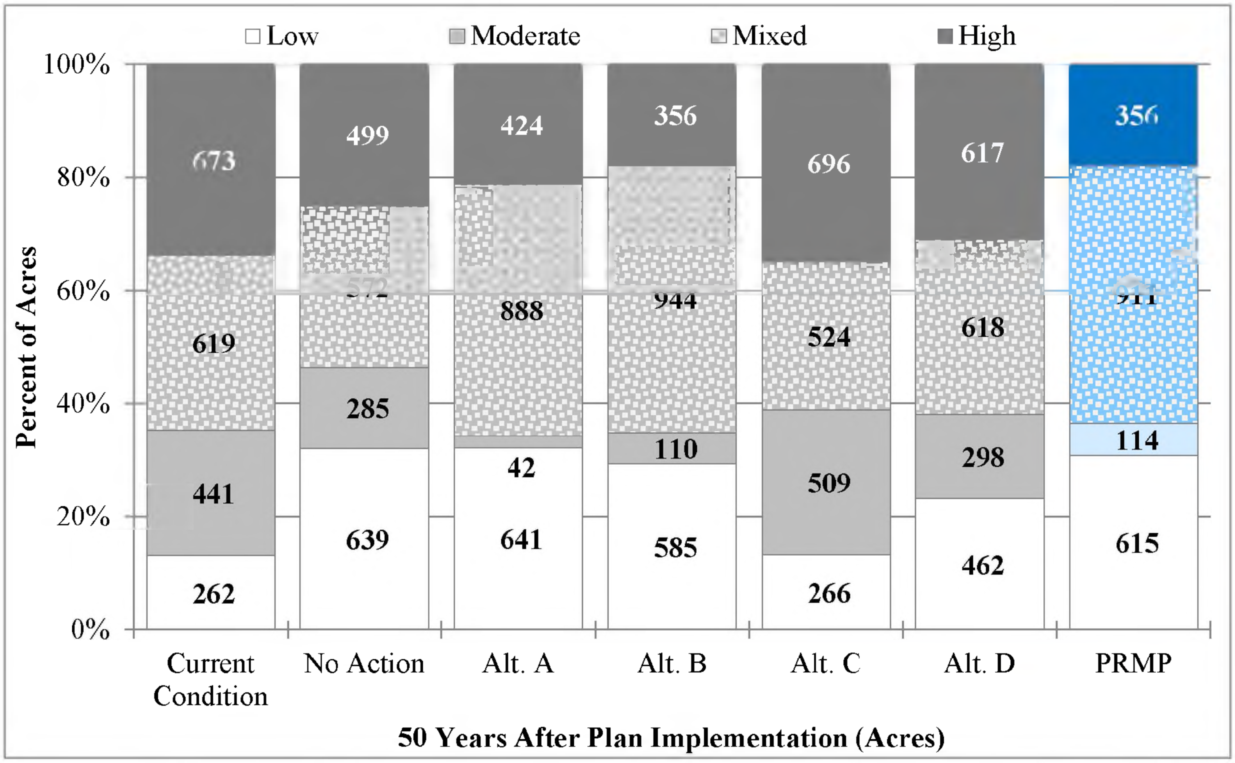


**Figure H-13.** Stand-level fire hazard for all BLM-administered lands on the Klamath Falls Field Office within the WDA in 2063

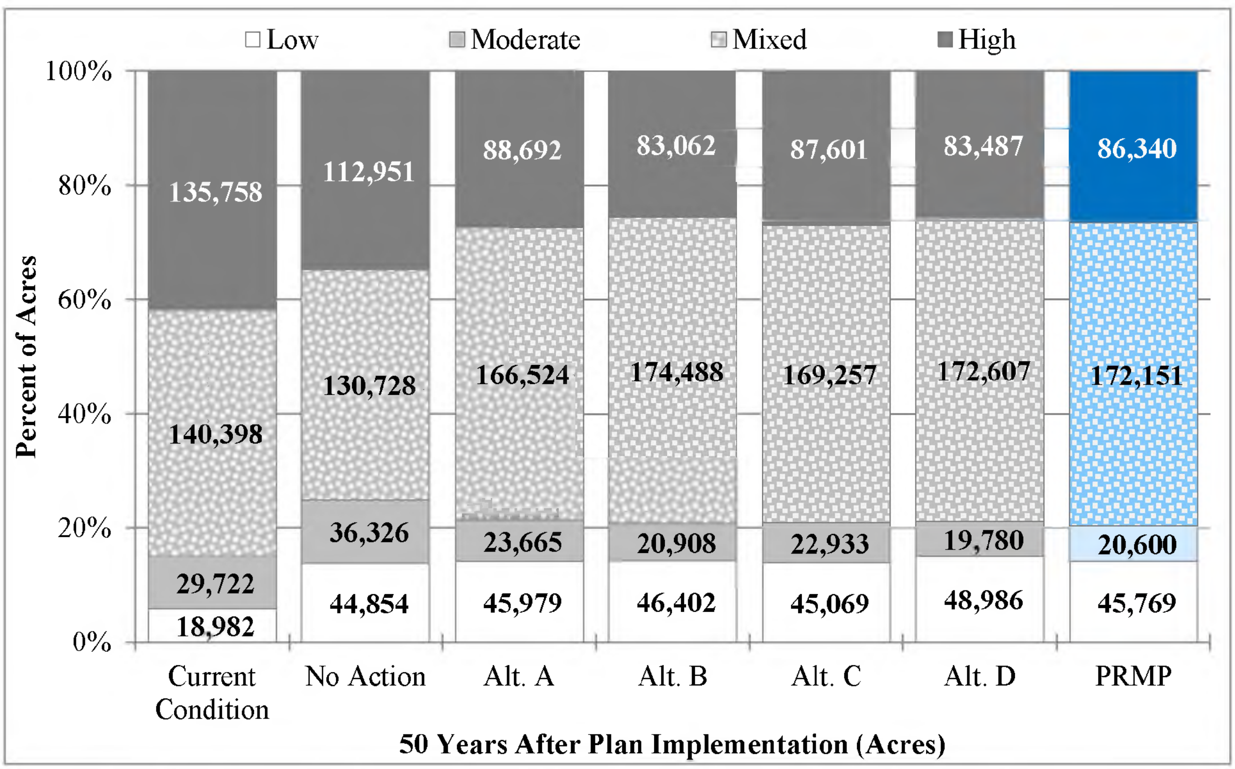


**Figure H-14.** Stand-level fire hazard for all BLM-administered lands on the Medford District within the WDA in 2063

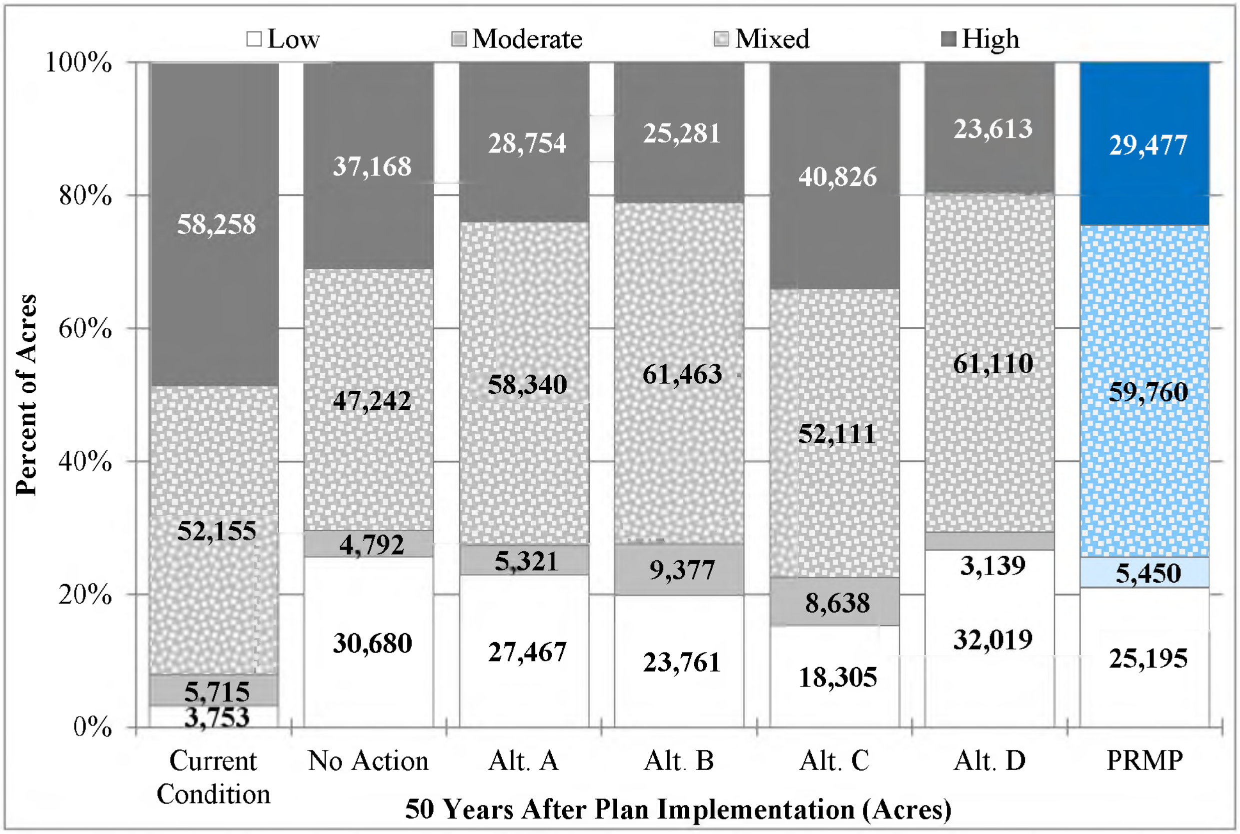


**Figure H-15.** Stand-level fire hazard for all BLM-administered lands on the Roseburg District within the WDA in 2063

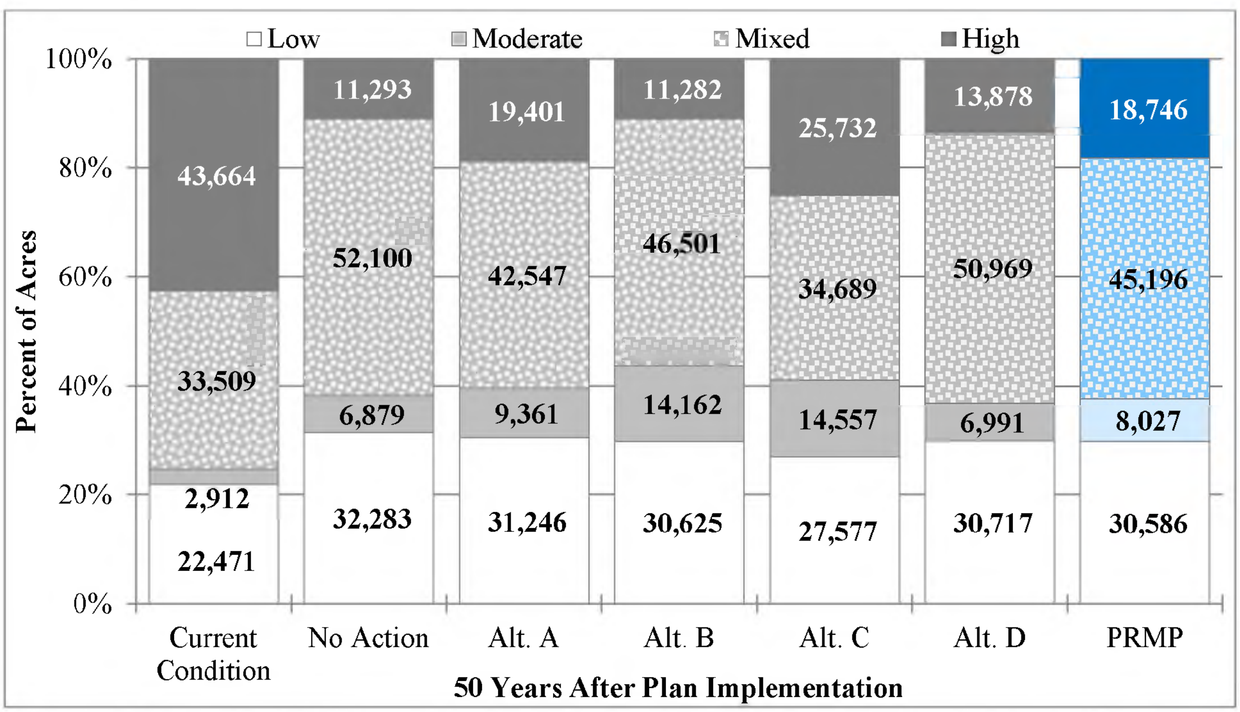


**Figure H-16.** Stand-level fire hazard for all BLM-administered lands on the Salem District within the WDA in 2063

## Issue 3 – Stand-level Fire Hazard for Late-Successional Reserve Within Wildland Developed Areas by Planning Area Region

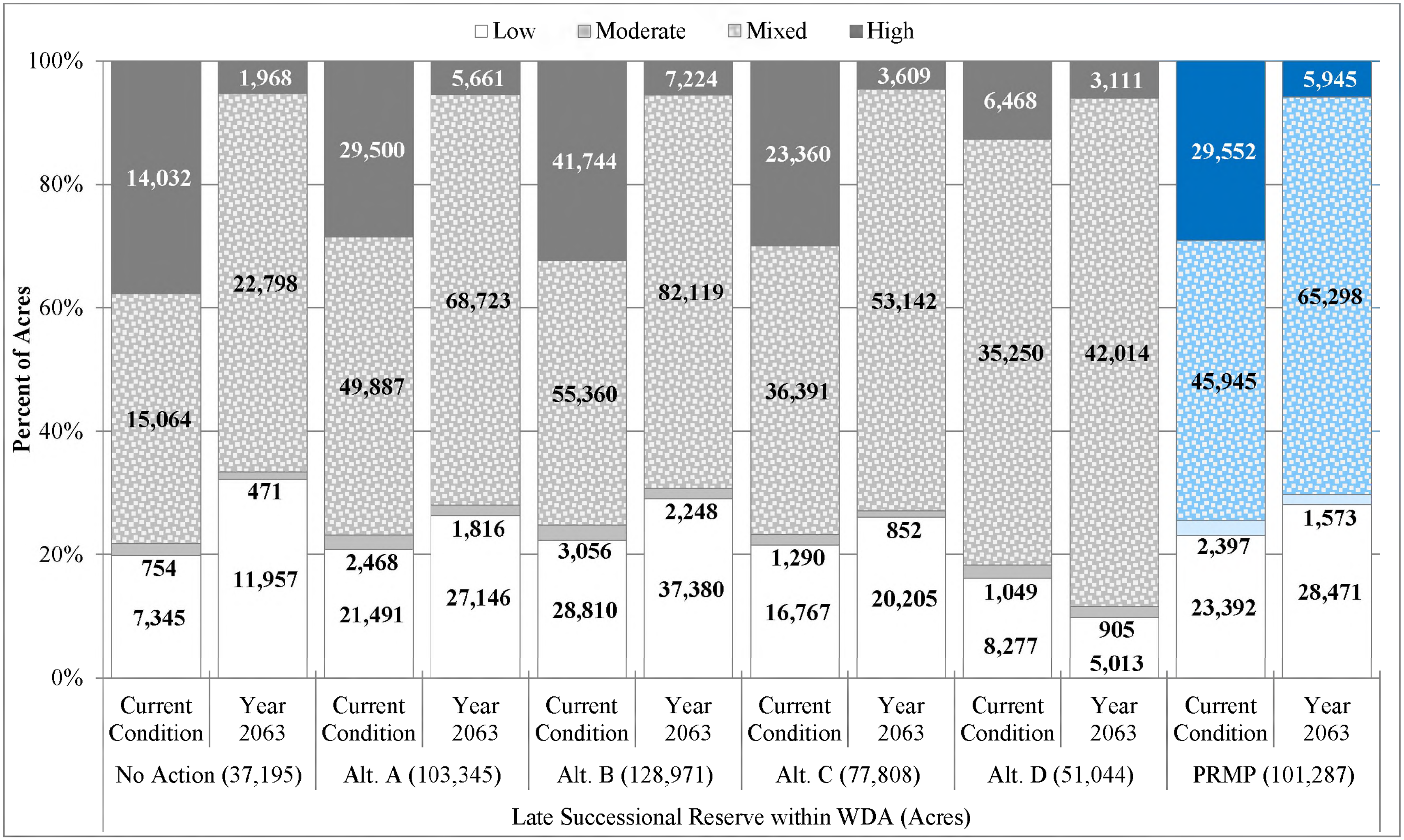


**Figure H-17.** Stand-level fire hazard in the Late-Successional Reserve in the dry forest in the coastal/north in 50 years

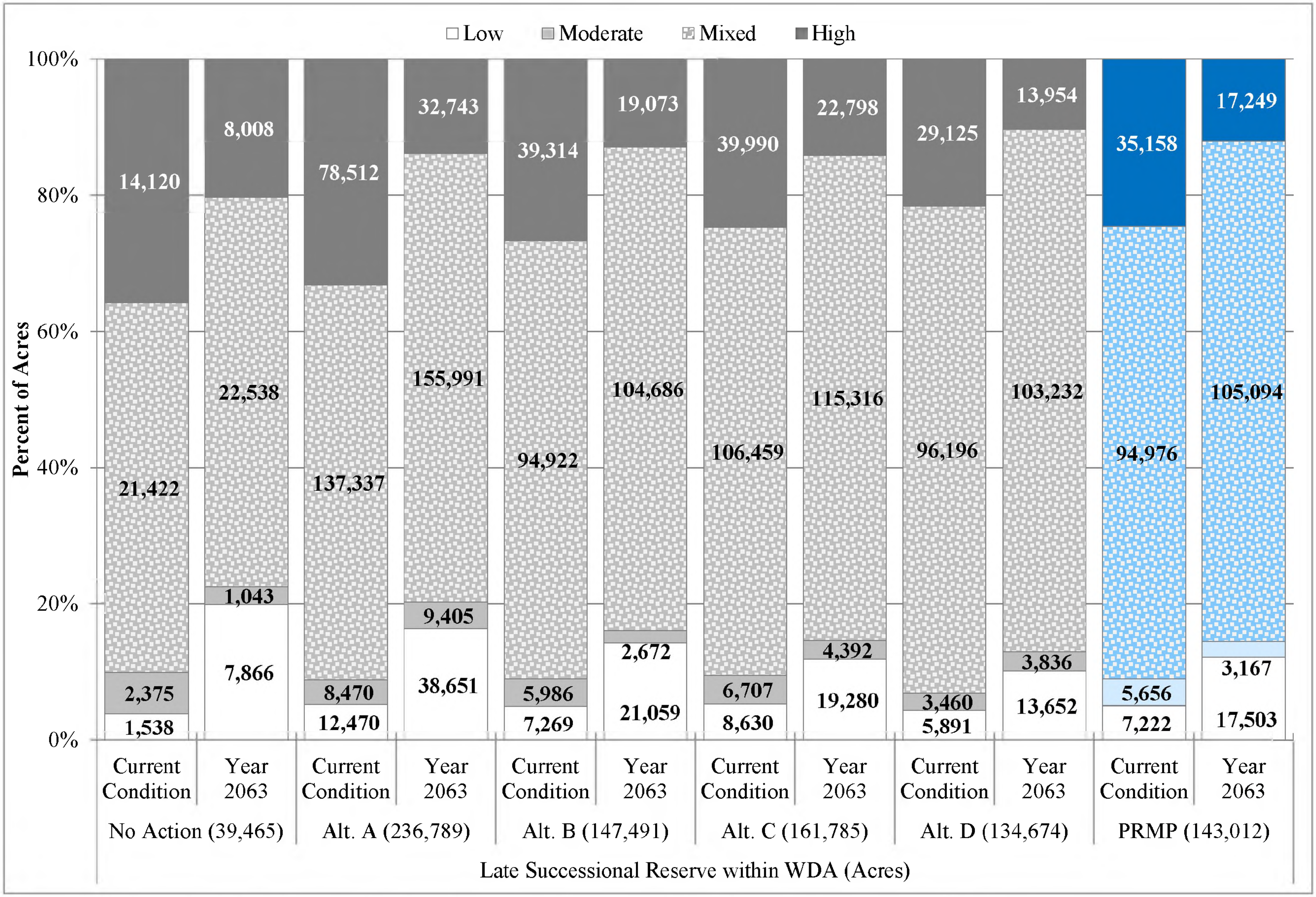

**Figure H-18.** Stand-level fire hazard in the Late-Successional Reserve in the dry forest in the interior/south in 50 years

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# Appendix I – Fisheries

**Table I-1.** Bureau Sensitive and Bureau Strategic fish species within the decision area.

| Common Name | Scientific Name | ESU or DPS | Status | District/ Field Office | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Coos Bay | Eugene | Klamath Falls | Medford | Roseburg | Salem |
| Pacific lamprey | *Entosphenus tridentatus* | All | Sensitive | X | X | X | X | X | X |
| Chum salmon | *Oncorhynchus keta* | Pacific Coast | Sensitive | X | | | | X | X |
| Steelhead | *Oncorhynchus mykiss* | Oregon Coast | Sensitive | X | X | | X | X | X |
| Umpqua chub | *Oregonichthys kalawatseti* | All | Sensitive | | | | X | X | |
| Coastal cutthroat trout | *Oncorhynchus clarkii clarkii* | SW Washington/ Columbia River | Sensitive | | | | | | X |
| Steelhead | *Oncorhynchus mykiss* | Klamath Mountains Province, Summer Run | Sensitive | X | | | X | | |
| Steelhead | *Oncorhynchus mykiss* | Klamath Mountains Province, Winter Run | Sensitive | X | | | X | | |
| Chinook salmon | *Oncorhynchus tshawytscha* | S. Oregon Coast/ N. California Coast | Sensitive | X | | | X | | |
| Jenny creek sucker | *Catostomus rimiculus* | All | Sensitive | | | X | X | | |
| Millicoma dace | *Rhinichthys cataractae* ssp. nov. | All | Sensitive | X | | | | | |
| Slender sculpin | *Cottus tenuis* | All | Strategic | | | X | | | |

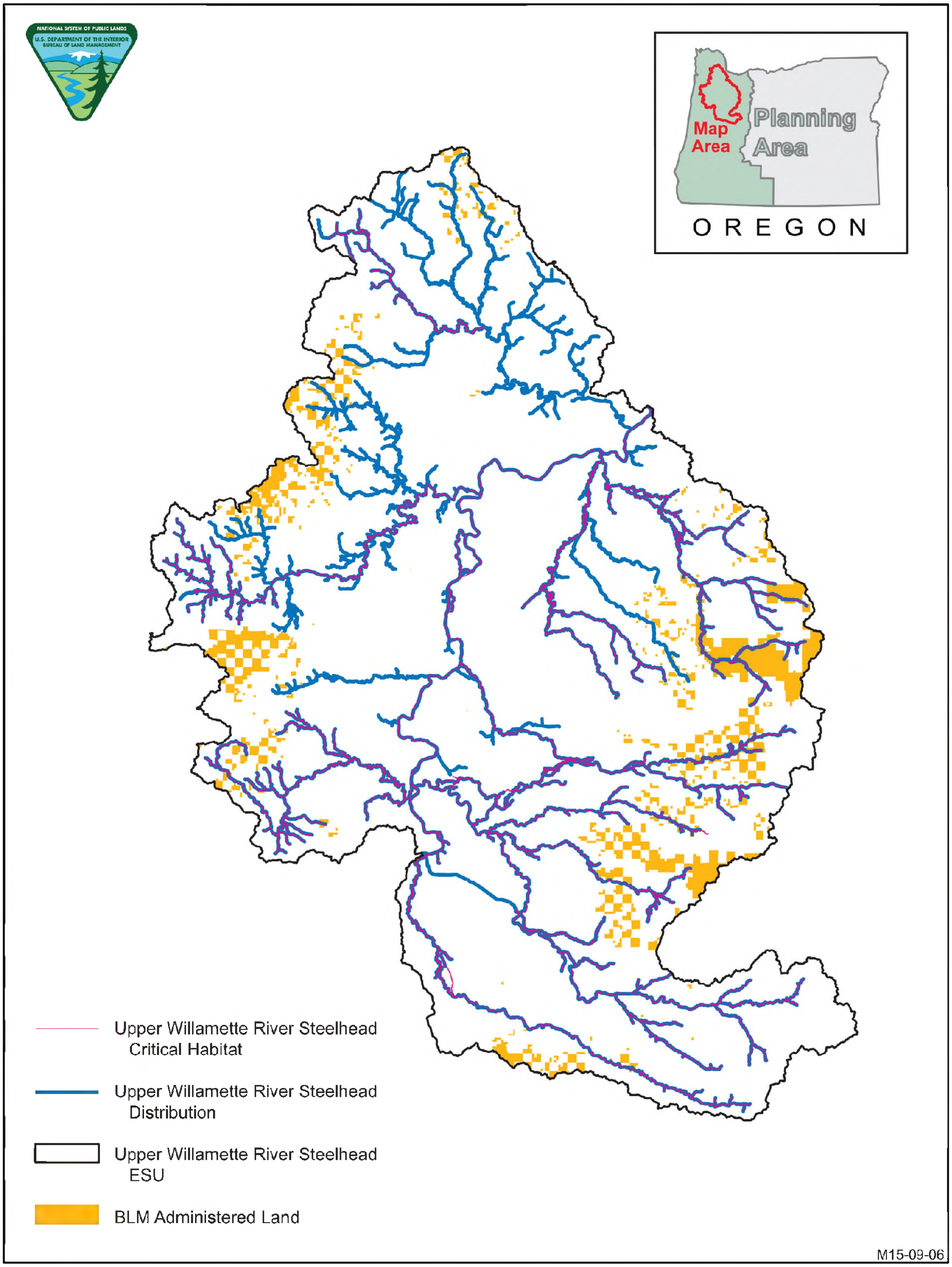


**Figure I-1.** Critical habitat designation and distribution of Upper Willamette River steelhead

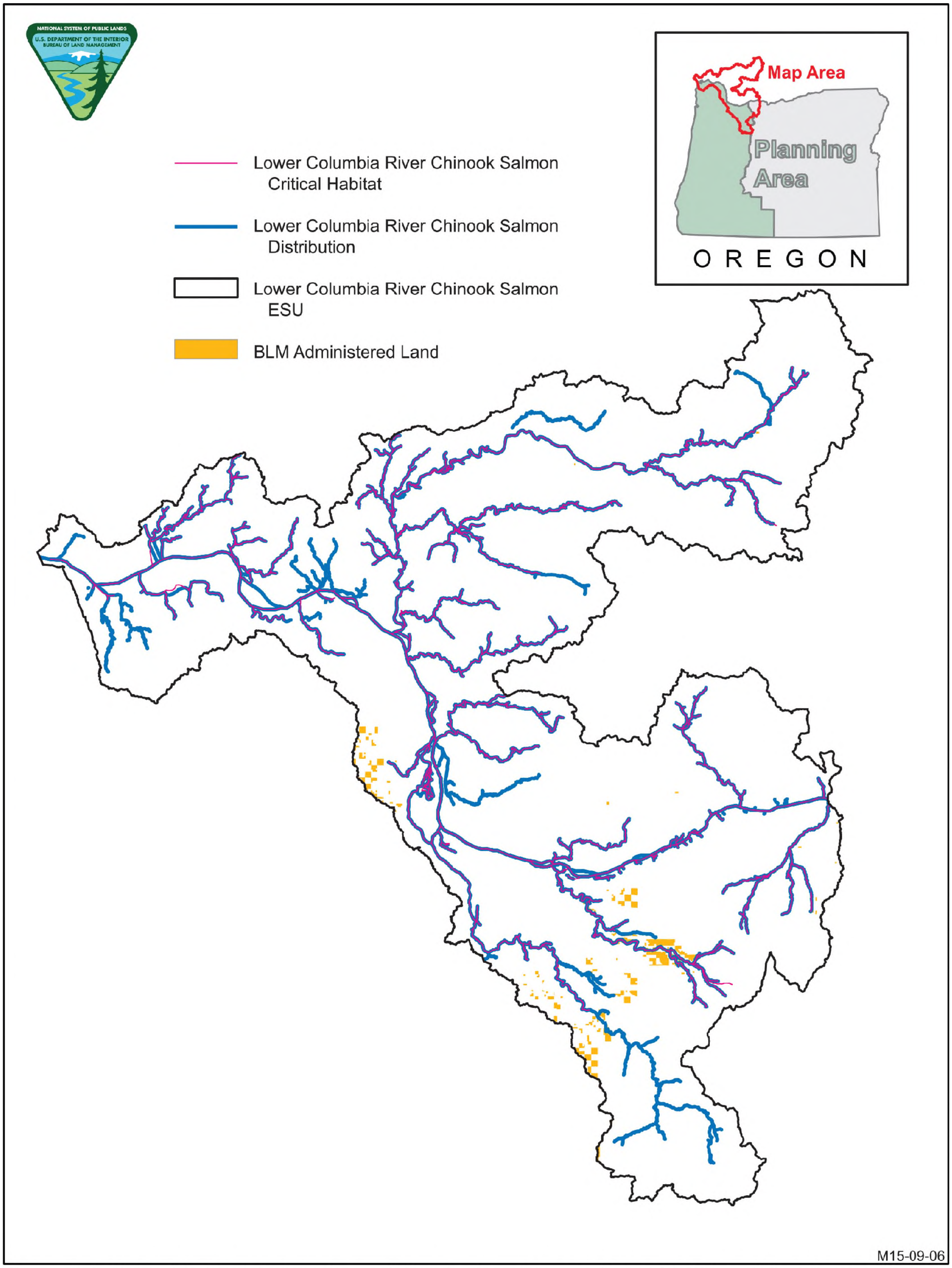


**Figure I-2.** Critical habitat designation and distribution of Lower Columbia River chinook salmon

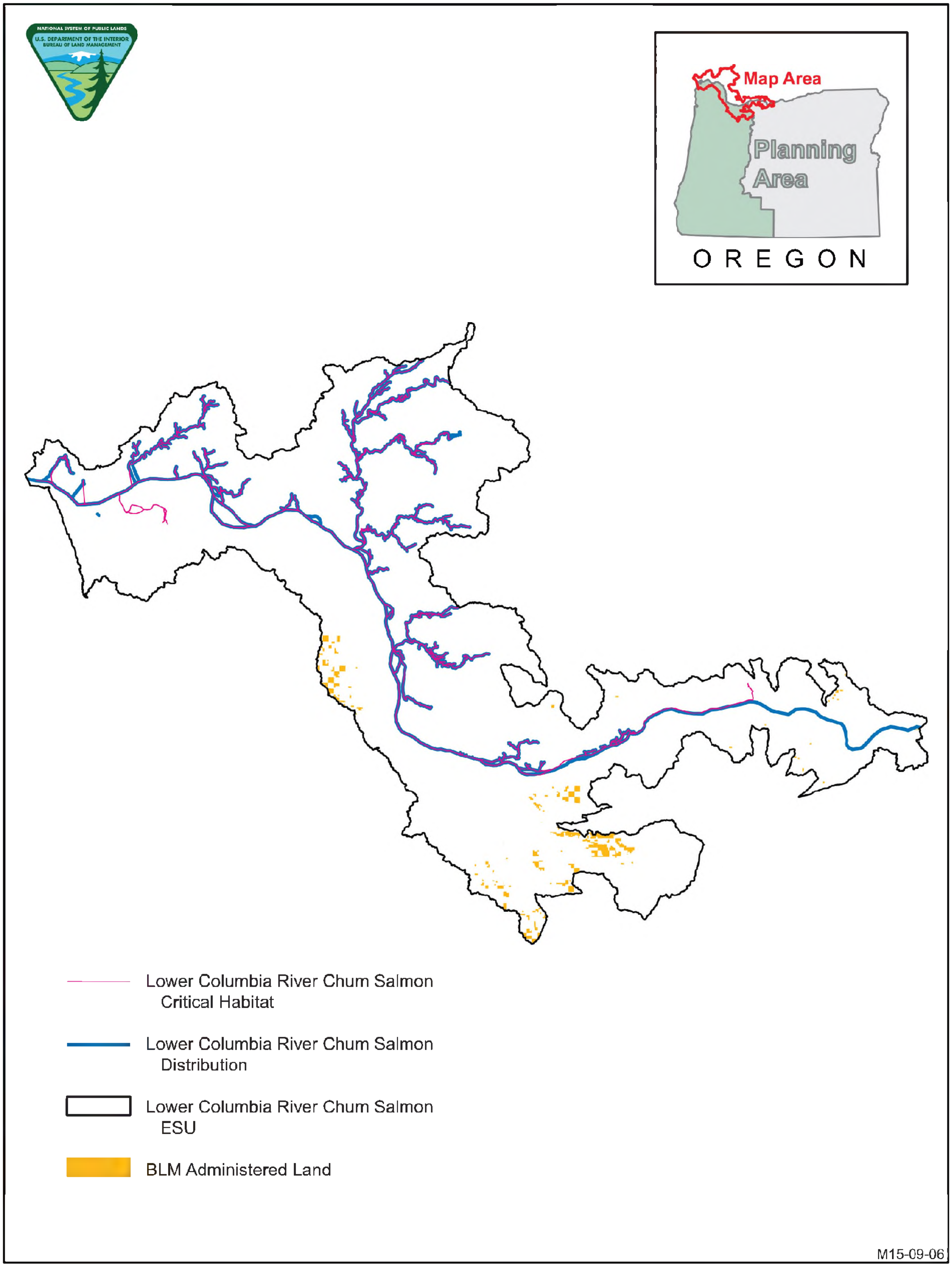


**Figure I-3.** Critical habitat designation and distribution of Lower Columbia River chum salmon

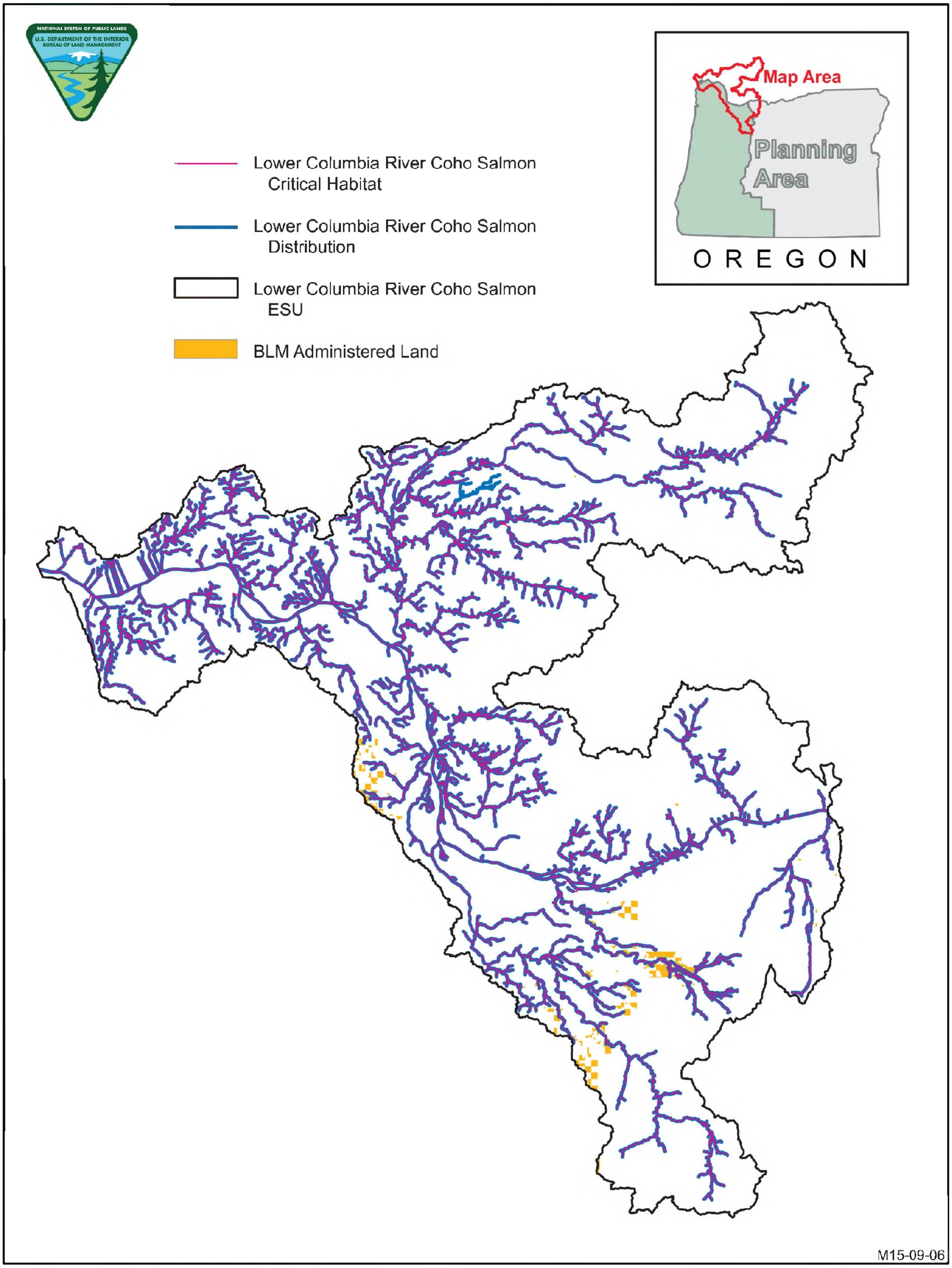

**Figure I-4.** Critical habitat designation and distribution of Lower Columbia River coho salmon

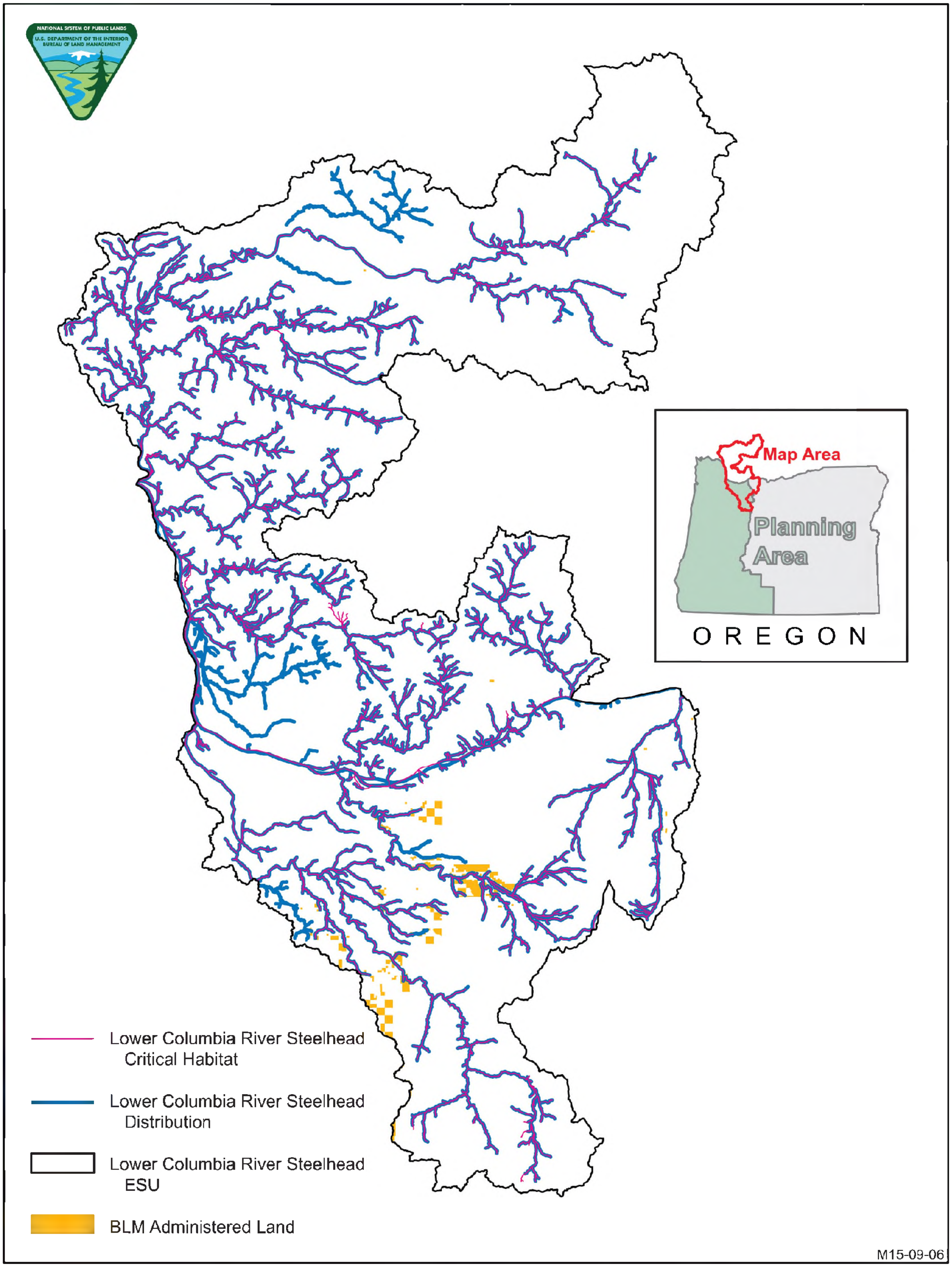


**Figure I-5.** Critical habitat designation and distribution of Lower Columbia River steelhead

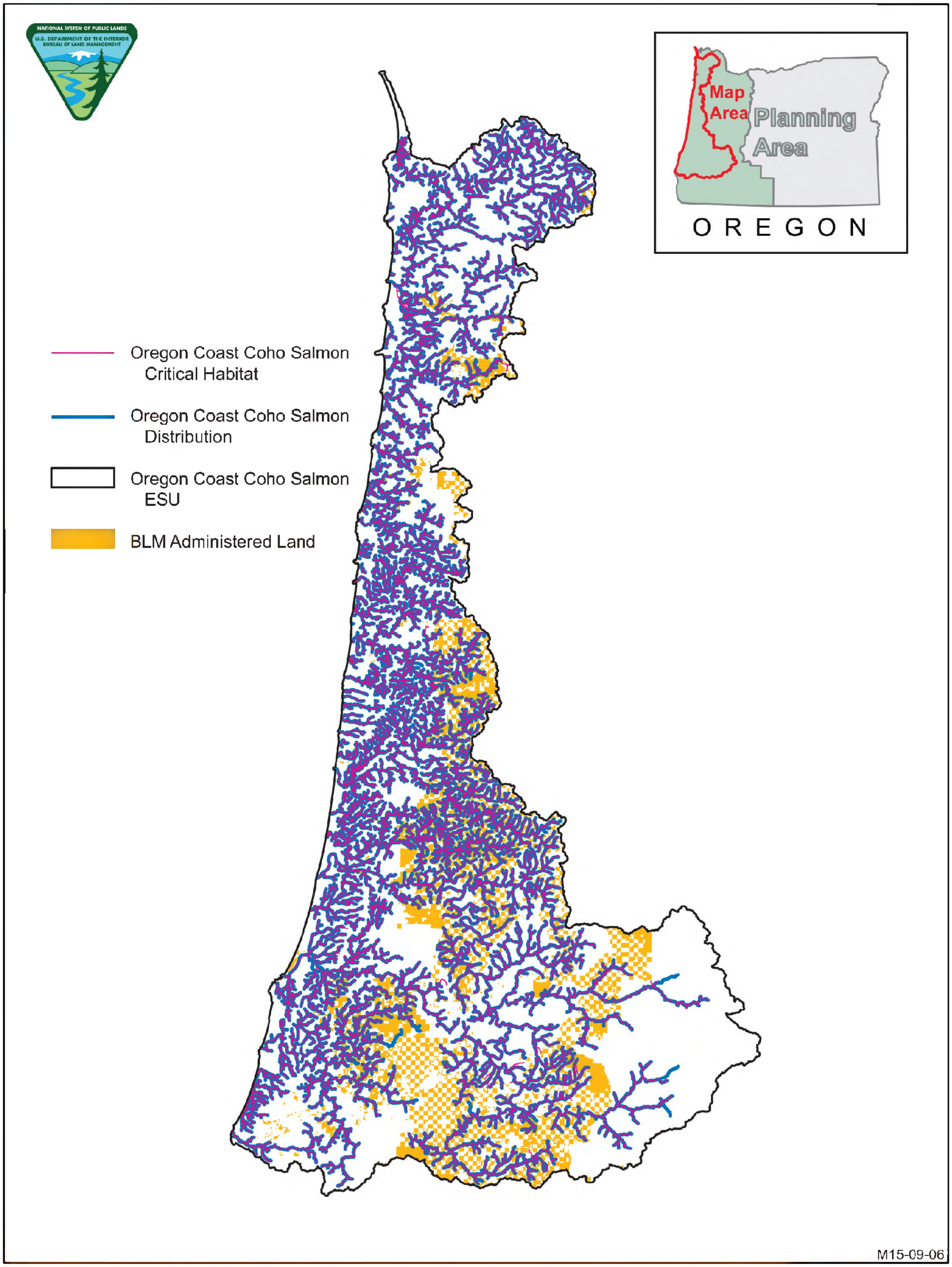


**Figure I-6.** Critical habitat designation and distribution of Oregon Coast coho salmon

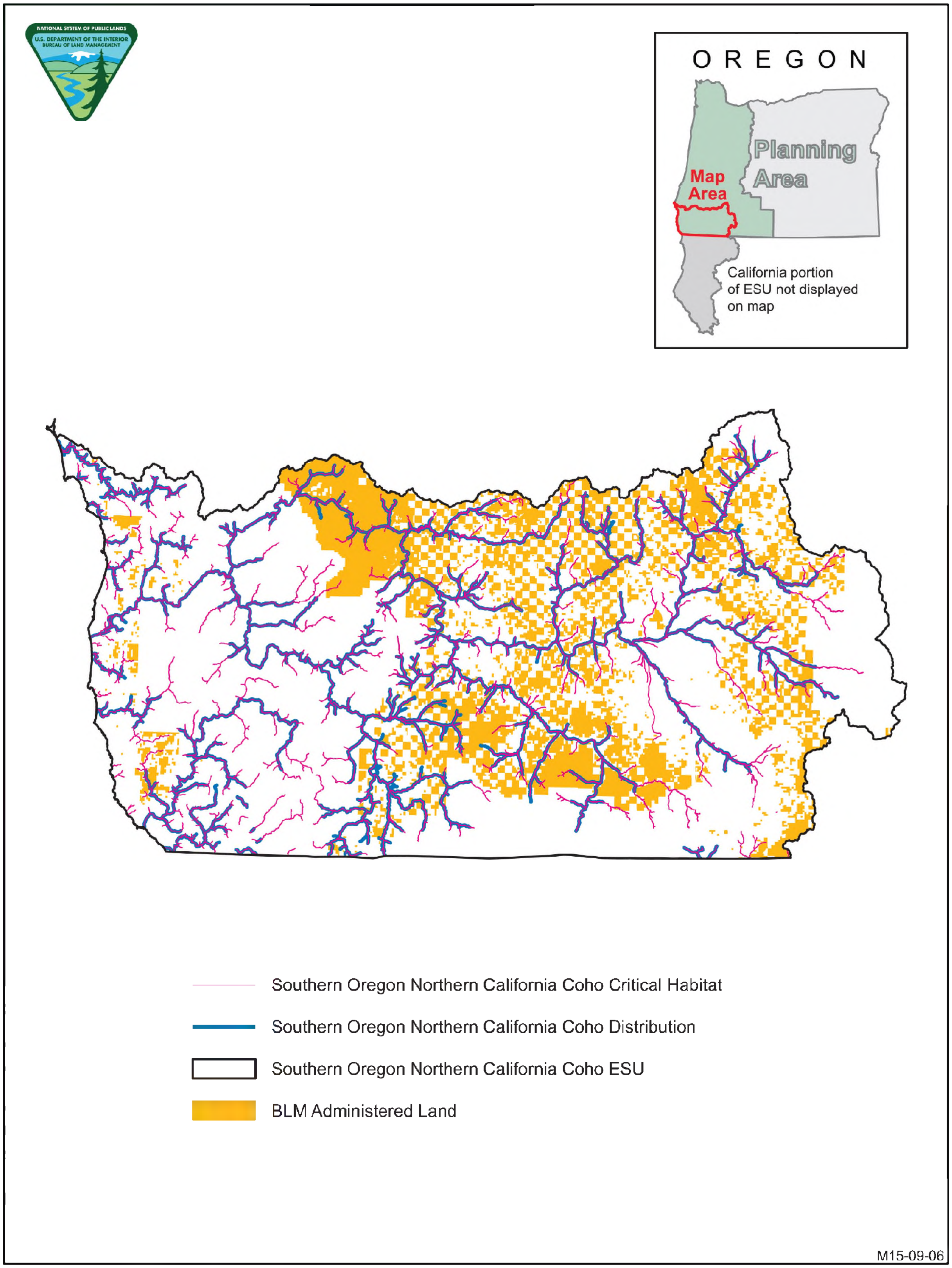


**Figure I-7.** Critical habitat designation and distribution of Southern Oregon Northern California coho salmon

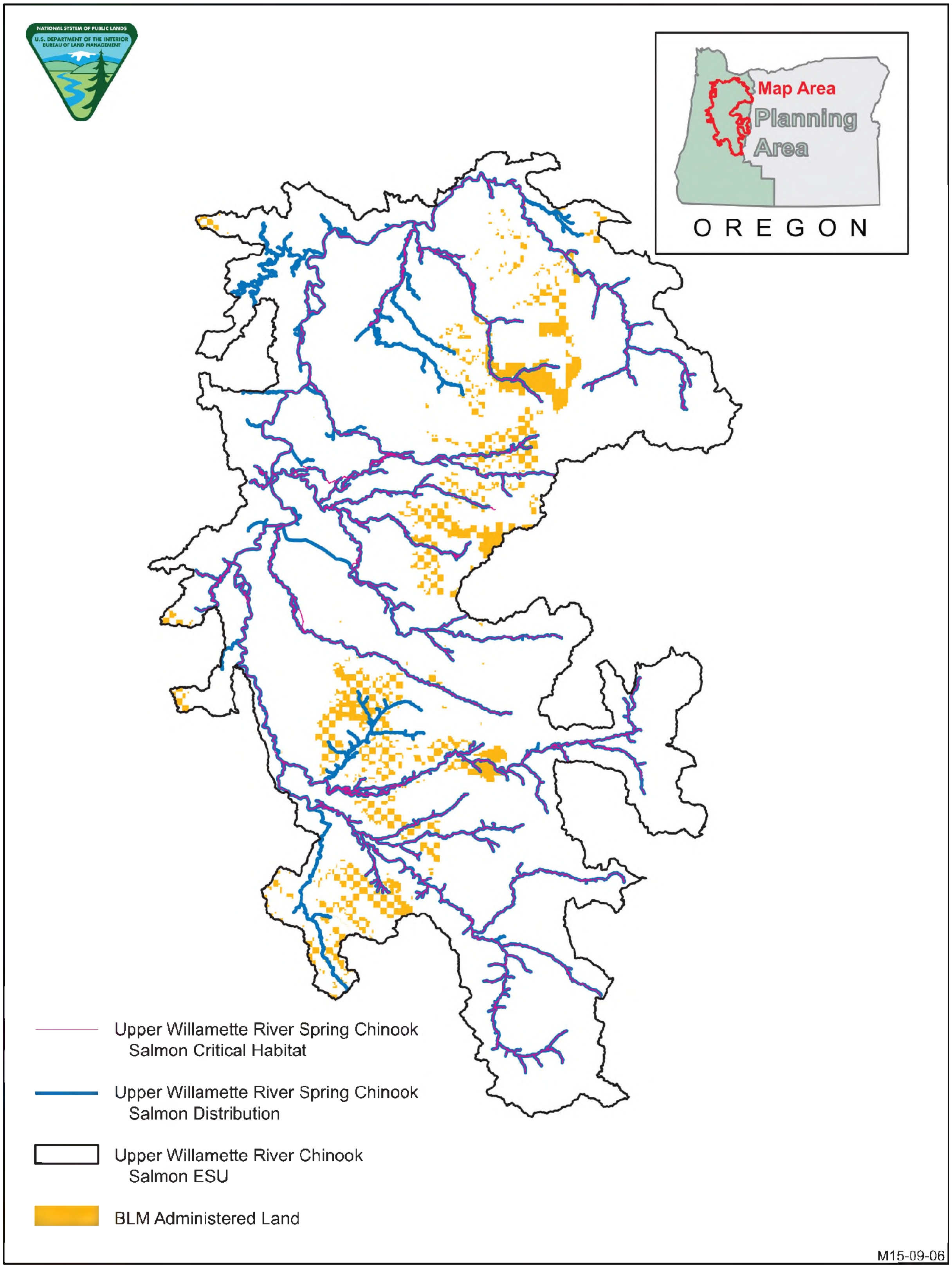


**Figure I-8.** Critical habitat designation and distribution of Upper Willamette River spring chinook salmon

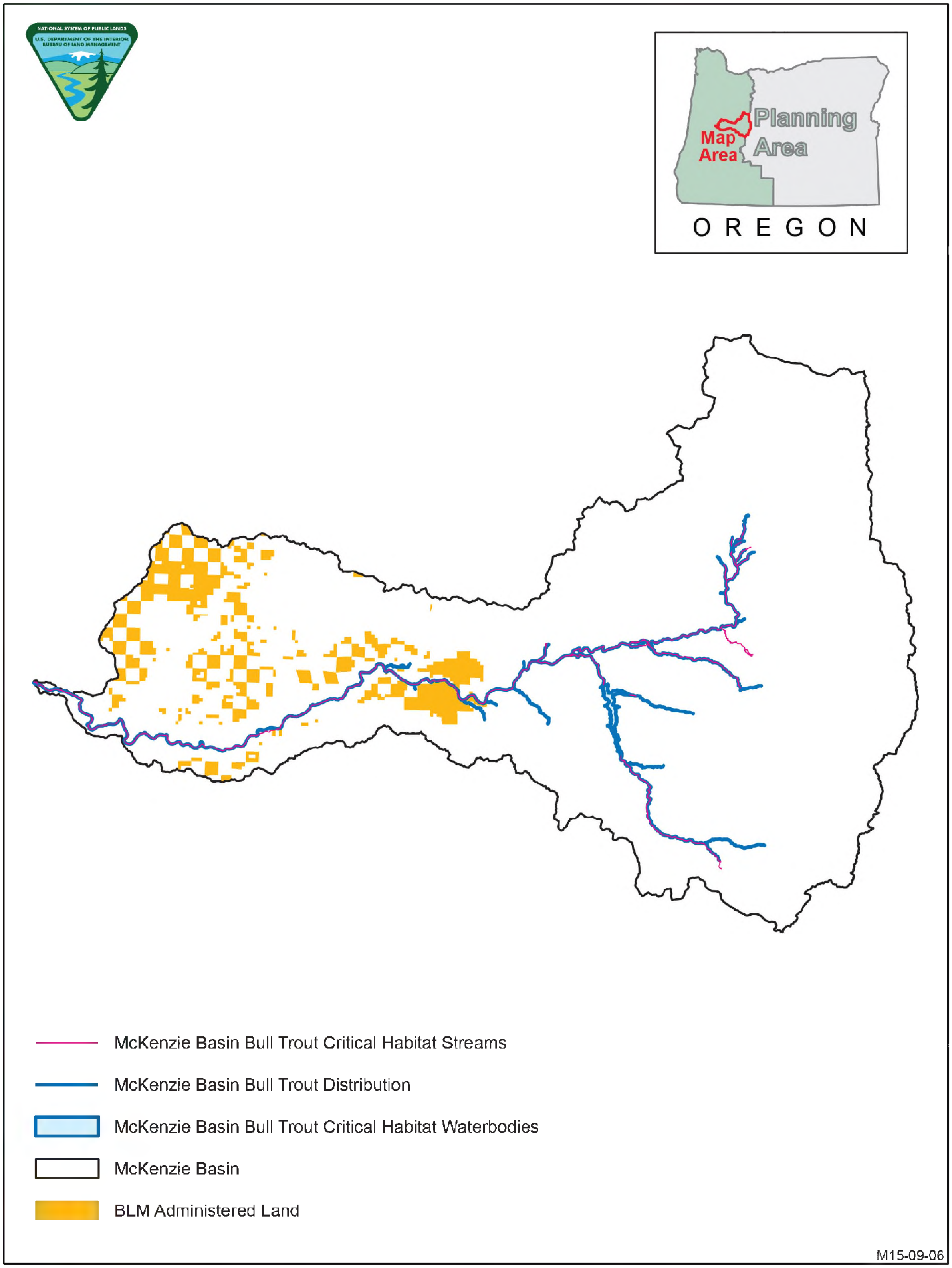


**Figure I-9.** Critical habitat designation and distribution of bull trout in the McKenzie Basin

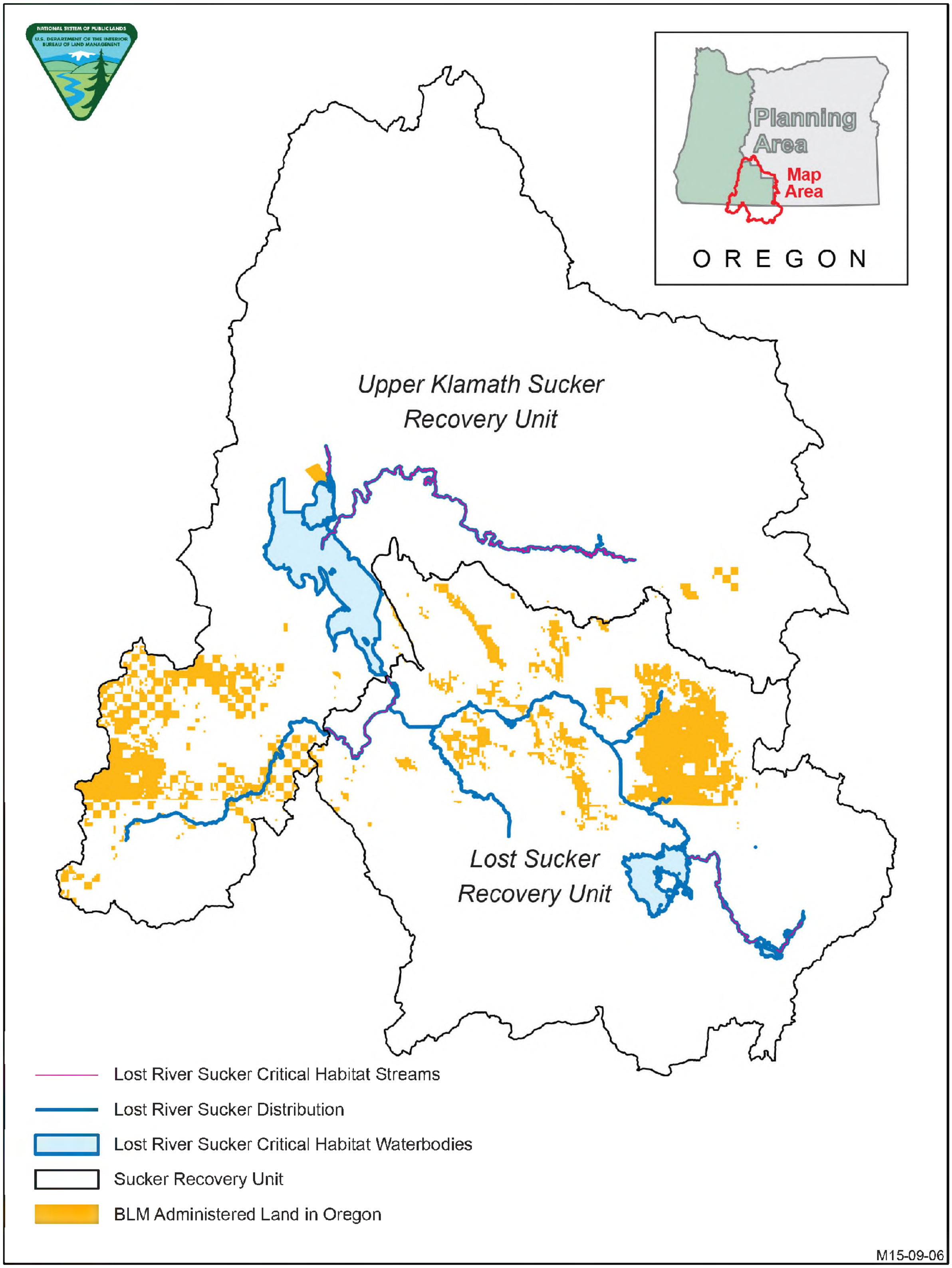


**Figure I-10.** Critical habitat designation and distribution of Lost River sucker

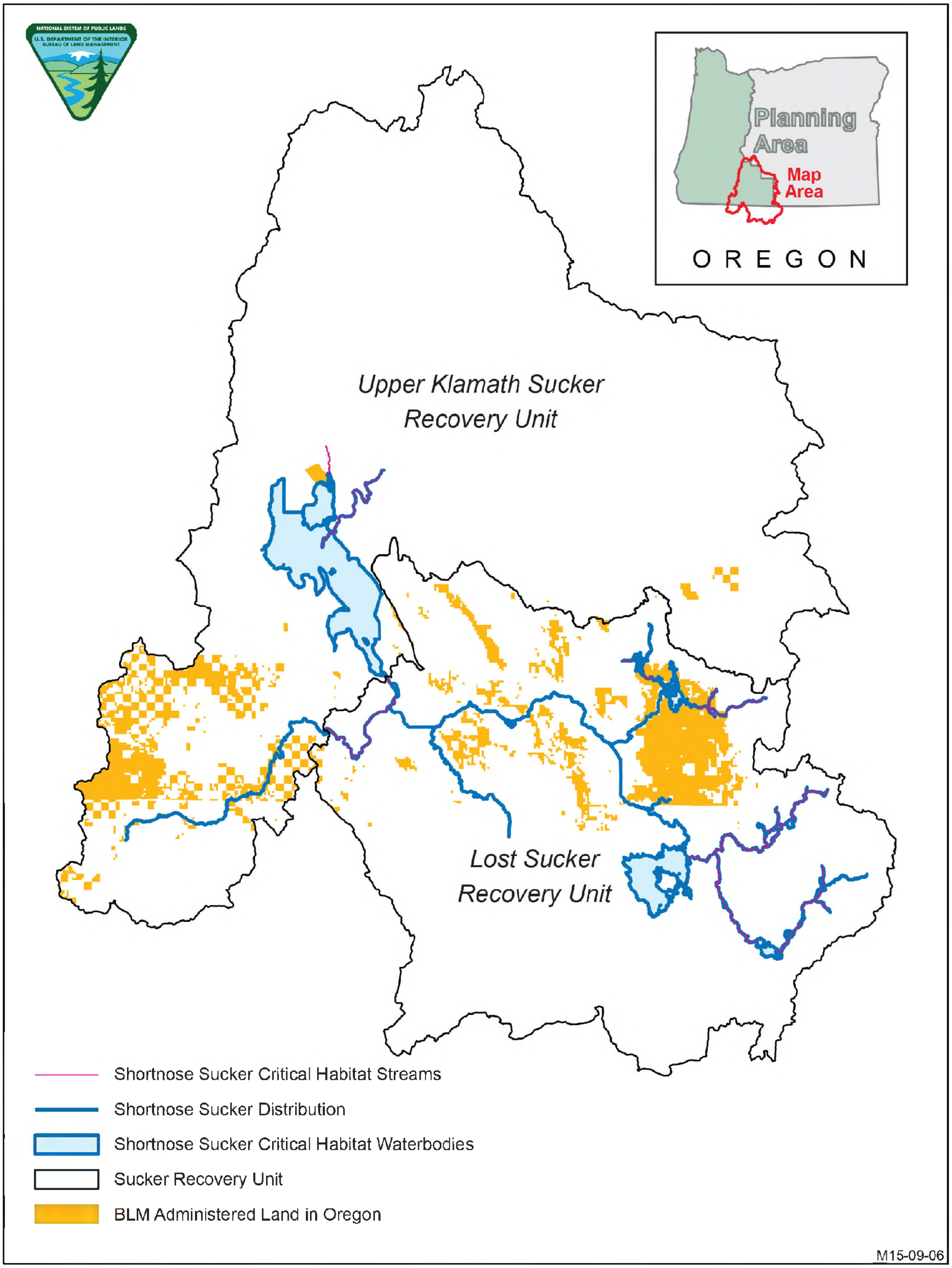


**Figure I-11.** Critical habitat designation and distribution of shortnose sucker

# Appendix J – Best Management Practices

## Introduction

A Best Management Practice (BMP) is a practice or combination of practices that have been determined to be the most effective and practicable in preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals (40 CFR 130.2 [m]). Using of BMPs is required by the Clean Water Act (33 U.S.C 1251 *et seq.*) to reduce nonpoint source pollution to the maximum extent practicable. Nonpoint source pollution is defined as pollutants detected in waterbodies, such as a streams or lakes, which come from the landscape in a dispersed manner. The BMPs are the primary controls for achieving Oregon's water quality standards pertaining to nonpoint source pollution. Oregon's narrative and numeric criteria within water quality standards are designed to protect designated beneficial uses such as salmonid spawning and rearing, resident fish and aquatic life, domestic water supplies, and water-contact recreation.

The BLM is responsible for implementing BMPs on the lands it administers.[30] The BMPs provide compliance with the Clean Water Act of 1972, as amended, State of Oregon water quality legislation (Chapter 340), and the O&C Act. For proposed management actions, the BLM would design and implement BMPs in a manner that is consistent with the ODEQ Memorandum of Understanding (ODEQ and USDI BLM 2011), and with the Clean Water Act.

The BLM's and ODEQ's strategy for managing and controlling nonpoint source water pollution from BLM-administered lands in the State of Oregon is managed through a Memorandum of Understanding between the two agencies (ODEQ and USDI BLM 2011). This MOU defines the process by which the BLM and ODEQ will cooperatively meet State and Federal water quality rules and regulations. The physical, chemical, and biological conditions of 'waters of the State' that support beneficial uses[31] would be protected, restored, and maintained by working in a proactive, collaborative, and adaptive manner. The MOU specifies that the BLM would implement site-specific BMPs as specified in management objectives, standards, guidelines, design features, and mitigation developed in RMPs, RMP amendments, project-level plans, and Water Quality Restoration Plans to meet applicable water quality standards. The MOU requires monitoring to ensure that practices are properly designed and applied, to determine the effectiveness of practices in meeting water quality standards, and to provide for adjustment of BMPs when it is found that water quality standards are not being protected.

The RMP contains measures in both management direction and BMPs to prevent and reduce the amount of pollution generated by non-point sources to a level compatible with water quality goals. Where a specific measure would apply to all actions on all sites (either in a specific land use allocation or across the decision area), the BLM presents the measure as management direction.[32] Where the applicability of a specific measure would depend upon site-specific conditions, technical feasibility, resource availability, and the water quality of those waterbodies potentially affected, the BLM presents the measure as a BMP. This appendix only lists the BMPs, which must be considered together with the management direction **(Appendix B)**.

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[30] The ODEQ has granted Designated Management Agency status to the BLM through a Memorandum of Understanding (ODEQ and USDI BLM 2011).

[31] Beneficial uses are defined in Oregon Revised Statute (ORS), Chapter 468B Water Quality, and Oregon Administrative Rules (OAR), Division 41.

[32] Management direction identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-administered lands and resources (**Appendix B**).

The BMPs described in this appendix are methods, measures, or practices selected based on site-specific conditions to ensure that the BLM would maintain water quality at its highest practicable level to meet water quality standards and TMDL load allocations as set by the State of Oregon's Department of Environmental Quality. These site-specific BMPs are a compilation of commonly employed practices developed through professional experience or research, and designed to minimize water quality degradation and loss of soil productivity. The BMPs include, but are not limited to, avoidance, structural and nonstructural treatments, operations, and maintenance procedures. Although normally preventative, BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation). The implementation of these BMPs would be the beginning of an iterative process that includes the monitoring and modification of BMPs, where needed, to achieve water quality goals. This cyclic process would be the primary mechanism to achieve Oregon's water quality standards.

For vegetation treatments using herbicides on BLM-administered lands in the decision area, BMPs are included in Vegetation Treatments Using Herbicides on BLM Lands in Oregon Record of Decision (USDI BLM 2010) as mitigation measures and standard operating practices, and are incorporated here by reference. Briefly, mitigation and standard operating procedures in Attachment A; General, Soil, Water Resources, Wetlands and Riparian Areas, Fish and Other Aquatic Organisms, Recreation and other beneficial uses and values (pp. 33–45), and additional mitigation measures (pp. 13–15) are considered BMPs for herbicide treatments. For other management activities, including minerals exploration and development, linear transmission projects, and most hazardous materials, the mechanism to achieve Oregon State Water Quality Standards would be guided by RMP management direction, regulations, or project-level design features, and not necessarily be covered by the BMPs contained in this RMP. For example, management of locatable minerals is governed by regulations found in 43 CFR 3809. The BMPs for locatable minerals include language from 43 CFR 3809 that requires operators to prevent unnecessary and undue degradation from mining operations, as defined in 43 CFR 3809.5 and 43 CFR 3809.415.

# Selection and Application of BMPs

For implementation actions under this RMP, BLM decision-makers will select the appropriate and applicable BMPs, using input from BLM staff. The BLM will select BMPs based upon site-specific conditions, technical feasibility, resource availability, and the water quality of those waterbodies potentially impacted. Not all of the BMPs listed will be selected for any specific management action. The BMPs below do not provide an exhaustive list of nonpoint source control measures. The BLM may identify additional nonpoint source control measures during project-level planning and analysis. The BLM will apply the selected BMPs in a manner that would be in conformance with all RMP management direction.

The BMPs that relate to instream activities may coincidently be similar to applicable practices specified in applicable permits, such as Army Corps of Engineers, Department of State Lands, and ODFW joint removal/fill permits, ODEQ water quality permits and 401 certifications, or project design criteria contained in biological assessments. The BMPs in the following tables are not specific permit requirements, but rather demonstrate the process by which the BLM would control nonpoint source pollution from instream activities.

# Monitoring and Adjustment

The BLM will monitor the application of BMPs through implementation and effectiveness monitoring. Post-project implementation monitoring of selected BMPs will evaluate whether the BLM carries forward

BMPs from the project-level plans. Effectiveness monitoring will evaluate whether selected BMPs meet water quality standards and criteria and assure protection of beneficial uses. The BLM would modify BMPs if monitoring demonstrates that water quality standards are not being protected. The BLM would make changes to individual BMPs, or additions or deletions to the BMP lists below, through plan maintenance, consistent with 43 CFR 1610.5–4.

# BMP Lists

**Table J-1** through **Table J-14** are organized by core activities on BLM-administered lands in the decision area. For each core activity, the table displays the sequential number and BMP in the left columns, the source or reference in the center column, and the applicable ODEQ narrative or numeric water quality standards in the right column. The table identifies the ODEQ Oregon Administrative Rules (OAR) number(s) in the right column and provides OAR references within the roads and landings section, to compare these BMPs to similar Oregon Department of Forestry OARs. See Oregon Administrative Rules on water pollution (ODEQ OARs, Division 41, 2015) for additional details about the standards and regulations that are associated with the BMPs.

Core activities with BMPs include:

- Road and landing maintenance and construction
- Timber harvest activities
- Silvicultural activities
- Fire and fuels management
- Surface source water for drinking water
- Recreation management
- Range management
- Minerals (salable) development
- Spill prevention and abatement
- Restoration activities
- Dry forest-specific BMPs

The following lists of BMPs are not intended to be all-inclusive nor replace site-specific project planning, which may require the use of different or additional BMP practices.

## Roads and Landings

**Table J-1.** Best management practices for roads and landings

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **General Construction** | | | |
| R 01 | Locate temporary and permanent roads and landings on stable locations, e.g., ridge tops, stable benches, or flats, and gentle-to-moderate side slopes. Minimize road construction on steep slopes (> 60 percent) consult TPCC for FP and FM classifications. | USDI BLM 2008, Appendix I – Water, R 1, p. 270<br><br>OAR 629-625-0200 (3) | OAR 629-625-0200–ODF, Road Location<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 02 | Locate temporary and permanent road construction or improvement to minimize the number of stream crossings. | USDI BLM 2008, Appendix I – Water, R 2, p. 270<br><br>OAR 629-625-0200 (3-4) | OAR 629-625-0200–ODF, Road Location<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 03 | Locate roads and landings away from wetlands, Riparian Reserve, floodplains, and waters of the State, unless there is no practicable alternative. Avoid locating landings in areas that contribute runoff to channels. | USDI BLM 2008, Appendix I – Water, R 4, p. 270<br><br>OAR 629-625-0200 (2) | OAR 629-625-0200–ODF, Road Location<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 04 | Locate roads and landings to reduce total transportation system mileage. Renovate or improve existing roads or landings when it would cause less adverse environmental impact. Where roads traverse land in another ownership, investigate options for using those roads before constructing new roads. | USDI BLM 2008, Appendix I – Water, R 2, p. 270<br><br>EPA 2005, p. 3-12, Bullet 1<br><br>OAR 629-625-0200 (5)<br><br>EPA 2005, p. 3-10, Bullet 1 | OAR 629-625-0200–ODF, Road Location<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 05 | Design roads to the minimum width needed for the intended use as referenced in BLM Manual 9113 – 1 – Roads Design Handbook (USDI BLM 2011). | USDI BLM 2008, Appendix I – Water, R 8, p. 271<br><br>OAR 629-625-0310 (3) | OAR 629-625-0310-ODF, Road Prism<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 06 | Confine pioneer roads to the construction limits of the permanent roadway to reduce the amount of area disturbed and avoid deposition in wetlands, Riparian Reserve, floodplains, and waters of the State. Install temporary drainage, erosion, and sediment control structures. Storm proof or close pioneer roads prior to the onset of the wet season. | USDI BLM 2008, Appendix I – Water, R 11, p. 271<br><br>EPA 2005, p. 3-41, Bullet 2 | OAR 629-625-0410-ODF, Disposal of Waste Materials<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 07 | Design road cut and fill slopes with stable angles, to reduce erosion and prevent slope failure. | USDI BLM 2008, Appendix I – Water, R 3, p. 270<br><br>EPA 2005 | OAR 629-625-0310-ODF, Road Prism<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 08 | End-haul material excavated during construction, renovation, or maintenance where side slopes generally exceed 60 percent and any slope where side-cast material may enter wetlands, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 10, p. 271<br><br>EPA 2005, p. 3-12, Bullet 5 | OAR 629-625-0310-ODF, Road Prism<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 09 | Construct road fills to prevent fill failure using inorganic material, compaction, buttressing, sub-surface drainage, rock facing, or other effective means. | USDI BLM 2008, Appendix I – Water, R 13, p. 271.<br><br>OAR 629-625-0310-5 | OAR 629-625-0310-ODF, Road Prism<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 10 | Design and construct sub-surface drainage (e.g., trench drains using geo-textile fabrics and drain pipes) in landslide-prone areas and saturated soils. Minimize or eliminate new road construction in these areas. | USDI BLM 2008, Appendix I – Water, R 19, p. 272<br><br>ODEQ 2005, RC-1, RC-6, pp.4-5, 4-6 | OAR 629-625-0300-ODF, Road Design<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 11 | Locate waste disposal areas outside wetlands, Riparian Reserve, floodplains, and unstable areas to minimize risk of sediment delivery to waters of the State. Apply surface erosion control prior to the wet season. Prevent overloading areas, which may become unstable. | USDI BLM 2008, Appendix I – Water, R 80, p. 281<br><br>OAR 629-625-0340 | OAR 629-625-0340-ODF,<br>Waste Disposal Areas<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 12 | Use controlled blasting techniques to minimize loss of material on steep slopes or into wetlands, Riparian Reserve, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 12, p. 271 | OAR 629-625-0410-ODF, Disposal of Waste Materials<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 13 | Use temporary sediment control measures (e.g., check dams, silt fencing, bark bags, filter strips, and mulch) to slow runoff and contain sediment from road construction areas. Remove any accumulated sediment and the control measures when work or haul is complete. When long-term structural sediment control measures are incorporated into the final erosion control plan, remove any accumulated sediment to retain capacity of the control measure. | USDI BLM 2008, Appendix I – Water, R 14, p. 271<br><br>ODEQ 2005, RC-11 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 14 | Avoid use of road fills for water impoundment dams unless specifically designed for that purpose. Impoundments over 9.2-acre-feet or 10 feet in depth will require a dam safety assessment by a registered engineer. Upgrade existing road fill impoundments to pass 100-year flood events. | OAR 629-625-0310-5 | OAR 629-625-0310-ODF, Road Prism<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Permanent Stream Crossings** | | | |
| R 15 | Minimize fill volumes at permanent and temporary stream crossings by restricting width and height of fill to amounts needed for safe travel and adequate cover for culverts. For deep fills (generally greater than 15 feet deep), incorporate additional design criteria (e.g., rock blankets, buttressing, bioengineering techniques) to reduce the susceptibility of fill failures. | USDI BLM 2008, Appendix I – Water, R 47, p. 276<br><br>OAR 629-625-0320 (1b) | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 16 | Locate stream-crossing culverts on well-defined, unobstructed, and straight reaches of stream. Locate these crossings as close to perpendicular to the streamflow as stream allows. When structure cannot be aligned perpendicular, provide inlet and outlet structures that protect fill, and minimize bank erosion. Choose crossings that have well-defined stream channels with erosion-resistant bed and banks. | USDI BLM 2008, Appendix I – Water, R 48, p. 276<br><br>EPA 2005, p. 3-14<br><br>Gesford and Anderson 2006, pp. 5–30 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 17 | On new construction, install culverts at the natural stream grade, unless a lessor gradient is required for fish passage. Stream crossings with ESA-listed fish must meet ARBO II (USDOC NMFS and USDI FWS 2013) fish passage design criteria. | USDI BLM 2008, Appendix I – Water, R 49, p. 276 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 18 | Design stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height. | USDI BLM 2008, Appendix I – Water, R 53, p. 277 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 19 | Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces. | USDI BLM 2008, Appendix I – Water, R 31, p. 274<br><br>OAR 629-625-0330 (3) | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 20 | Place instream grade control structures above or below the crossing structure, if necessary, to prevent stream head cutting, culvert undermining and downstream sedimentation. Employ bioengineering measures to protect the stability of the streambed and banks. | ODEQ 2005 , RC - 2<br><br>Gesford and Anderson 2006, pp 5–31<br><br>USDA FS 2002 Chapter 20 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 21 | Prevent culvert plugging and failure in areas of active debris movement with measures such as beveled culvert inlets, flared inlets, wingwalls, over-sized culverts, trash racks, or slotted risers. | USDI BLM 2008, Appendix I – Water, R 59, p. 278 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 22 | To reduce the risk of loss of the road crossing structure and fill causing excessive sedimentation, use bridges or low-water fords when crossing debris-flow susceptible streams. Avoid using culverts when crossing debris-flow susceptible streams when practicable. | USDI BLM 2008, Appendix I – Water, R 59, p. 280 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 23 | Utilize stream diversion and isolation techniques when installing stream crossings. Evaluate the physical characteristics of the site, volume of water flowing through the project area and the risk of erosion and sedimentation when selecting the proper techniques. | USDI BLM 2008, Appendix I – Water, R 50, R 51, p. 277 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 24 | Limit activities and access points of mechanized equipment to streambank areas or temporary platforms when installing or removing structures. Keep equipment activity in the stream channel to an absolute minimum. | USDI BLM 2008, Appendix I – Water, R 52, p. 277<br><br>OAR 629-625-0430 (2) | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 25 | Install stream crossing structures before heavy equipment moves beyond the crossing area. | USDI BLM 2008, Appendix I – Water, R 60, p. 278 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 26 | Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not possible, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Prevent or reduce ditch flow conveyance to the stream through cross drain placement above the stream crossing. | USDI BLM 2008, Appendix I – Water, R 26, p. 273, R 33 p. 274<br><br>Gesford and Anderson 2006, pp. 5–22<br><br>OAR 629-625-0330 (4) | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Temporary Stream Crossings for Roads and Skid Trails** | | | |
| R 27 | When installing temporary culverts, use washed rock as a backfill material. Use geotextile fabric as necessary where washed rock will spread with traffic and cannot be practicably retrieved. | USDI BLM 2008, Appendix I – Water, R 63, p. 279<br><br>ODEQ 2005, NS-3 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
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| R 28 | Use no-fill structures (e.g., portable mats, temporary bridges, and improved hardened crossings) for temporary stream crossings. When not practicable, design temporary stream crossings with the least amount of fill and construct with coarse material to facilitate removal upon completion. | OAR 629-625-0320 (2) | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 29 | Remove temporary crossing structures promptly after use. Follow practices under the Closure/Decommissioning section for removing stream crossing drainage structures and reestablishing the natural drainage. | USDI BLM 2008, Appendix I – Water, R 65, p. 279<br><br>OAR 629-625-0430 (5) | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Surface Drainage** | | | |
| R 30 | Effectively drain the road surface by using crowning, insloping or outsloping, grade reversals (rolling dips), and waterbars or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and erosion-proofed. | USDI BLM 2008, Appendix I – Water, R 22, p. 272<br><br>EPA 2005, p. 3-41 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 31 | Outslope temporary and permanent low volume roads to provide surface drainage on road gradients up to 6 percent unless there is a traffic hazard from the road shape. | USDI BLM 2008, Appendix I – Water, R 23, R 24, p. 273<br><br>EPA 2005, p. 3-42<br><br>USDA FS 2002 Chapter 13 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 32 | Consider using broad-based drainage dips or leadoff ditches in lieu of cross drains for low volume roads. Locate these surface water drainage measures where they will not drain into wetlands, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 25, R 26, p. 273<br><br>EPA 2005, pp. 3-41 – 3-45<br><br>USDA FS 2002 Chapter 13 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 33 | Avoid use of outside road berms unless designed to protect road fills from runoff. If road berms are used, breach to accommodate drainage where fill slopes are stable. | USDI BLM 2008, Appendix I – Water, R 27, p. 273<br><br>Gesford and Anderson 2006, pp. 3–7 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 34 | Construct variable road grades and alignments (e.g., roll the grade and grade breaks) which limit water concentration, velocity, flow distance, and associated stream power. | USDI BLM 2008, Appendix I – Water, R 28, p. 273<br><br>Gesford and Anderson 2006, pp. 5–20<br><br>OAR 629-625-0310 (1) | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
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| R 35 | Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines. | USDI BLM 2008, Appendix I – Water, R 29, p. 273<br><br>OAR 629-625-0330 (5) | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 36 | Design roads crossing low-lying areas so that water does not pond on the upslope side of the road. Provide cross drains at short intervals to ensure free drainage. | USDI BLM 2008, Appendix I – Water, R 19, p. 272<br><br>EPA 2005, p. 3-14, Bullet 1 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 37 | Divert road and landing runoff water away from headwalls, slide areas, high landslide hazard locations, or steep erodible fill slopes. | USDI BLM 2008, Appendix I – Water, R 29, p. 273<br><br>OAR 629-625-0330 (2) | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 38 | Design landings to disperse surface water to vegetated stable areas. | USDI BLM 2008, Appendix I – Water, R 30, p. 274 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Cross Drains** | | | |
| R 39 | Locate cross drains to prevent or minimize runoff and sediment conveyance to waters of the State. Implement sediment reduction techniques such as settling basins, brush filters, sediment fences, and check dams to prevent or minimize sediment conveyance. Locate cross drains to route ditch flow onto vegetated and undisturbed slopes. | USDI BLM 2008, Appendix I – Water, R 33, p. 274<br><br>OAR 629-625-0330 (4) | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 40 | Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion. At a minimum, space cross drains at intervals referred to in the BLM Road Design Handbook 9113-1 (USDI BLM 2011), Illustration 11 –'Spacing for Drainage Lateral.' Increase cross drain frequency through erodible soils, steep grades, and unstable areas. | USDI BLM 2008, Appendix I – Water, R 34, p. 274 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 41 | Choose cross drain culvert diameter and type according to predicted ditch flow, debris and bedload passage expected from the ditch. Minimum diameter is 18." | USDI BLM 2008, Appendix I – Water, R 35, p. 274<br><br>Johansen *et al.* 1997, p. 3 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
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| R 42 | Locate surface water drainage measures (e.g., cross drain culverts, rolling dips, and water bars) where water flow will be released on convex slopes or other stable and non-erosive areas that will absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the State. Where possible locate surface water drainage structures above road segments with steeper downhill grade. Locate cross drains at least 50 feet from the nearest stream crossing and allow for a sufficient non-compacted soil and vegetative filter. | USDI BLM 2008, Appendix I – Water, R 26, p. 273<br><br>Johansen *et al.* 1997, p. 3 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 43 | Armor surface drainage structures (e.g., broad based dips, and leadoff ditches) to maintain functionality in areas of erosive and low-strength soils. | USDI BLM 2008, Appendix I – Water, R 38, p. 275 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 44 | Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where alternatives to discharging water onto loose material, erodible soils, fills, or steep slopes are not available. | USDI BLM 2008, Appendix I – Water, R 39, R 40, p. 275<br><br>ODEQ 2005, RC-2<br><br>Gesford and Anderson 2006, pp. 5–31 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 45 | Cut protruding ‘shotgun’ culverts at the fill surface or existing ground. Install downspout or energy dissipaters to prevent erosion. | USDI BLM 2008, Appendix I – Water, R 41, p. 275 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 46 | Skew cross drain culverts 45–60 degrees from the ditchline and provide pipe gradient slightly greater than ditch gradient to reduce erosion at cross drain inlet. | BLM Road Design Handbook H9113-1 2009 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 47 | Provide for unobstructed flow at culvert inlets and within ditch lines during and upon completion of road construction prior to the wet season. | OAR 629-625-0420 | OAR 629-625-0330-ODF, Drainage<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
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| **Timing of In-water Work** | | | |
| R 48 | Conduct all nonemergency in-water work during the ODFW instream work window. Avoid winter sediment and turbidity entering streams during in-water work to the extent practicable. | USDI BLM 2008, Appendix I – Water, R 44, p. 276, R 65, p. 279<br><br>Oregon guidelines for timing of in-water work to protect fish and wildlife resources ODFW 2008<br><br>OAR 629-625-0430 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 49 | Remove stream crossing culverts and entire in-channel fill material during ODFW instream work period. | USDI BLM 2008, Appendix I – Water, R 93, p. 283<br><br>Oregon guidelines for timing of in-water work to protect fish and wildlife resources ODFW 2008 | OAR 629-625-0650-ODF,Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Low-water Ford Stream Crossings** | | | |
| R 50 | Harden low-water ford approaches with durable materials. Provide cross drainage on approaches. Limit ford crossings to the ODFW instream work period. | USDI BLM 2008, Appendix I – Water, R 67, p. 279<br><br>EPA 2005, p. 3-50 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 51 | Restrict access to unimproved low-water stream crossings. | USDI BLM 2008, Appendix I – Water, R 69, p. 280<br><br>OAR 629-625-0430 (5) | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 52 | Use permanent low-water fords (e.g., concrete and well-anchored concrete mats) in debris-flow susceptible streams. | USDI BLM 2008, Appendix I – Water, R 70, p. 280.<br><br>EPA 2005, p. 3-50 | OAR 629-625-0320-ODF, Stream Crossing Structures<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Maintaining Water Quality - Noxious Weeds** | | | |
| R 53 | Locate equipment-washing sites in areas with no potential for runoff into wetlands, Riparian Reserve, floodplains, and waters of the State. Do not use solvents or detergents to clean equipment on site. | USDI BLM 2008, Appendix I – Water, R 75, p. 280<br><br>ODEQ 2005, NS-5 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
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| **Water Source Development and Use** | | | |
| R 54 | Limit disturbance to vegetation and modification of streambanks when locating road approaches to in-stream water source developments. Surface these approaches with durable material. Employ erosion and runoff control measures. | USDI BLM 2008, Appendix I – Water, R 102, p. 285 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 55 | Direct pass-through flow or overflow from in-channel and any connected off-channel water developments back into the stream. | USDI BLM 2008, Appendix I – Water, R 104, p. 285 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 56 | Direct overflow from water harvesting ponds to a safe non-eroding dissipation area, and not into a stream channel. | USDI BLM 2008, Appendix I – Water, R 105, p. 285 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 57 | Limit the construction of temporary in-channel water drafting sites. Develop permanent water sources outside of stream channels and wetlands. | USDI BLM 2008, Appendix I – Water, R 106, p. 286<br><br>ODEQ 2005, NS-1 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 58 | Do not place pump intakes on the substrate or edges of the stream channel. When placing intakes instream, place on hard surfaces (e.g., shovel and rocks) to minimize turbidity. Use a temporary liner to create intake site. After completion of use, remove liner and restore channel to natural condition. | USDI BLM 2008, Appendix I – Water, R 107, p. 286<br><br>ODEQ 2005, NS-1 | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 59 | Do not locate placement of road fill in the proximity of a public water supply intake (404(f) exemption criteria xi) in waters of the State. | USACOE (1972) 404(f) exemption criteria xi | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 60 | Avoid water withdrawals from fish-bearing streams whenever possible. Limit water withdrawals in ESA-listed fish habitat and within 1,500 feet of ESA-listed fish habitat to 10 percent of stream flow or less at the point of withdrawal, and in non-ESA-listed fish habitat to 50 percent or less at the point of withdrawal, based on a visual assessment by a fish biologist or hydrologist. The channel must not be dewatered to the point of isolating fish. | USDC NMFS 2013 ARBO II, p. 43 (NWR-2013-9664)<br><br>USDA FS 2012, p. 146 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
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| **Erosion Control Measures** | | | |
| R 61 | During roadside brushing, remove vegetation by cutting rather than uprooting. | OAR 629-625-0430 (4) | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 62 | Limit road and landing construction, reconstruction, or renovation activities to the dry season. Keep erosion control measures concurrent with ground disturbance to allow immediate stormproofing. | USDI BLM 2008, Appendix I – Water, R 9, p. 271 | OAR 629-625-0440-ODF, Stabilization<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 63 | Apply native seed and certified weed-free mulch to cut and fill slopes, ditchlines, and waste disposal sites with the potential for sediment delivery to wetlands, Riparian Reserve, floodplains and waters of the State. If needed to promote a rapid ground cover and prevent aggressive invasive plants, use interim erosion control non-native sterile annuals before attempting to restore natives. Apply seed upon completion of construction and as early as possible to increase germination and growth. Reseed if necessary to accomplish erosion control. Select seed species that are fast-growing, have adequate provide ample ground cover and soil-binding properties. Apply mulch that will stay in place and at site-specific rates to prevent erosion. | USDI BLM 2008, Appendix I – Water, R 17, p. 272 | OAR 629-625-0440-ODF, Stabilization<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 64 | Place sediment-trapping materials or structures such as straw bales, jute netting, or sediment basins at the base of newly constructed fill or side slopes where sediment could be transported to waters of the State. Keep materials away from culvert inlets or outlets. | USDI BLM 2008, Appendix I – Water, R 14, p. 271, R 21, p. 272<br><br>USDA FS 2002 Chapter 18 | OAR 629-625-0440-ODF, Stabilization<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 65 | Use biotechnical stabilization and soil bioengineering techniques to control bank erosion (e.g., commercially produced matting and blankets, live plants or cuttings, dead plant material, rock, and other inert structures). | USDI BLM 2008, Appendix I – Water, R 54, p. 277<br><br>USDA FS 2002, Chapters 18 and 20 | OAR 629-625-0440-ODF, Stabilization<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 66 | Suspend ground-disturbing activity if projected forecasted rain will saturate soils to the extent that there is potential for movement of sediment from the road to wetlands, floodplains, and waters of the State. Cover or temporarily stabilize exposed soils during work suspension. Upon completion of ground-disturbing activities, immediately stabilize fill material over stream crossing structures. Measures could include but not limited to erosion control blankets and mats, soil binders, soil tackifiers, or placement of slash. | USDI BLM 2008, Appendix I – Water, R 57, p. 278, R 88, p. 282 | OAR 629-625-0440-ODF, Stabilization<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 67 | Apply fertilizer in a manner to prevent direct fertilizer entry to wetlands, Riparian Reserve, floodplains, and waters of the State. | OAR 629-625-0440<br><br>Aquatic Resources Biological Opinion NMFS-ARBO 2013 | OAR 629-625-0440-ODF, Stabilization<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Road Use and Dust Abatement** | | | |
| R 68 | Apply water or approved road surface stabilizers/dust control additives to reduce surfacing material loss and buildup of fine sediment that can enter into wetlands, floodplains and waters of the State. Prevent entry of road surface stabilizers/dust control additives into waters of the State during application. For dust abatement, limit applications of lignin sulfonate to a maximum rate of 0.5 gal/yd$^2$ of road surface, assuming a 50:50 (lignin sulfonate to water) solution. | USDI BLM 2008, Appendix I – Water, R 76, p. 281<br><br>ODEQ 2005, EP-13<br><br>Western Oregon Programmatic 2011 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Road Maintenance** | | | |
| R 69 | Prior to the wet season, provide effective road surface drainage maintenance. Clear ditch lines in sections where there is lowered capacity or obstructed by dry ravel, sediment wedges, small failures, or fluvial sediment deposition. Remove accumulated sediment and blockages at cross-drain inlets and outlets. Grade natural surface and aggregate roads where the surface is uneven from surface erosion or vehicle rutting. Restore crowning, outsloping or insloping for the road type for effective runoff. Remove or provide outlets through berms on the road shoulder. After ditch cleaning prior to hauling, allow vegetation to reestablish or use sediment entrapment measures (e.g., sediment trapping blankets and silt fences). | USDI BLM 2008, Appendix I – Water, R 81, R 84, R 85, p. 281<br><br>OAR 629-625 0600 (2-4)<br><br>EPA 2005, pp. 3-61 – 3-62 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 70 | Retain ground cover in ditch lines, except where sediment deposition or obstructions require maintenance. | USDI BLM 2008, Appendix I – Water, R 86, p. 282 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 71 | Maintain water flow conveyance, sediment filtering and ditch line integrity by limiting ditch line disturbance and groundcover destruction when machine cleaning within 200 feet of road stream crossings. | USDA FS 2012, pp. 113–114.<br>EPA 2005, p. 3-62 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 72 | Avoid undercutting of cut-slopes when cleaning ditch lines. | USDI BLM 2008, Appendix I – Water, R 78, p. 281<br><br>EPA 2005, p. 3-62 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 73 | Remove and dispose of slide material when it is obstructing road surface and ditch line drainage. Place material on stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. Seed with native seed and use weed-free mulch. | USDI BLM 2008, Appendix I – Water, R 79, p. 281<br><br>OAR 629-625-0600 (6) | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 74 | Do not sidecast loose ditch or surface material where it can enter wetlands, Riparian Reserve, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 80, p. 281<br><br>OAR 629-625-0600 (7) | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 75 | Retain low-growing vegetation on cut-and-fill slopes. | USDI BLM 2008, Appendix I – Water, R 86, p. 282<br><br>EPA 2005, EP-6 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 76 | Seed and mulch cleaned ditch lines and bare soils that drain directly to wetlands, floodplains, and waters of the State, with native species and weed-free mulch. | USDI BLM 2008, Appendix I – Water, R 78, p. 281 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Road Stormproofing** | | | |
| R 77 | Inspect and maintain culvert inlets and outlets, drainage structures and ditches before and during the wet season to diminish the likelihood of plugged culverts and the possibility of washouts. | USDI BLM 2008, Appendix I – Water, R 81, R 82, p. 281<br><br>OAR 629-625-0600 (3) | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 78 | Repair damaged culvert inlets and downspouts to maintain drainage design capacity. | USDI BLM 2008, Appendix I – Water, R 82, p. 281<br><br>OAR 629-625-0600 (3) | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 79 | Blade and shape roads to conserve existing aggregate surface material retain or restore the original cross section, remove berms and other irregularities that impede effective runoff or cause erosion, and ensure that surface runoff is directed into vegetated, stable areas. | USDI BLM 2008, Appendix I – Water, R 84, p. 281<br><br>OAR 629-625-0600 (4) | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 80 | Stormproof open resource roads receiving infrequent maintenance to reduce road erosion and reduce the risk of washouts by concentrated water flows. Stormproof temporary roads if retained over-winter. | USDI BLM 2008, Appendix I – Water, R 87, p. 282<br><br>OAR 629-625-0600 (2) | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 81 | Suspend stormproofing/ decommissioning operations and cover or otherwise temporarily stabilize all exposed soil if conditions develop that cause a potential for sediment-laden runoff to enter a wetland, floodplain, or waters of the State. Resume operations when conditions allow turbidity standards to be met. | USDI BLM 2008, Appendix I – Water, R 88, p. 282 | OAR 629-625-0600-ODF, Road Maintenance<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Road Closure and Decommissioning** | | | |
| R 82 | Inspect closed roads to ensure that vegetation stabilization measures are operating as planned, drainage structures are operational, and noxious weeds are not providing erosion control. Conduct vegetation treatments and drainage structure maintenance as needed. | OAR 629-625-0650 (2) | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 83 | Decommission temporary roads upon completion of use. | USDI BLM 2008, Appendix I – Water, R 90, p. 283 | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 84 | Prevent use of vehicular traffic utilizing methods such as gates, guard rails, earth/log barricades, to reduce or eliminate erosion and sedimentation due to traffic on roads. | USDI BLM 2008, Appendix I – Water, R 91, p. 283<br><br>OAR 629-625-0650 (2) | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 85 | Convert existing drainage structures such as ditches and cross drain culverts to a long-term maintenance free drainage configuration such as an outsloped road surface and waterbars. | USDI BLM 2008, Appendix I – Water, R 92, p. 283<br><br>OAR 629-625-0650 (3) | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 86 | Place and remove temporary stream crossings during the dry season, without overwintering, unless designed to accommodate the 100-year theoretical flood. See also R 49. | OAR 629-625-0430 (5) | OAR 629-625-0430-ODF, Stream Protection<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| R 87 | Place excavated material from removed stream crossings on stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. In some cases, the material could be used for recontouring old road cuts or be spread across roadbed and treated to prevent erosion. | USDI BLM 2008, Appendix I – Water, R 94, p. 284 | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 88 | Reestablish stream crossings to the natural stream gradient. Excavate sideslopes back to the natural bank profile. Reestablish natural channel width and floodplain. | USDI BLM 2008, Appendix I – Water, R 95, p. 284 | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 89 | Install cross ditches or waterbars upslope from stream crossing to direct runoff and potential sediment to the hillslope rather than deliver it to the stream | USDI BLM 2008, Appendix I – Water, R 96, p. 284<br><br>OAR 629-625-0650 (3) | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 90 | Following culvert removal and prior to the wet season, apply erosion control and sediment trapping measures (e.g., seeding, mulching, straw bales, jute netting, and native vegetative cuttings) where sediment can be delivered into wetlands, Riparian Reserve, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 97, p. 284<br><br>OAR 629-625-0650 (3) | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 91 | Implement tillage measures, including ripping or subsoiling to an effective depth. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites. | USDI BLM 2008, Appendix I – Water, R 98, p. 285 | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 92 | After tilling the road surface, pull back unstable road fill and end-haul or contour to the natural slopes. | USDI BLM 2008, Appendix I – Water, R 99, p. 285 | OAR 629-625-0650-ODF, Vacating Forest Roads<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Wet-season Road Use** | | | |
| R 93 | On active haul roads, during the wet season, use durable rock surfacing and sufficient rock depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 71, p. 280<br><br>OAR 629-625-0700 (2) | OAR 629-625-0700-ODF, Wet Weather Road Use<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 94 | Prior to winter hauling activities, implement structural road treatments such as: increasing the frequency of cross drains, installing sediment barriers or catch basins, applying gravel lifts or asphalt road surfacing at stream crossing approaches, and armoring ditch lines. | USDI BLM 2008, Appendix I – Water, R 72, p. 280<br><br>OAR 629-625-0700 (2) | OAR 629-625-0700-ODF, Wet Weather Road Use<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 95 | Remove snow on surfaced roads in a manner that will protect the road and adjacent resources. Retain a minimum layer (4”) of compacted snow on the road surface. Provide drainage through the snow bank at periodic intervals to allow snowmelt to drain off the road surface. | USDI BLM 2008, Appendix I – Water, R 74, p. 280<br><br>BLM snow removal letter | OAR 629-625-0700-ODF, Wet Weather Road Use<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 96 | Avoid removing snow from unsurfaced roads where runoff drains to waters of the State. | USDA FS 2012, pp. 120–123<br><br>EPA 2005, p. 3-80 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| R 97 | Maintain road surface by applying appropriate gradation of aggregate and suitable particle hardness to protect road surfaces from rutting and erosion under active haul where runoff drains to wetlands, Riparian Reserve, floodplains, and waters of the State. | USDI BLM 2008, Appendix I – Water, R 71, p. 280<br><br>OAR 629-625-0700 (2) | OAR 629-625-0700-ODF, Wet Weather Road Use<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 98 | To reduce sediment tracking from natural surface roads during active haul, provide a gravel approach before entrance onto surfaced roads. | EPA 2005, pp. 3-57 – 3-58 | OAR 629-625-0700-ODF, Wet Weather Road Use<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| R 99 | Install temporary culverts and washed rock on top of low-water ford to reduce vehicle contact with water during active haul. Remove culverts promptly after use. | USDA FS 2012, pp. 119–120 | OAR 629-625-0700-ODF, Wet Weather Road Use<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

## Timber Harvest Activities

**Table J-2.** Best management practices for timber harvest activities

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Cable Yarding** | | | |
| TH 01 | Design yarding corridors crossing streams to limit the number of such corridors, using narrow widths, and using the most perpendicular orientation to the stream feasible. Minimize yarding corridor widths and space corridors as far apart as is practicable given physical and operational limitations, through practices such as setting limitations on corridor width, corridor spacing, or the amount of corridors in an area. For example, such practices could include, as effective and practicable:<br>– Setting yarding corridors at 12–15 foot maximum widths, and<br>– Setting corridor spacing where they cross the streams to no less than 100 feet apart when physical, topography, or operational constraints demand, with an overall desire to keep an average spacing of 200 feet apart. | USDI BLM 2008, Appendix I – Water, TH 2, p. 287 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| TH 02 | Trees felled for yarding corridors in the Riparian Reserve would be directed toward the stream and left on site. | | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| TH 03 | Require full suspension over flowing streams, non-flowing streams with highly erodible bed and banks, and jurisdictional wetlands. | USDI BLM 2008, Appendix I – Water, TH 3, p. 287 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 04 | When logging downhill into Riparian Reserve, design the logging system to prevent converging yarding trails from intersecting the stream network. | USDI BLM 2008, Appendix I – Water, TH 4, p. 287 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 05 | Prevent streambank and hillslope disturbance on steep slopes (generally > 60 percent) by requiring full-suspension within 50 feet of definable stream channels. Yard the remaining areas across the Riparian Reserve using at least one-end suspension. | USDI BLM 2008, Appendix I – Water, TH 5, p. 287 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 06 | Implement erosion control measures such as waterbars, slash placement, and seeding in cable yarding corridors where the potential for erosion and delivery to waterbodies, floodplains, and wetlands exists. | USDI BLM 2008, Appendix I – Water, TH 6, p. 288 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| **Ground-based Harvesting** | | | |
| TH 07 | Exclude ground-based equipment on hydric soils, defined by the Natural Resources Conservation Service. | USDI BLM 2008, Appendix I – Water, TH 8, p. 288 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 08 | Limit designated skid trails for thinning or regeneration harvesting to ≤ 15 percent of the harvest unit area to reduce displacement or compaction to acceptable limits. | Soil Quality Standards USDA FS 1998 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 09 | Limit width of skid roads to single width of what is operationally necessary for the approved equipment. Where multiple machines are used, provide a minimum-sized pullout for passing. | USDI BLM 2008, Appendix I – Water, TH 10, p. 288 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 10 | Ensure leading-end of logs is suspended when skidding. | USDI BLM 2008, Appendix I – Water, TH 11, p. 288 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 11 | Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture; generally from May 15 to Oct 15. Low soil moisture varies by texture and is based on site-specific considerations. Low soil moisture limits will be determined by qualified specialists using a qualitative method to determine an estimated soil moisture and soil texture.[33] | USDI BLM 2008, Appendix I – Water, TH 12, p. 288 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 12 | Incorporate existing skid trails and landings as a priority over creating new trails where feasible, into a designated trail network for ground-based harvesting equipment, consider proper spacing, skid trail direction and location relative to terrain and stream channel features. | USDI BLM 2008, Appendix I – Water, TH 13, p. 289 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |

[33] Soil moisture is the ratio of the weight of the water in the soil to the weight of the solids, expressed as a percentage.

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| TH 13 | Limit non-specialized skidders or tracked equipment to slopes less than 35 percent, except when using previously constructed trails or accessing isolated ground based harvest areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow. | USDI BLM 2008, Appendix I – Water, TH 14, p. 289 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 14 | Limit the use of specialized ground-based mechanized equipment (those machines specifically designed to operate on slopes greater than 35 percent) to slopes less than 50 percent, except when using previously constructed trails or accessing isolated ground based harvesting areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow. | USDI BLM 2008, Appendix I – Water, TH 15, p. 289 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 15 | Designate skid trails in locations that channel water from the trail surface away from waterbodies, floodplains, and wetlands, or unstable areas adjacent to them. | USDI BLM 2008, Appendix I – Water, TH 16, p. 289. | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 16 | Directionally fall trees to lead for skidding and skyline yarding to minimize ground disturbance when moving logs to skid trails and skyline corridors. | USDI BLM 2008, Appendix I – Water, TH 17, p. 289 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 17 | Apply erosion control measures to skid trails and other disturbed areas with potential for erosion and subsequent sediment delivery to waterbodies, floodplains, or wetlands. These practices may include seeding, mulching, water barring, tillage, and woody debris placement. Use guidelines from the road decommissioning section. | USDI BLM 2008, Appendix I – Water, TH 18, p. 289 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 18 | Construct waterbars on skid trails using guidelines in **Table J-6** where potential for soil erosion or delivery to waterbodies, floodplains, and wetlands exists. | USDI BLM 2008, Appendix I – Water, TH 19, p. 289 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 19 | Subsoil skid trails, landings, or temporary roads where needed to achieve 20 percent detrimental soil conditions, minimize surface runoff, improve soil structure, and water movement through the roadbed. See also R 92–93. | USDI BLM 2008, Appendix I – Water, R 98, p. 285 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 20 | Block skid trails to prevent public motorized vehicle and other unauthorized use at the end of seasonal use. | USDI BLM 2008, Appendix I – Water, TH 21, p. 290 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| TH 21 | Allow harvesting operations (cutting and transporting logs) when ground is frozen or adequate snow cover exists to prevent soil compaction and displacement. | USDI BLM 2008, Appendix I – Water, TH 12, p. 288 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| TH 22 | Minimize the area where more than half of the depth of the organically-enriched upper horizon (topsoil) is removed when conducting forest management operations | Soil Quality Standards USDA FS 1998 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 23 | Maintain the minimum percent of effective ground cover needed to control surface erosion, as shown in **Table J-3**, following forest management operations. Ground cover may be provided by vegetation, slash, duff, medium to large gravels, cobbles, or biological crusts. | Soil Quality Standards USDA FS 1998 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| **Helicopter** | | | |
| TH 24 | Consider the use of helicopter or aerial logging systems to prevent water quality impacts from road construction or ground-based timber yarding, where other BMPs would be more costly or have limited effectiveness. | USDI BLM 2008, Appendix I – Water, TH 23, p. 290 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028 |
| **Horse** | | | |
| TH 25 | Within Riparian Reserve, limit horse logging to slopes less than 20 percent. | USDI BLM 2008, Appendix I – Water, TH 24, p. 290 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |
| TH 26 | Construct waterbars on horse skid trails when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands. | USDI BLM 2008, Appendix I – Water, TH 25, p. 290 | ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 |

**Table J-3.** Soil cover based on erosion hazard ratings

| NRCS Erosion Hazard Rating* | Minimum Percent Effective Ground Cover – Year 1 | Minimum Percent Effective Ground Cover – Year 2 |
|---|---|---|
| Very Severe | 60% | 75% |
| Severe | 45% | 60% |
| Moderate | 30% | 40% |
| Slight | 20% | 30% |

* Rating obtained from Natural Resources Conservation Services County Soil Survey information by map unit.

## Silvicultural Activities

**Table J-4.** Best management practices for planting, pre-commercial thinning, and fertilization

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Planting and Pre-commercial Thinning** | | | |
| S 01 | Limit the crossing of stream channels with motorized support vehicles (e.g., OHVs) and mechanized equipment to existing road crossings or temporary ford crossings to the ODFW instream work period. | USDI BLM 2008, Appendix I – Water, S 1, p. 291 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| S 02 | Scatter treatment debris on disturbed soils and water bar any equipment access trails that could erode and deposit sediment in waterbodies, floodplains, and wetlands. | USDI BLM 2008, Appendix I – Water, S 4, p. 291 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| **Fertilization** | | | |
| S 03 | For streams and waterbodies that support domestic use, apply fertilizer further than 100 feet from the edge of the active channel or shoreline. | USDI BLM 2008, Appendix I – Water, S 5, p. 291 | EPA 440/5-86-001,-10 mg/L nitrate nitrogen for domestic water supply.<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| S 04 | Locate storage, transfer, and loading sites outside Riparian Reserve and separated from hydrological connections (e.g., road ditches that are linked to stream channels). | USDI BLM 2008, Appendix I – Water, S 6, p. 291 | EPA 822-R-13-001 2013,-salmonid acute criterion, 17 mg total ammonia nitrogen/L at pH 7 and temperature of 20 °C.<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |

## Fire and Fuels Management

**Table J-5.** Best management practices for fire and fuel management

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Underburn, Jackpot Burn, and Broadcast Burn** | | | |
| F 01 | Keep broadcast burns and jackpot burns out of Riparian Reserve inner zone, unless prescribed for restoration purposes (e.g., sudden oak death sanitation, improve species composition, and invigorate deciduous trees). Locate ignition lines above large open meadows associated with stream channels, unless prescribed for restoration. | USDI BLM 2008, Appendix I – Water, F 1, p. 293 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| F 02 | Reduce fuel loads by whole tree yarding, and piling material, as necessary, prior to under burning in dry forest types where fuel loads are elevated. | USDI BLM 2008, Appendix I – Water, F 2, p. 293 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| F 03 | Avoid direct ignition or ignition by a backing-in fire of large woody material that is touching the high water mark of a waterbody or that may be affected by high flows. | USDI BLM 2008, Appendix I – Water, F 3, p. 293 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| F 04 | Avoid delivery of chemical retardant foam or additives to waterbodies, and wetlands. Store and dispose of ignition devices/ materials (e.g., flares and plastic spheres) outside Riparian Reserve or a minimum of 150 feet from waterbodies, floodplains, and wetlands. Maintain and refuel equipment (e.g., drip torches and chainsaws) a minimum of 100 feet from waterbodies, floodplains, and wetlands. Portable pumps can be refueled on-site within a spill containment system. | USDI BLM 2008, Appendix I – Water, F 4, p. 293 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| F 05 | Limit fire lines inside Riparian Reserve. Construct fire lines by hand on all slopes greater than 35 percent and inside the Riparian Reserve inner zone. Use erosion control techniques such as tilling, waterbarring, or debris placement on fire lines when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands. Space the waterbars as shown in **Table J-6**. Avoid placement of any fire line where water would be directed into waterbodies, floodplains, wetlands, headwalls, or areas of instability. | USDI BLM 2008, Appendix I – Water, F 5, p. 294 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| F 06 | In broadcast burning, consume only the upper horizon organic materials and allow no more than 15 percent of the burned area mineral soil surface to change to a reddish color. | Soil Quality Standards USDA FS 1998 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| **Pile and Burn** | | | |
| F 07 | Avoid burning piles within 35 feet of a stream channel. | USDI BLM 2008, Appendix I – Water, F 6, p. 294 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| F 08 | Avoid creating piles greater than 16 feet in height or diameter. Pile smaller diameter materials and leave larger > 12" pieces within the unit. Reduce burn time and smoldering of piles by extinguishment with water and tool use. | Soil Quality Standards USDA FS 1998 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| F 09 | When burning machine-constructed piles, preferably locate and consume organic materials on landings or roads. If piles are within harvested units and more than 15 percent of the burned area mineral soil (the portion beneath the pile) surface changes to a reddish color then consider that amount of area towards the 20 percent detrimental limit. | Soil Quality Standards USDA FS 1998 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Mechanical and Manual Fuels Treatments** | | | |
| F 10 | Prevent mechanical fuel reduction equipment within the Riparian Reserve inner zone, unless prescribed for restoration.<br><br>Limit mechanical fuel reduction equipment to slopes less than 35 percent. Restrict non-track mechanized equipment (e.g., feller bunchers and horizontal bar masticators) to slopes less than 20 percent. | USDI BLM 2008, Appendix I – Water, F 7, p. 294 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| F 11 | Use temporary stream crossings if necessary to access the opposite side with any equipment or vehicles (including OHVs). Follow Temporary Stream Crossing practices under Roads section. | USDI BLM 2008, Appendix I – Water, F 8, p. 294 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| F 12 | Place residual slash on severely burned areas, where there is potential for sediment delivery into waterbodies, floodplains and wetlands. | USDI BLM 2008, Appendix I – Water, F 9, p. 294 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Wildfire Suppression** | | | |
| F 13 | Limit fire lines inside Riparian Reserve. Where hand constructed fire lines are necessary in Riparian Reserve, angle the approach, where feasible, rather than have it perpendicular to the Riparian Reserve.<br><br>Limit heavy equipment to slopes less than 35 percent.<br><br>Locate fire lines to minimize directing water into waterbodies, wetlands, headwalls, or areas of instability.<br><br>Use erosion control techniques such as tilling, waterbarring, or debris placement on fire lines when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands. Space waterbars as shown in **Table J-6**. Block dozer lines and roads or landing intersections with an approved barricade or scattered slash to preclude public motorized vehicle use. | USDI BLM 2008, Appendix I – Water, F 5, p. 294, F 11, p. 295 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| F 14 | Prevent cutting of logs or woody material if any portion of that material extends into the stream channel, unless for restoration.<br><br>Fall snags in the Riparian Reserve towards the stream channel when felling is necessary for safety or fire suppression activities. | USDI BLM 2008, Appendix I – Water, F 12, p. 295 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| F 15 | Avoid locating incident bases, camps, helibases, staging areas, constructed helispots, and other centers for incident activities in Riparian Reserve or within 200 feet of any waterbody, floodplain, or wetland. Water drafting sites for engines and tankers would be permitted. | USDI BLM 2008, Appendix I – Water, F 13, p. 295 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1))<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| F 16 | Locate and maintain portable sanitation facilities at incident bases, camps (including spike/remote camps), helibases, staging areas, constructed helispots, and other centers for incident activities in accordance with State and local regulations. | USDI BLM 2008, Appendix I – Water, F 14, p. 295 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009 |
| F 17 | Avoid application of chemical retardant, foam, or other chemicals to waterways, maintain a 300 ft. buffer (FA-IM-2008-029), unless the wildfire is deemed a threat to human safety or private property.<br><br>Apply aerial retardant adjacent to Riparian Reserve by making parallel passes. | USDI BLM 2008, Appendix I – Water, F 15, p. 295 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| **Emergency Stabilization or Rehabilitation** | | | |
| F 18 | Implement emergency fire stabilization or rehabilitation treatments to accomplish erosion control as quickly as possible and before the wet season.<br><br>Soil and water conservation practices may include, but are not restricted to:<br>– Seeding or planting native vegetation for short-term cover development and long-term recovery, unless not available in quantities necessary for the emergency response.<br>– Mulching with straw, wood chips, or other suitable material. To avoid introducing noxious weeds when mulching, use certified weed-free straw mulch or rice straw where available.<br>– Placing straw wattles on the contour at adequate spacing between each row to capture eroded material without overflowing. Embed to the surface of the soil in slight trench to prevent undermining.<br>– Placing and anchoring log erosion barriers similarly to straw wattles.<br>– Spreading available cut vegetation or slash on bare soils.<br>– Placing channel sediment retention or stabilization structures.<br>– Placing trash racks for debris above road drainage structures.<br>– Installing drainage structures, such as waterbars or drainage dips, on fire lines, fire roads, and other cleared areas according to guidelines in **Table J-6** (Waterbar spacing by gradient and erosion class).<br>– Repairing damaged road drainage facilities, such as flattened or ripped culvert ends, or burned out plastic pipes, or cleaning ditch lines of materials that impede natural flow.<br>– Blocking or decommissioning roads and trails. | USDI BLM 2008, Appendix I – Water, F 16, p. 296<br><br>Interagency Burned Area Emergency Response Guidebook; Interpretation of Department of the Interior 620 DM 3 and USDA Forest Service Manual 2523 For the Emergency Stabilization of Federal and Tribal Trust Lands Version 4.0 February 2006 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Post-Fire Road Repair** | | | |
| F 19 | Implement emergency fire rehabilitation treatments to accomplish erosion control as quickly as possible and before the wet season.<br><br>Soil and water conservation practices may include, but are not restricted to:<br>– Reducing road system hydrologic conductivity though proper grading, culvert spacing, and installing drivable dips.<br>– Replacing culverts to increase peak flow capacity of stream crossing culverts to accommodate the 100-year design flood.<br>– Preventing culvert plugging.<br>– Correcting stream diversions. | USDI BLM 2008, Appendix I – Water, F 17, p. 297<br><br>Interagency Burned Area Emergency Response Guidebook; Interpretation of Department of the Interior 620 DM 3 (USDI BLM 2006) and USDA Forest Service Manual 2523 For the Emergency Stabilization of Federal and Tribal Trust Lands Version 4.0 (USDA FS *et al.* 2006) | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Fuel/Retardant Transport** | | | |
| F 20 | If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances would be transported to a project site, implement the following precautions:<br>1. Plan a safe route and transfer sites that could contain the transported volume.<br>2. Plan an active dispatch system that can relay the information to appropriate resources.<br>3. Ensure a spill containment kit that can absorb and contain 55 gallons of petroleum product and chemical substances is readily available.<br>4. Provide for immediate notification in the event of a spill. Have a radio equipped vehicle lead the chemical or fuel truck to the project site.<br>5. Assemble a spill notification list that includes the district hazardous materials coordinator, DEQ, and spill clean-up contractors.<br>6. Construct a water user contact list with address and phone numbers.<br>7. When operating within Source Water Watersheds, pre-estimate travel times through the watershed to predict downstream arrival times.<br>8. Be prepared to sample water and carry sample containers. | USDI BLM 2008, Appendix I – Water, F 18, p. 297 | [40 CFR 112] - Oil Pollution Prevention. Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved.<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12) and (13)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |

**Table J-6.** Water bar spacing by gradient and erosion class

| Gradient (Percent) | Water Bar Spacing* Per Erosion Class† | | |
|---|---|---|---|
| | **High (Feet)** | **Moderate (Feet)** | **Low (Feet)** |
| 2–5% | 200 | 300 | 400 |
| 6–10% | 150 | 200 | 300 |
| 11–15% | 100 | 150 | 200 |
| 16–20% | 75 | 100 | 150 |
| 21–35% | 50 | 75 | 100 |
| 36+% | 50 | 50 | 50 |

* Spacing is determined by slope distance and is the maximum allowed for the grade.
† The erosion classes include the following rock types:
**High:** Granite, sandstone, andesite porphyry, glacial or alluvial deposits, soft matrix conglomerate, volcanic ash, and pyroclastics
**Moderate:** Basalt, andesite, quartzite, hard matrix conglomerate, and rhyolite
**Low:** Metasediments, metavolcanics, and hard shale

## Surface Source Water for Drinking Water

**Table J-7.** Best management practices for surface source water for drinking water protection

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| SW 01 | Plan, locate, design, construct, operate, inspect, and maintain sanitary facilities to minimize water contamination. | USDI BLM 2008, Appendix I – Water, SW 1, p. 299 | ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 02 | Locate contractor camps outside DEQ sensitive zones in drinking water source areas for public water systems. If this is not possible, require self-contained sanitary facilities. | USDI BLM 2008, Appendix I – Water, SW 2, p. 299<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 03 | Require self-contained sanitary facilities in surface source water watersheds, when long-term camping (greater than 14 days) is involved with contract implementation. | USDI BLM 2008, Appendix I – Water, SW 3, p. 299 | ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 04 | Provide self-contained sanitary facilities when there is high recreational use (almost continuous occupancy) inside DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone. | USDI BLM 2008, Appendix I – Water, SW 4, p. 299<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13) |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| SW 05 | Locate pack and riding, facilities outside DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone. | USDI BLM 2008, Appendix I – Water, SW 5, p. 299<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution:<br>Bacteria OAR 340-041-0009<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 06 | Do not allow surface occupancy within 200 feet of a known domestic water source or within DEQ sensitive zones in drinking water source areas for public water systems. | USDI BLM 2008, Appendix I – Water, SW 6, p. 299<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution:<br>Bacteria OAR 340-041-0009<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 07 | Do not apply sewage sludge as a soil amendment within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve. | USDI BLM 2008, Appendix I – Water, SW 7, p. 300<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution:<br>Bacteria OAR 340-041-0009<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 08 | Avoid loading, or storing chemical, fuel, or fertilizer in DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone. | USDI BLM 2008, Appendix I – Water, SW 8, p. 300<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution:<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 09 | Conduct equipment maintenance outside DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone. | USDI BLM 2008, Appendix I – Water, SW 9, p. 300<br><br>ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm | ODEQ–Water Pollution:<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 10 | Use non-oil-based dust suppressants within surface source water watersheds. | USDI BLM 2008, Appendix I – Water, SW 10, p. 300 | ODEQ–Water Pollution:<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |
| SW 11 | Use fire retardant and surfactants as a last resort in fire suppression activities within surface source water watersheds. | USDI BLM 2008, Appendix I – Water, SW 11, p. 300 | ODEQ–Water Pollution:<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |

## Recreation

**Table J-8.** Best management practices for recreation management

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **All Recreation Facilities** | | | |
| REC 01 | Implement erosion control measures at recreation sites to stabilize exposed soils where water flows or sediment, may reach waterbodies. | USDI BLM 2008, Appendix I – Water, REC 1, p. 301 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 02 | Minimize development of recreation facilities that are not water-dependent (e.g., boat ramps and docks) in the Riparian Reserve. | USDI BLM 2008, Appendix I – Water, REC 2, p. 301 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| **Developed Recreation Sites** | | | |
| REC 03 | Use self-contained sanitary facilities at all developed recreational facilities, unless a sewage system and drain field is approved by ODEQ. | USDI BLM 2008, Appendix I – Water, REC 3, p. 301 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009 |
| REC 04 | When conducting recreation site maintenance, do not cut portions of logs or coarse woody debris that fall across the active stream channel. Keep adequate lengths of material on the banks to anchor it in place. If not possible to make the log stable, it may be removed. | USDI BLM 2008, Appendix I – Water, REC 5, p. 301 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Water Dependent Facilities** | | | |
| REC 05 | Construct boat ramps and approaches with hardened surfaces. Minimize riprap to a 4-foot width to protect concrete ramps. Docks must not be wider than 6', and not include any treated wood. | USDI BLM 2008, Appendix I – Water, REC 6, p. 301 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| **Off-highway Vehicle (OHV) Trails** | | | |
| REC 06 | Locate new OHV trails on stable locations (e.g., ridge tops, benches, and gentle-to-moderate side slopes). Minimize trail construction on steep slopes where runoff could channel to a waterbody. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 07 | Design, construct, and maintain trail width, grades, curves, and switchbacks suitable to the terrain and designated use. Use and maintain surfacing materials suitable to the site and use, to withstand traffic and to minimize runoff and erosion. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 08 | Suspend construction or maintenance of trails, where erosion and runoff into waterbodies would occur. | USDI BLM 2008, Appendix I – Water, REC 11, p. 302 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 09 | Locate staging areas outside Riparian Reserve. Design or upgrade staging areas to prevent sediment/pollutant delivery to wetlands, floodplains, and waterbodies, (e.g., rocking or hardening and drainage through grading or shaping). | USDI BLM 2008, Appendix I – Water, REC 12, p. 302 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| REC 10 | Designate class of vehicle suitable for the trail location, width, trail surfaces, and waterbody crossings, to prevent erosion and potential sediment delivery. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| REC 11 | Designate season of use if the trail bed is prone to erosion, rutting, gullying, or compaction, due to high soil moisture, standing water or snowmelt. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| REC 12 | Use existing road crossings of streams and floodplains on low-volume roads and partially decommissioned roads that tie with the trail system, where safety permits. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Toxic Substances OAR 340-041-0033 |
| REC 13 | Minimize low-water stream crossings for constructed or existing trails. Cross streams on stable substrate (e.g., bedrock, cobble) in areas of low streambanks. Block alternate stream-crossing routes where OHV wheel slippage (acceleration/ braking) would tear down banks or deliver sediment. | USDI BLM 2008, Appendix I – Water, REC 7, p. 301 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Toxic Substances OAR 340-041-0033 |
| REC 14 | Avoid public motorized vehicle use in ponds and wetlands, and navigating up or down streams and side-channels. Use suitable barriers where feasible. | USDI BLM 2008, Appendix I – Water, REC 7, pp. 302–303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Toxic Substances OAR 340-041-0033 |
| REC 15 | Design improved stream crossings (culverts and bridges) for the 100-year flood event. Stream crossings with ESA-listed fish must meet ARBO II (NMFS 2013 and USFWS 2013) fish passage design criteria (See Roads and Landings section for stream crossing BMPs). | USDI BLM 2008, Appendix I – Water, REC 10, p. 302 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Toxic Substances OAR 340-041-0033 |
| REC 16 | In OHV bridge structures, avoid chemically treated materials at water level contact points where leachate or solids may enter waterbodies. | USDI BLM 2008, Appendix I – Water, REC 15, p. 302 | ODEQ–Water Pollution:<br>Toxic Substances OAR 340-041-0033<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (10)<br>Toxic Substances OAR 340-041-0033 |
| REC 17 | Use a temporary flow diversion bypass to minimize downstream turbidity, when constructing in perennial stream crossings (See Roads and Landings section for Stream Crossing BMPs). | USDI BLM 2008, Appendix I – Water, REC 16, p. 302 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| REC 18 | When constructing or maintaining trails within Riparian Reserve, do not cut the portion of logs or down woody material that extend into the active stream channel. Provide for adequate stabilization of the logs if not doing so would create a safety hazard. | USDI BLM 2008, Appendix I – Water, REC 8, p. 302 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| REC 19 | Harden trail approaches to stream crossings using materials such as geotextile fabric and rock aggregate. | USDI BLM 2008, Appendix I – Water, REC 13, p. 302 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| REC 20 | Hydrologically disconnect trails from waterbodies to the extent practicable. Install drainage features (e.g., drain dips and leadoff ditches), on approaches to stream crossings as needed to divert runoff and reinforce with rock for longevity. | USDI BLM 2008, Appendix I – Water, REC 14, p. 302.<br><br>USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 21 | Where trails intersect road ditches, provide erosion resistant crossings. Divert water from the trail to keep from reaching wetlands, floodplains, and waterbodies. | USDI BLM 2008, Appendix I – Water, REC 18, p. 303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 22 | If trail width is too wide for the designated use (such as old roads converted to trails), consider tilling one side of the trail, covering with brush, and seeding or planting. | USDI BLM 2008, Appendix I – Water, REC 19, p. 303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 23 | Repair rills and gullies to keep sediment from reaching wetlands, floodplains, and waterbodies. | USDI BLM 2008, Appendix I – Water, REC 20, p. 303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 24 | Construct and repair water bars, drain dips, and leadoff ditches as needed. These features may need rock reinforcement to promote longevity. Self-maintaining drain dips or leadoff features are the preferred design. | USDI BLM 2008, Appendix I – Water, REC 21, p. 303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 25 | Monitor trail condition to identify surface maintenance and drainage needs to prevent or minimize sediment delivery to waterbodies. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 26 | Close and rehabilitate unauthorized trails, where needed, to protect sensitive areas and water quality. | USDA FS 2012, pp. 91–92 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Toxic Substances OAR 340-041-0033 |
| **Trails (Hiking)** | | | |
| REC 27 | When constructing or maintaining trails within Riparian Reserve, do not cut any portion of logs or coarse woody debris that extend into the active stream channel. Use alternative passage options, such as earthen ramps, small notch steps, or slight trail realignments, to facilitate maintenance of intact logs. Cut and stabilize if necessary for safe passage and safety. | USDI BLM 2008, Appendix I – Water, REC 23, p. 303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-004(1)<br>Biocriteria OAR 340-041-0011<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| **Trail Closure** | | | |
| REC 28 | Remove existing stream crossings or bridges (See Road Decommissioning BMPs). | USDI BLM 2008, Appendix I – Water, REC 24, p. 303 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (8)<br>Turbidity OAR 340-041-0036 |
| REC 29 | Position fill or waste material in a location that would avoid direct or indirect sediment discharge to streams or wetlands. | USDI BLM 2008, Appendix I – Water, REC 25, p. 304 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| REC 30 | Plant restored stream banks with native vegetation, mulch, and then plant with water-tolerant species where appropriate. | USDI BLM 2008, Appendix I – Water, REC 26, p. 304 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| REC 31 | Barricade and allow nearby vegetation to grow into closed trails. | USDI BLM 2008, Appendix I – Water, REC 27, p. 304 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| **Dispersed Recreation** | | | |
| REC 32 | Site camps for permitted group overnight camping greater than 150 feet from surface water. | USDI BLM 2008, Appendix I – Water, REC 28, p. 304 | ODEQ–Water Pollution:<br>Bacteria OAR 340-041-0009<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (13) |

## Range Management

**Table J-9.** Best management practices for livestock grazing

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| G 01 | Fence water developments, including springs and seeps, unless other methods are available. Pipe overflow away from the developed source area. | USDI BLM 2008, Appendix I – Water, G 1, p. 305 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009<br>Biocriteria OAR 340-041-0011<br>Dissolved Oxygen OAR 340-041-0016<br>Temperature OAR 340-041-0028<br>Turbidity OAR 340-041-0036 |
| G 02 | Do not locate salting areas within 0.25 mile of permanent water sources or Riparian Reserve. | USDI BLM 2008, Appendix I – Water, G 2, p. 305 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009<br>Biocriteria OAR 340-041-0011<br>Dissolved Oxygen OAR 340-041-0016<br>Temperature OAR 340-041-0028<br>Turbidity OAR 340-041-0036 |
| G 03 | Locate new permanent livestock handling or management facilities (corrals, pens, or holding pastures) outside Riparian Reserve or 200 feet from waterbodies and on level ground where drainage would not enter surface waters.<br><br>Make changes as necessary to existing facilities within Riparian Reserve to meet water quality standards and regulations. | USDI BLM 2008, Appendix I – Water, G 3, p. 305 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009<br>Biocriteria OAR 340-041-0011<br>Dissolved Oxygen OAR 340-041-0016<br>Temperature OAR 340-041-0028<br>Turbidity OAR 340-041-0036 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| G 04 | Apply specific livestock grazing strategies for riparian wetland areas, including timing, intensity, or exclusion for maintenance of proper functioning condition.<br><br>Use one or more of the following features:<br>– Include the waterbodies, floodplains, and wetlands within a separate pasture.<br>– Fence or herd livestock out of waterbodies, floodplains, and wetlands for as long as necessary to allow vegetation to recover.<br>– Control the timing and intensity of grazing to keep livestock off stream banks when they are most vulnerable to damage and to coincide with the physiological needs of target plant species.<br>– Add more rest to the grazing cycle to increase plant vigor, allow stream banks to re-vegetate, or encourage more desirable plant species composition.<br>– Limit grazing intensity to a level that will maintain desired species composition and vigor.<br>– Permanently exclude livestock from those waterbodies, floodplains, and wetlands areas that are at high risk and have poor recovery potential, and when there is no practical way to protect them while grazing adjacent uplands. | USDI BLM 2008, Appendix I – Water, G 4, p. 306 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009<br>Biocriteria OAR 340-041-0011<br>Dissolved Oxygen OAR 340-041-0016<br>Temperature OAR 340-041-0028<br>Turbidity OAR 340-041-0036 |
| G 05 | Recover degraded waterbodies through adjustments to forage utilization levels, improved livestock distribution, and management through fencing, vegetation treatments, water source developments, or changes in season of use or livestock numbers. | USDI BLM 2008, Appendix I – Water, G 5, p. 306 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004<br>Statewide Narrative OAR 340-041-0007(1)<br>Bacteria OAR 340-041-0009<br>Biocriteria OAR 340-041-0011<br>Dissolved Oxygen OAR 340-041-0016<br>Temperature OAR 340-041-0028<br>Turbidity OAR 340-041-0036 |

## Minerals (Salable) Development

**Table J-10.** Best management practices for minerals (salable)

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Salable Minerals** | | | |
| M 01 | Locate stockpile sites on stable ground where the material would not move into waterbodies, floodplains, and wetlands. | USDI BLM 2008, Appendix I – Water, M 18, p. 309 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| M 02 | Locate, design, and construct salable mineral sites to control runoff and prevent or minimize sediment delivery to streams.<br><br>Prevent overburden, solid wastes, drainage water, or petroleum products from entering wetlands, Riparian Reserve, flood plains, and waters of the State. | USDI BLM 2008, Appendix I – Water, M 18, p. 309<br><br>OAR 629-625-0500 1-5 | OAR 629-625-0500-ODF, Rock Pits and Quarries<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| M 03 | Locate, design, and maintain settling ponds to contain sediment discharges. | USDI BLM 2008, Appendix I – Water, M 1, p. 309 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| M 04 | When a quarry or rock pit is depleted or vacated, stabilize cutbanks, headwalls, and other surfaces to prevent surface erosion and landslides. Close roads, excavations, and crusher pads in accordance with Roads and Landings section. Remove all potential pollutants to prevent their entry into wetlands, Riparian Reserve, floodplains, and waters of the State. | OAR 629-625-0500<br><br>ODEQ 2005 NS - 6 | OAR 629-625-0500-ODF, Rock Pits and Quarries<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |
| M 05 | Use erosion-reduction practices, such as seeding, mulching, silt fences, and woody debris placement, to limit erosion and transport of sediment to streams from quarries. Provide drainage from stockpiles and mineral sites, dispersed over stable vegetated areas rather than directly into stream channels. Grade all material sites, where practicable to conform with the surrounding topography prior to closure. Utilized topsoil as a medium to for successful revegetation. Reseed and plant trees, where needed. | USDI BLM 2008, Appendix I – Water, M 22, p. 309 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Turbidity OAR 340-041-0036 |

## Spill Prevention and Abatement

**Table J-11.** Best management practices for spill prevention and abatement

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
| --- | --- | --- | --- |
| **Operations Near Waterbodies** | | | |
| SP 01 | Take precautions to prevent leaks or spills of petroleum products (e.g., fuel, motor oil, and hydraulic fluid) from entering the waters of the State. | [40 CFR 112]<br>OAR 629-620-0100(2) | [40 CFR 112] – Oil Pollution Prevention Reportable quantity is a visible sheen where waterways are involved.<br><br>OAR 629-620-0100-ODF, Chemical and Other Petroleum Product Rules<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12) and (13)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| SP 02 | Take immediate action to stop and contain leaks or spills of chemicals and other petroleum products. Notify the Oregon Emergency Response System, through the District Hazard Materials specialist, of any spill that enters the waters of the State. | [40 CFR 112]<br>OAR 629-620-0100(3), (4) | [40 CFR 112] – Oil Pollution Prevention Reportable quantity is a visible sheen where waterways are involved.<br><br>OAR 629-620-0100-ODF, Chemical and Other Petroleum Product Rules<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12) and (13)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| SP 03 | Inspect and clean heavy equipment as necessary prior to moving on to the project site, in order to remove oil and grease, noxious weeds, and excessive soil.<br><br>Inspect hydraulic fluid and fuel lines on heavy-mechanized equipment for proper working condition.<br><br>Where possible, maintain and refuel heavy equipment a minimum of 150 feet away from streams and other waterbodies.<br><br>Refuel small equipment (e.g. chainsaws and water pumps) at least 100 feet from waterbodies (or as far as possible from the waterbody where local site conditions do not allow a 100-foot setback) to prevent direct delivery of contaminants into a waterbody. Refuel small equipment from no more than 5-gallon containers. Use absorbent material or a containment system to prevent spills when re-fueling small equipment within the stream margins or near the edge of waterbodies.<br><br>In the event of a spill or release, take all reasonable and safe actions to contain the material. Specific actions are dependent on the nature of the material spilled.<br><br>Use spill containment booms or as required by ODEQ. Have access to booms and other absorbent containment materials.<br><br>Immediately remove waste or spilled hazardous materials (including but not limited to diesel, oil, hydraulic fluid) and contaminated soils near any stream or other waterbody, and dispose of it/them in accordance with the applicable regulatory standard. Notify Oregon Emergency Response System of any spill over the material reportable quantities, and any spill not totally cleaned up after 24 hours.<br><br>Store equipment containing reportable quantities of toxic fluids outside of Riparian Reserve | USDI BLM 2008, Appendix I – Water, SP 1, p. 311 | [40 CFR 112] – Oil Pollution Prevention Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved.<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12) and (13)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| SP 04 | If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances would be transported to a project site as project materials, implement the following precautions:<br>1. Plan a safe route and material transfer sites so that all spilled material will be contained easily at that designated location.<br>2. Plan an active dispatch system that can relay the information to appropriate resources.<br>3. Ensure a spill containment kit that can absorb and contain 55 gallons of petroleum product and chemical substances is readily available.<br>4. Provide for immediate notification to OERS in the event of a spill. Have a radio-equipped vehicle lead the chemical or fuel truck to the project site.<br>5. Assemble a spill notification list that includes the district hazardous materials coordinator, ODEQ, and spill clean-up contractors.<br>6. Construct a downstream water user contact list with addresses and phone numbers.<br>7. When operating within source water watersheds, pre-estimate water flow travel times through the watershed to predict downstream arrival times.<br>8. Be prepared to sample water and carry sample containers.<br>9. Be prepared to assist OSP and ODFW to assess wildlife impacts of any material spilled. | USDI BLM 2008, Appendix I – Water, SP 2, p. 312 | [40 CFR 112] – Oil Pollution Prevention Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved.<br><br>ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12) and (13)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| **Spill Abatement** | | | |
| SP 05 | Spill Prevention, Control, and Countermeasure Plan (SPCC): All operators shall develop a modified SPCC plan prior to initiating project work if there is a potential risk of chemical or petroleum spills near waterbodies. The SPCC plan will include the appropriate containers and design of the material transfer locations. No interim fuel depot or storage location other than a manned transport vehicle would be used. | USDI BLM 2008, Appendix I – Water, SP 3, p. 312 | [40 CFR 112] – Oil Pollution Prevention Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved.<br><br>OAR-340-142-0030-DEQ, Oil and Hazardous Materials Emergency Response Requirements |
| SP 06 | Spill Containment Kit (SCK): All operators shall have a SCK as described in the SPCC plan on-site during any operation with potential for run-off to adjacent waterbodies. The SCK will be appropriate in size and type for the oil or hazardous material carried by the operator. | USDI BLM 2008, Appendix I – Water, SP 4, p. 313 | OAR-340-142-0030-DEQ, Oil and Hazardous Materials Emergency Response Requirements |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| SP 07 | Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site. | USDI BLM 2008, Appendix I – Water, SP 5, p. 313 | OAR-340-102-DEQ, Standards Applicable to Generators of Hazardous Waste<br><br>OAR-340-122-DEQ, Hazardous Substance Remedial Action Rules |

## Restoration Activities

**Table J-12.** Best management practices for restoration activities

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| RST 01 | Confine work in the stream channels to the ODFW in-water work period unless a waiver is obtained from permitting agencies. | USDI BLM 2008, Appendix I – Water, RST 1, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| RST 02 | In stream channels that are sensitive to disturbance (e.g., meadow streams), do not drive heavy equipment in flowing channels and floodplains. | USDI BLM 2008, Appendix I – Water, RST 2, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| RST 03 | In well-armored channels that are resistant to damage (e.g., bedrock, small boulder, and cobble-dominated), consider conducting the majority of heavy-equipment work from within the channel, during low streamflow, to minimize damage to sensitive riparian areas. | USDI BLM 2008, Appendix I – Water, RST 3, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| RST 04 | Design access routes for individual work sites to reduce exposure of bare soil and extensive stream bank shaping. | USDI BLM 2008, Appendix I – Water, RST 4, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| RST 05 | Limit the number and length of equipment access points through Riparian Reserve. | USDI BLM 2008, Appendix I – Water, RST 5, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| RST 06 | Limit the amount of stream bank excavation to the minimum necessary to ensure stability of enhancement structures. Provide isolation from flowing water during excavation. Place excavated material above the flood-prone area and cover or place a berm to avoid its reentry into the stream during high-flow events. | USDI BLM 2008, Appendix I – Water, RST 6, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036<br>Temperature OAR 340-041-0028 |
| RST 07 | Inspect all mechanized equipment daily for leaks and clean as necessary to ensure that toxic materials, such as fuel and hydraulic fluid, do not enter the stream. | USDI BLM 2008, Appendix I – Water, RST 7, p. 314 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| RST 08 | Locate equipment storage areas at least 100 feet from any water feature, including machinery used in stream channels for more than one day. | USDI BLM 2008, Appendix I – Water, RST 8, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| RST 09 | When using heavy equipment in or adjacent to stream channels during restoration activities, develop and implement an approved spill containment plan that includes having a spill containment kit on-site and at previously identified containment locations. | USDI BLM 2008, Appendix I – Water, RST 9, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| RST 10 | Refuel equipment, including chainsaws and other hand power tools, at least 100 feet from waterbodies (or as far as possible from the waterbody where local site conditions do not allow a 100-foot setback) to prevent direct delivery of contaminants into a waterbody. | USDI BLM 2008, Appendix I – Water, RST 10, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (12)<br>Biocriteria OAR 340-041-0011<br>Toxic Substances OAR 340-041-0033 |
| RST 11 | Use waterbars, barricades, seeding, and mulching to stabilize bare soil areas along project access routes prior to the wet season. | USDI BLM 2008, Appendix I – Water, RST 11, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| RST 12 | Prior to the wet season, stabilize disturbed areas where soil will support seed growth, with the potential for sediment delivery to wetlands, and waters of the State. Apply native seed and certified weed-free mulch or erosion control matting in steep or highly erosive areas. If needed to promote a rapid ground cover and prevent aggressive invasive plants, use interim erosion control non-native sterile annuals before attempting to restore native seed or plants. | USDI BLM 2008, Appendix I – Water, RST 12, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| RST 13 | When replacing culverts design placement location, crossing type, and installation depth to avoid excessive scour through the site, consider using larger culverts and embedding the culvert to 30 percent bedload. Use bridges on high-gradient stream channels. | USDI BLM 2008, Appendix I – Water, RST 13, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |
| RST 14 | Rehabilitate headcuts and gullies. Use large wood in preference to rock weirs. | USDI BLM 2008, Appendix I – Water, RST 14, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| RST 15 | Implement measures to control turbidity. Measures may include installation of turbidity control structures (e.g., isolation, diversion, and silt curtains) immediately downstream of in-stream restoration work areas. Remove these structures following completion of turbidity-generating activities. | USDI BLM 2008, Appendix I – Water, RST 15, p. 315 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1)<br>Biocriteria OAR 340-041-0011<br>Turbidity OAR 340-041-0036 |

## Dry Forest-specific BMPs

Soils of concern in the dry forest area include those with a high potential for severe surface erosion, soil creep, periodic slumping (even when not overly saturated), and low nutrient potential. These soils weathered from granite, schist, and pyroclastic materials. The Timber Production Capability Classification (TPCC) and Handbook (5251-1, USDI BLM 1986) involves mapping, with discrete mapping units and interpretations of timbered lands. The classification uses geology, landform, topographic position, climate (especially precipitation), soil properties, and vegetation. Lands with the capacity to erode excessively or prone to movement are denoted with either a fragile code of FM (surface erosion potential) or FP (mass movement potential) (**Table J-13**).

**Table J-13.** Timber Production Capability Classification soil categories of concern

| Category | Description of Soil Categories |
|---|---|
| Surface Erosion FM | These sites have soil surface horizons that are highly erodible, easily detached and subject to bouncing or sliding downhill (dry ravel), even if partially vegetated. The soils overlay intrusive volcanic bedrock (e.g., granite, diorite, and schist). The Natural Resources Conservation Service (NRCS) provides a Revised Universal Soil Loss Equation soil loss tolerance factor, known as T factor, which ranges from a low of 1 (on shallow soils, 1–10" depth), to 5 (on soils deeper than 60"). This factor describes the maximum rate of annual soil loss in tons/acre that can be lost and still permit crop productivity to sustain economically and indefinitely. Disturbances from harvesting or burning create increased dry raveling of soil, losses of soil nutrients, and burying of newly planted seedlings. Classification coding may be FMR for suitable lands or FMNW for non-suitable lands. |
| Mass Movement FP | These sites range from gentle to moderately steep slopes, 10–60 percent, where the rate of sliding is slow enough to permit forest management, but with some loss in wood quality in certain areas. Sites may have an impervious clay pan overlaying pyroclastic bedrock (e.g., volcanic tuffs, breccia, and are subject to movement). Tree roots providing strength and certain landforms act as resisting forces, while gravity and soil moisture may initiate non-uniform spatial and temporal rates of movement. Slow deep seated, slump or earth flow types of mass movements may occur, forming an undulating topography. Classification coding may be FPR for suitable lands or FPNW for non-suitable lands. |

**Table J-14.** Best management practices specific to the dry forest (refer to **Table J-13** for category type)

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Roads and Landings: General Construction, Maintenance<br>Timber Harvest: Cable Yarding** | | | |
| DF 01 | Use full log suspension whenever possible on TPCC soils identified as prone to surface erosion, category FM in **Table J-13**. Use one-end suspension on these soils if full suspension is not practicable. Restrict yarding to the dry season, generally from June to end of September.<br><br>Suspend the leading end over TPCC soils identified as prone to mass movement, category FP in **Table J-13**. Restrict yarding to the dry season. | USDI BLM 2008, Appendix I – Water, MFO 1, p. 317 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Timber Harvest: Ground-based** | | | |
| DF 02 | Limit non-specialized ground-based yarding equipment to slopes less than 20 percent on TPCC soils identified as category FM or FP in **Table J-13**, where soils average less than or equal to 20 percent clay in the top 6" of soil as determined by NRCS soil survey data.<br><br>Otherwise, limit non-specialized ground-based yarding equipment to slopes less than 35 percent, on TPCC soils identified as category FM or FP in **Table J-13**, where soils average greater than 20 percent clay in the top 6".<br><br>Avoid tilling on TPCC soils identified as category FM (when moisture is excessive) or FP in **Table J-13**, unless adequate ground cover is present to arrest potential erosion. | USDI BLM 2008, Appendix I – Water, MFO 2, p. 317 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Fire and Fuels Management** | | | |
| DF 03 | Avoid mechanical piling to limit severe surface disturbance and displacement on TPCC soils identified as category FM or FP in **Table J-13** | USDI BLM 2008, Appendix I – Water, MFO 3, p. 318 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| DF 04 | Implement prescribed burning on FG and FM soils when fuel moisture contents result in 'cool burns.' Post-burn surface soil characteristics may include litter that is consumed and duff that is deeply charred or consumed or organic matter that is partially charred to a depth >1.0 cm, but mineral soil is not visibly altered. | USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 4 2005 Table 1.4 Part B | None |

| BMP Number | Best Management Practices | Source | Water Quality Standards and Regulations |
|---|---|---|---|
| **Wildfire: Suppression** | | | |
| DF 05 | Limit the use of non-specialized ground-based fire line construction equipment and other major surface-disturbing activities (for example, safety zones or helispots) to slopes equal to 20 percent or less on TPCC soils identified as category FM or FP in **Table J-13**. | USDI BLM 2008, Appendix I – Water, MFO 5, p. 318 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |
| **Rights-of-Way** | | | |
| DF 06 | Avoid facility construction on soils identified on TPCC soils identified as the FM category in **Table J-13**, unless water quality would be maintained.<br><br>Locate rights-of-ways to minimize surface disturbance on TPCC soils identified as category FM or FP in **Table J-13.** | USDI BLM 2008, Appendix I – Water, MFO 6, p. 318 | ODEQ–Water Pollution:<br>Antidegradation OAR 340-041-0004(1)<br>Statewide Narrative OAR 340-041-0007(1), (7)<br>Turbidity OAR 340-041-0036 |

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# Appendix K – Lands and Realty

This appendix provides detailed data about lands and realty, found in **Chapters 2** and **3** of the Proposed RMP/Final EIS and includes the following:

- Land Tenure Adjustment Criteria
- Land Withdrawals
- Land Tenure Zone 3 Lands
- Inventory of Communication Sites

## Land Tenure Adjustment Criteria

In accordance with the Federal Land Policy and Management Act of 1976 (FLPMA) and other laws, Executive Orders, and Departmental and BLM policy, the BLM will consider the following factors in evaluating opportunities for disposal or acquisition of lands or interests in lands. The lists are not all-inclusive, but represent the major factors that the BLM will consider.

### General Land Tenure Adjustment Evaluation Factors

The BLM will use the following criteria to evaluate all land tenure adjustments:

- Improves manageability of specific areas
- Maintains or enhances important public resource values and uses
- Consolidates Federal mineral estate or reuniting split surface and mineral estates
- Facilitates development of energy and mineral potential
- Reduces difficulty or cost of public land administration
- Provides accessibility to Federal land for public recreation and other uses
- Amount of public investments in facilities or improvements and the potential for recovering those investments
- Suitability of land for management by another Federal agency
- Significance of decision in stabilizing or enhancing business, social, and economic conditions, or lifestyles
- Meets long-term public management goals as opposed to short term
- Facilitates National, State, and local BLM priorities
- Consistency with cooperative agreements and plans or policies of other agencies
- Facilitates implementation of other aspects of the approved resource management plans

### Acquisition Criteria

The BLM will use the following criteria to identify parcels for acquisition:

- Facilitates access to public land and resources retained for long-term public use
- Secures Threatened or Endangered or Bureau Sensitive plant and animal species habitat
- Protects riparian areas and wetlands
- Contributes to biodiversity
- Protects high-quality scenery
- Enhances the opportunity for new or emerging public land uses or public resource values
- Facilitates management practices, uses, scales of operation, or degrees of management intensity that are viable under economic program efficiency standards

- Protects significant cultural resources and sites eligible for inclusion on the National Register of Historic Places where non-Federal sites exist for the proposed use

### Disposal Criteria

The BLM will use the following criteria to identify the disposal of parcels in Land Tenure Zone 2 as part of an exchange, or the disposal of parcels in Land Tenure Zone 3:

- Suitability for purposes including but not limited to community expansion or economic development, such as industrial, residential, or agricultural development
- Lands of limited public resource value
- Lands that are difficult for the BLM to manage and unsuitable for transfer to other Federal agencies or State and local governments
- Lands that would aid in aggregating or repositioning other public lands or public land resource values where the public values to be acquired outweigh the values to be exchanged

### O&C Land Exchange Criteria

An O&C land exchange is an exchange within the O&C area as delineated in Public Law 105-321. The BLM will consider the following forest management and related factors when evaluating the feasibility of an O&C land exchange:

- Land exchanges that maintain the existing balance between the various land use allocations will be considered favorably
- Land exchanges that enhance public resource values or improve land patterns and management capabilities of both non-Federal and BLM-administered lands within the planning area by consolidating ownership and reducing the potential for land use conflict
- Offered lands that are primarily suitable for agriculture, business, and home sites, or lands that would require extensive post-acquisition management will not be favorably considered. The O&C lands designated for timber production will generally not be exchanged for lands, which will be managed solely for a single use, such as species protection.
- Generally, where cutting rights are reserved on existing and future timber stands by the proponent, the proposed exchange will not be considered favorably.

The exchange of O&C and CBWR lands specifically for lands located outside of the 18 O&C counties is prohibited by regulations in 43 CFR 2200. This restriction applies to timber and other interests in lands as well.

## Land Withdrawals

**Table K-1** through **Table K-7** contains detailed information about existing and proposed land withdrawals.

**Table K-1.** Withdrawal tables legend

| **Authority/Order Type:** | | **Segregation Effect:** | |
|---|---|---|---|
| DO | Director Order | A | Withdrawn from operation of the general land laws, the mining laws, and the Mineral Leasing Act |
| EO | Executive Order | B | Withdrawn from operation of the general land and mining laws |
| SO | Secretarial Order | C | Withdrawn from operation of the general land laws |
| BO | Bureau Order | D | Withdrawn from operation of the general land laws; Open to mining subject to Public Law 359 |
| PL | Public Law | E | Withdrawn from operation of the general land laws; Withdrawn from mining except metalliferous |
| PLO | Public Land Order | F | Withdrawn from operation of the general agricultural and mining laws |
| PSR | Power Site Reserve | | |
| PSC | Power Site Classification | **Recommendation:** | |
| R&PP | Recreation and Public Purpose | C | Continue |
| WPD | Water Power Designation | R | Revoke |
| FPC | Federal Power Commission | E | Expire |
| FO | Federal Energy Regulatory Commission Order | | |

**Notes:**

Location description indicates sections within which withdrawn lands are located. Information on which portions of the cited sections are withdrawn is available within the District Office.

Table does not include lands that have been completely transferred out of Federal ownership subsequent to withdrawal or lands within U.S. Forest Service National Forest boundaries.

***Note: Acres are based on the most available information, but may have discrepancies because of the general nature of some of the information.***

**Table K-2.** Withdrawals in the Coos Bay District

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 50856 | PLO 7215 | T. 19 S., R. 12 W., Sec. 1 | 40.43 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 26 S., R. 14 W., Sec. 28 | 40 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 27 S., R. 14 W., Sec. 29 | 2.26 | Pacific Coastline, Highway 101 | BLM | F | Revoke patented parcel |
| | | T. 30 S., R. 15 W., Sec. 12 | 40 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 32 S., R. 15 W., Sec. 4 | 71.75 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 33 S., R. 14 W., Sec. 31 | 155.16 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 34 S., R. 14 W., Sec. 6 | 40.7 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 34 S., R. 14 W., Sec.33 | 162.05 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 34 S., R. 14 W., Sec. 34 | 40 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 34 S., R. 15 W., Sec. 1 | 7.92 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 38 S., R. 14 W., Sec. 4 | 40 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 38 S., R. 14 W., Sec. 5 | 40 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 38 S., R. 14 W., Sec. 34 | 34 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 39 S., R. 14 W., Sec. 23 | 40 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 41 S., R. 13 W., Sec. 6 | 2.56 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | T. 41 S., R. 13 W., Sec. 7 | 0.32 | Pacific Coastline, Highway 101 | BLM | F | C |
| | | **Total Acres for OR 50856:** | **757.15** | | | | |
| ORE 016183C | PLO 3869 | T. 20 S., R. 9 W., Sec. 31 | 81.29 | Smith River Falls Recreation Site | BLM | B | C - Developed Sites |
| | | T. 20 S., R. 9 W., Sec. 33 | 3.5 | Vincent Creek Recreation Site | BLM | B | C |
| | | T. 23 S., R. 10 W., Sec. 2 | 78.86 | Loon Lake Recreation Site | BLM | B | C |
| | | T. 27 S., R. 10 W., Sec. 4 | 60 | Park Creek Recreation Site | BLM | B | C |
| | | T. 27 S., R. 10 W., Sec. 18 | 20 | Big Tree Recreation Site | BLM | B | R |
| | | T. 30 S., R. 9 W., Sec. 9 | 80 | Bear Creek Recreation Site | BLM | B | R |
| | | T. 32 S., R. 14 W., Sec. 12 | 120 | Sixes River Recreation Site | BLM | B | C |
| | | **Total Acres for ORE 016183C:** | **443.65** | | | | |
| OR 23558 | SO 12/31/1930 | T. 23 S., R. 10 W., Sec. 1 | 51.51 | Rec Wdl. No. 43 East Shore Recreation Site | BLM | B | C - Developed Site |
| OR 19291A | PLO 3530 | T. 27 S., R. 10 W., Secs. 17–20 | 590 | Cherry Creek Natural Area | BLM | B | C - Protecting site, for research opportunities |
| OR 6398 | PL 181 | T. 27 S., R. 11 W., Sec. 35 | 120 | LaVerne County Park | BLM/Coos Co. | B | C - Developed County Park |
| | | T. 27 S., R. 12 W., Sec. 35 | 160 | Rock Prairie County Park | BLM/Coos Co. | B | C - Potential for County Park Development |
| | | T. 28 S., R. 9 W., Sec. 7 | 87.72 | Judge Hamilton County Park | BLM/Coos Co. | B | C - Potential for County Park Development |
| | | T. 28 S., R. 11 W., Sec. 5 | 80 | Middle Creek County Park | BLM/Coos Co. | B | C - Potential for County Park Development |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 28 S., R. 11 W., Sec. 11 | 80 | Frona County Park | BLM/Coos Co. | B | C - Developed County Park |
| | | **Total Acres for OR 6398:** | **527.72** | | | | |
| OR 21318 | SO 6/12/1907 | T. 40 S., R. 13 W., Secs. 11, 14 | 320.75 | Potential National Park | BLM | B | R - Not developed; No planned development; No public support for establishment of park or monument. |
| OR 19231 | EO 11/24/1903 | T. 22 S., R. 13 W., Sec. 14 | 71.1 | Umpqua Jetty Maintenance | COE | B | R - COE indicated a desire to relinquish |
| OR 21901 | EO 8/23/1895 | T. 22 S., R. 13 W., Sec. 13 | 130 | Umpqua River Light Station | USCG | B | R - USCG indicated a desire to relinquish |
| OR 4011 | EO 7/14/1884 | T. 26 S., R. 14 W., Secs. 2, 3 | 5.1 | Bar Watch Administrative Site | USCG | B | C |
| OR 19227 | EO 7/14/1884 | T. 26 S., R. 14 W., Sec. 2 | 2.43 | Military Facility | US Navy | B | C |
| OR 22094 | EO 6/14/1876 | T. 26 S., R. 14 W., Sec. 4 | 21.58 | Sub surface only/Cape Arago Lighthouse | USCG | | R |
| ORE 012693 | PLO 5490 | All Public Domain lands | 50,329 | Multiple Use Management | BLM | Surface closed to Ag laws | C |
| OR 54142 | PLO 7436 | T. 25 S., R. 13 W., Secs. 4–8, 18, 19 | See total acres below | North Spit Rec Area and ACEC | BLM | Closed to the mining laws | C |
| | | T. 25 S., R. 14 W., Secs. 12, 13, 23–26 | | North Spit Rec Area and ACEC | BLM | Closed to the mining laws | C |
| | | **Total Acres for OR 54142:** | **1,779.27** | | | | |
| OR 24294 | PL 95-450 | T. 26 S., R. 14 W., Secs. 5, 8, 17–19 | 15 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 27 S., R. 14 W., Sec. 19 | 8 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 28 S., R. 15 W., Secs. 25, 26, 35 | 3.56 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 29 S., R. 15 W., Sec. 2 | 4 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 31 S., R. 16 W., Secs. 24, 25, 34, 35 | 30 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 32 S., R. 16 W., Secs. 2, 3, 10, 17, 21, 28-31 | 54 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 33 S., R. 15 W., Secs. 6, 8, 21, 22, 33 | 38 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 34 S., R. 14 W., Sec. 30 | | Oregon Islands National Wildlife Refuge | USFWS | A | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 34 S., R. 15 W., Sec. 31 | 31.83 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 36 S., R. 15 W., Secs. 2, 11, 15-17 | 32 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 38 S., R. 14 W., Secs. 30, 31 | 12 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 38 S., R. 15 W., Sec. 1 | 16 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 39 S., R. 14 W., Secs. 6, 8, 16, 17 | 30 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | T. 40 S., R. 14 W., Secs. 4, 16, 22, 26 | 38 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| | | **Total Acres for OR 24294:** | **Not available** | | | | |
| OR 711 | PLO 4395 | T. 28 S., R. 15 W., Sec. 25 | See total acres below | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 31 S., R. 16 W., Secs. 24, 25, 34 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 31 S., R. 15 W., Sec. 35 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 32 S., R. 16 W., Secs. 17, 21, 28–31 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 33 S., R. 15 W., Secs. 21, 22, 33 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 34 S., R. 15 W., Sec. 4 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 36 S., R. 15 W., Secs. 2, 11 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 38 S., R. 15 W., Sec. 1 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 38 S., R. 14 W., Secs. 30, 31 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 39 S., R. 14 W., Secs. 6, 8, 16, 17 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | T. 40 S., R. 14 W., Secs. 4, 22 | | Oregon National Wildlife Refuge | USFWS | B | C |
| | | **Total Acres for OR 711:** | **222.56** | | | | |
| OR 50874 | PLO 7170 | T. 29 S., R. 15 W., Secs. 35, 36 | 70.9 | Lost Lake | BLM | B | C |
| OR 45401 | PLO 6967 | T. 30 S., R. 15 W., Secs. 2, 3, 10, 11, 15, 21, 28, 32, 33 | 963.38 | New River ACEC | BLM | B | C |
| OR 51194 | PLO 7170 | T. 31 S., R. 15 W., Secs. 7, 8 | 111.48 | Floras Lake | BLM | B | C |
| OR 51891 | PLO 7246 | T. 32 S., R. 14 W., Sec. 6 | 44.48 | Edson Creek Recreation Site | BLM | B | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 24293 | PL 91-504 | T. 40 S., R. 14 W., Sec. 22 | 21 | Oregon Islands National Wildlife Refuge | USFWS | A | C |
| OR 22376 | EO 7035 | T. 40 S., R. 14 W., Sec. 35 | 21 | Oregon Islands National Wildlife Refuge | USFWS | B | C |
| OR 25306 | PLO 6287 | Unsurveyed islands rocks reefs | | Oregon National Wildlife Refuge | USFWS | B | C |
| OR 11517 | EO 5/6/1935 | Unsurveyed islands rocks reefs | 100 | Oregon Islands National Wildlife Refuge Addition | USFWS | B | C |
| OR 19130 | SO of 4/30/1921 | T. 27 S., R. 11 W., Sec. 35 | 40 | Water Power Potential/PSC 1 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 10 W., Secs. 6, 8, 12, 14 | 165.26 | Water Power Potential/PSC 1 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19130:** | **Not available** | | | | |
| OR 19140 | SO of 6/1/1926 | T. 27 S., R. 10 W., Sec. 31 | 115.35 | Water Power Potential/PSC 147 | BLM | D | R - unless viable for hydropower |
| | | T. 27 S., R. 11 W., Sec. 35 | 236.72 | Water Power Potential/PSC 147 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 10 W., Secs. 5, 6 | 169.26 | Water Power Potential/PSC 147 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 11 W., Sec. 1 | 320 | Water Power Potential/PSC 147 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19140:** | **841.33** | | | | |
| OR 19144 | SO of 7/19/1926 | T. 22 S., R. 8 W., Secs. 4*, 7, 9, 17, 21 | 276.1 | Water Power Potential/PSC 162 | BLM | D | R - unless viable for hydropower |
| | | T. 22 S., R. 9 W., Secs. 7–9 | 109.44 | Water Power Potential/PSC 162 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 8 W., Sec. 13 | 80 | Water Power Potential/PSC 162 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19144:** | **465.54** | | | | |
| OR 19152 | SO of 2/15/1928 | T. 22 S., R. 9 W., Sec. 7 | 183.93 | Water Power Potential/PSC 198 | BLM | D | R - unless viable for hydropower |
| OR 20365 | EO of 5/28/1912 | T. 20 S., R. 9 W., Secs. 26, 28, 32, 34 | 245.22 | Water Power Potential/PSR 273 | BLM | D | R - unless viable for hydropower |
| OR 20365 | EO of 5/28/1912 | T. 21 S., R. 8 W., Secs. 2*, 4* | 320 | Water Power Potential/PSR 273 | BLM | D | R - unless viable for hydropower |
| OR 19101 | EO of 8/7/1917 | T. 20 S., R. 8 W., Secs. 17, 19, 21, 27, 33 | 186.57 | Water Power Potential/PSR 629, | BLM | D | R - unless viable for hydropower |
| | | T. 20 S., R. 9 W., Secs. 21, 25, 27, 31, 33, 35 | 1,508.32 | Water Power Potential/PSR 629 | BLM | D | R - unless viable for hydropower |
| | | T. 21 S., R. 8 W., Secs. 1, 9, 11 | 616.26 | Water Power Potential/PSR 629 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19101:** | **2,311.15** | | | | |
| OR 19011 | SO of 7/13/1917 | T. 20 S., R. 9 W., Secs. 21, 25, 27, 31, 33, 35 | 1,362.74 | Water Power Potential/WPD 11 | BLM | | R - unless viable for hydropower |
| | | T. 20 S., R. 8 W., Secs. 17, 19, 21, 27, 31, 33 | 1,586.55 | Water Power Potential/WPD 11 | BLM | | R - unless viable for hydropower |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 21 S., R. 8 W., Secs. 1, 9, 11 | 1,062.95 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | T. 22 S., R. 9 W., Secs.7, 13, 15*, 17 | 282.52 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | T. 22 S., R. 8 W., Secs. 5, 21 | 20.03 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | T. 22 S., R. 7 W., Sec.19 | 47.45 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 10 W., Secs.1, 11*, 13, 35 | 37.38 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 9 W., Secs. 7*, 17*, 19* | 200.21 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | T. 23S 7 W., Secs. 5, 7, 9, 15, 19*, 21, 23, 27, 31, 33 | 887.79 | Water Power Potential/WPD 11 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19011:** | **Not available** | | | | |
| OR 19102 | EO of 6/29/1917 | T. 22 S., R. 8 W., Sec. 24 | 3 | Protect water power and reservoir potential/PSR 630 | BLM | D | R - unless viable for hydropower. |
| OR 19105 | EO of 7/24/1917 | T. 22 S., R. 7 W., Sec. 19 | 29.93 | Water Power Potential/PSR 633 | BLM | D | R - unless viable for hydropower |
| | | T. 22 S., R. 8 W., Secs. 5, 21 | 20.03 | Water Power Potential/PSR 633 | BLM | D | R - unless viable for hydropower |
| | | T. 22 S., R. 9 W., Secs. 7, 13, 15*, 17 | 282.52 | Water Power Potential/PSR 633 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 7 W., Secs. 5, 7, 9, 15, 19*, 21, 23, 27, 31, 33 | 887.79 | Water Power Potential/PSR 633 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 8 W., Sec. 11 | 29.38 | Water Power Potential/PSR 633 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19105:** | **Not available** | | | | |
| OR 19106 | EO of 7/17/1917 | T. 22 S., R. 10 W., Sec. 35 | 239.95 | Water Power Potential/PSR 634 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 9 W., Secs. 7*, 17*, 19* | 200.21 | Water Power Potential/PSR 634 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 10 W., Secs. 1, 13 | 211.51 | Water Power Potential/PSR 634 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19106:** | **651.67** | | | | |
| OR 19109 | EO of 7/17/1917 | T. 23 S., R. 10 W., Sec. 35 | 40 | Water Power Potential/PSR 645, | BLM | D | R - unless viable for hydropower |
| OR 19012 | SO of 7/13/1917 | T. 23 S., R. 10 W., Sec. 35 | 40 | Water Power Potential/WPD 12 | BLM | D | R - unless viable for hydropower |
| OR 19113 | EO of 12/12/1917 | T. 26S., 9 W., Secs. 17*, 19*, 29*, 31* | | Water Power Potential/PSR 659 | BLM | D | R - unless viable for hydropower |
| | | T. 27 S., R. 11 W., Sec. 15 | 182.8 | Water Power Potential/PSR 659 | BLM | D | R - unless viable for hydropower |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 30 S., R. 9 W., Secs. 9, 17 | 120 | Water Power Potential/PSR 659 | BLM | D | R - unless viable for hydropower |
| | | T. 30 S., R. 10 W., Secs. 3, 13 | 280 | Water Power Potential/PSR 659 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19113:** | **Not available** | | | | |
| OR 19014 | SO of 12/12/1917 | T. 26 S., R. 9 W., Secs. 17*, 19*, 29*, 31* | | Water Power Potential/WPD 14 | BLM | D | R - unless viable for hydropower |
| | | T. 27 S., R. 11 W., Sec. 15 | 187 | Water Power Potential/WPD 14 | BLM | D | R - unless viable for hydropower |
| | | T. 30 S., R. 9 W., Secs. 9, 17 | 200 | Water Power Potential/WPD 14 | BLM | D | R - unless viable for hydropower |
| | | T. 30 S., R. 10 W., Sec. 3, 13 | 280 | Water Power Potential/WPD 14 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19014:** | **Not available** | | | | |
| OR 19017 | SO of 1/12/1921 | T. 27 S., R. 11 W., Secs. 5*, 7†, 17, 19, 21†, 29, 31, 33† | 2,418.76 | Water Power Potential/WPD 17 | BLM | D | R - unless viable for hydropower |
| | | T. 27 S., R. 12 W., Secs. 11*, 13*, 23*, 25*, 27*, 35* | 1,663.57 | Water Power Potential/WPD 17 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 9 W., Sec. 7 | 335.2 | Water Power Potential/WPD 17 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 10 W., Secs. 3, 5, 9, 11, 15* | 1,296.28 | Water Power Potential/WPD 17 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 11 W., Secs. 1, 3, 5*, 7 | 883.12 | Water Power Potential/WPD 17 | BLM | D | R - unless viable for hydropower |
| | | T. 28 S., R. 12 W., Secs. 1†, 3*, 11*, 13, 15*, 21* | 1,516 | Water Power Potential/WPD 17 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19017:** | **8,112.93** | | | | |
| OR 19142 | SO of 12/4/1926 | T. 22 S., R. 10 W., Secs. 15*, 21*, 22*, 26*, 27*, 34* | | Water Power Potential/PSC 157 | BLM | D | R - unless viable for hydropower |
| | | T. 23 S., R. 10 W., Sec. 2* | 76.86 | Water Power Potential/PSC 157 | BLM | D | R - unless viable for hydropower |
| | | T. 24 S., R. 8 W., Sec. 31* | | Water Power Potential/PSC 157 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19142:** | **Not available** | | | | |
| OR 19116 | EO of 12/12/1917 | T. 26 S., R. 9 W., Secs.10*, 14* | 640 | Water Power Potential/PSR 662 | BLM | D | R - unless viable for hydropower |
| | | T. 32 S., R. 13 W., Secs. 17, PB 37 | 387 | Water Power Potential/PSR 662 | BLM | D | R - unless viable for hydropower |
| | | T. 32 S., R. 14 W., Secs. 11, 12 | 160 | Water Power Potential/PSR 662 | BLM | D | R - unless viable for hydropower |
| | | **Total Acres for OR 19116:** | **Not available** | | | | |
| | EO of 12/12/1910 | T. 25 S., R. 12 W., Secs. 29-33 | 400 | Resource Protection/Coal Lands | BLM | | Removal/Revocation |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 19180 | USGS Order of 7/15/1947 | T. 26 S., R. 8 W., Sec. 8 | 80 | Water Power Potential/PSC 382 | BLM | D | R - unless viable for hydropower |
| ORE 013683 | PLO 4448 | T. 29.5 S., R. 7 W., Sec. 32 | 4.3 | Reclamation Project/Umpqua River | COE | B | C |

* Open to entry subject to Section 24 of the Federal Power Act
† Open to entry in part subject to Section 24 of the Federal Power Act

**Table K-3.** Withdrawals in the Eugene District

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| ORE 05555 | BO of 7/12/1957 | T. 15 S., R. 7 W., Sec. 7 | 40 | Air Navigation | FAA | A | C |
| ORE 013117 | PLO 3610 | T. 18 S., R. 1 E., Sec. 31 | See total acres below | Fall Creek Reservoir | COE | B | C |
| | | T. 19 S., R. 1 E., Sec. 6 | | Fall Creek Reservoir | COE | B | C |
| **Total Acres for ORE 013117:** | | | **81.2** | | | | |
| OR 19234 | PLO 497 | T. 17 S., R. 5 W., Secs. 27, 28 | 5.27 | Fern Ridge Reservoir | COE | A | C |
| OR 19240 | PLO 727 | T. 19 S., R. 1 E., Sec. 34 | 1.37 | Lookout Point Reservoir | COE | A | C |
| OR 711 | PLO 4395 | T. 16 S., R. 12 W., Sec. 33 | 1 | Oregon Islands National Wildlife Refuge | USFWS | B | C |
| OR 25306 | PLO 6287 | T. 16 S., R. 12 W., Sec. 33 | 1 | Oregon Islands National Wildlife Refuge | USFWS | B | C |
| ORE 016183A | PLO 3869 | T. 16 S., R. 7 W., Sec. 19 | See total acres below | Lake Creek, Whittaker Creek, Clay Creek, Haight Creek, Sharps Creek Recreation Sites | BLM | B | C |
| | | T. 18 S., R. 8 W., Sec. 21 | | Lake Creek, Whittaker Creek, Clay Creek, Haight Creek, Sharps Creek Recreation Sites | BLM | B | C |
| | | T. 19 S., R. 7 W., Secs. 19, 35 | | Lake Creek, Whittaker Creek, Clay Creek, Haight Creek, Sharps Creek Recreation Sites | BLM | B | C |
| | | T. 22 S., R. 1 W., Sec. 15 | | Lake Creek, Whittaker Creek, Clay Creek, Haight Creek, Sharps Creek Recreation Sites | BLM | B | C |
| **Total Acres for ORE 016183A:** | | | **440.12** | | | | |
| ORE 012093 | PLO 5490 | All public domain lands in and west of Range 8 East and all lands within the area, which become public domain lands in the future. | 9,000.52 | Reserved for multiple use management | BLM | Surface closed to ag laws | E |
| OR 8754 | PLO 5229 | T. 15 S., R. 1 W., Secs. 29, 30, 31, 32 | 260 | Shotgun Creek Recreation Site | BLM | B | C |
| OR 46473 | PLO 6963 | T. 18 S., R. 12 W., Secs. 3, 15 | 257.6 | Florence Sand Dunes | BLM | B | C |
| OR 48744 | PLO 7081 | T. 17 S., R. 3 E., Secs. 3, 9, 10, 11 | 292.25 | Eagle Rock Section of McKenzie River | BLM | B | C |
| OR 19133 | SO of 6/7/1922 | T. 19 S., R. 7 W., Secs. 21, 25, 35 | See total acres below | Protect water power and reservoir development potential/PSC 41 | BLM | D | C |
| | | T. 20 S., R. 6 W., Sec. 5 | | PSC 41 | BLM | D | C |
| **Total Acres for OR 19133:** | | | **550.49** | | | | |
| OR 19148 | SO of 5/23/1957 | T. 20 S., R. 2 W., Sec. 31 | See total acres below | Protect water power and reservoir development potential/PSC 180 | BLM | D | C |
| | | T. 21 S., R. 1 W., Secs. 31*, 33, 35 | | Protect water power and reservoir development potential/PSC 180 | BLM | D | C |
| | | T. 21 S., R. 2 W., Sec. 15 | | PSC 180 | BLM | D | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | **Total Acres for OR 19148:** | **300.6** | | | | |
| OR 19186 | DO of 7/25/1952 | T. 16 S., R. 2 E., Secs. 23, 24, 27 | 276.64 | Protect water power and reservoir development potential/PSC 426 | BLM | D | C |
| OR 19040 | EO of 7/2/1910 | T. 16 S., R. 2 E., Secs. 28*, 34* | See total acres below | Protect water power and reservoir development potential/PSR 95 | BLM | D | C |
| | | T. 17 S., R. 2 E., Sec. 2* | | PSR 95 | BLM | D | C |
| | | T. 17 S., R. 3 E., Sec. 4 | | PSR 95 | BLM | D | C |
| | | **Total Acres for OR 19040:** | **152.28** | | | | |
| OR 19059 | EO of 7/10/1910 | T. 16 S., R. 3 E., Sec. 31* | See total acres below | Protect water power and reservoir development potential/PSR 285 | BLM | D | C |
| | | T. 17 S., R. 3 E., Sec. 4 | | Protect water power and reservoir development potential/PSR 285 | BLM | D | C |
| | | **Total Acres for OR 19059:** | **163.56** | | | | |
| OR 19113 | EO of 12/12/1917 | T. 15 S., R. 6 W., Sec. 7 | See total acres below | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 16 S., R. 7 W., Sec. 19 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 17 S., R. 8 W., Secs. 1*, 3*, 17† | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 18 S., R. 7 W., Secs. 3*, 31, 33 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 18 S., R. 8 W., Secs. 17*, 21, 27, 35 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 19 S., R. 6 W., Secs. 7, 9, 29, 31 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 19 S., R. 7 W., Secs. 1, 3, 5, 9, 19, 21, 27, 35 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 19 S., R. 8 W., Secs. 3, 11, 13 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 20 S., R. 6 W., Secs. 1, 3, 5, 9, 11 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | T. 20 S., R. 7 W., Sec. 3 | | Protect water-power development potential/ PSR 659 | BLM | D | C |
| | | **Total Acres for OR 19113:** | **5,961.48** | | | | |
| OR 19115 | EO of 12/12/1917 | T. 16 S., R. 2 E., Secs. 29, 33*, 35* | See total acres below | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | T. 17 S., R. 2 E., Sec. 1* | | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | T. 17 S., R. 3 E., Secs. 3*, 5*, 9* | | Protect water-power development potential/ PSR 661 | BLM | D | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 20 S., R. 2 W., Sec. 31 | | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | T. 21 S., R. 1 W., Secs. 31*, 33, 35 | | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | T. 21 S., R. 2 W., Secs. 3*, 7*, 31 | | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | T. 22 S., R. 2 W., Secs. 5, 15, 23 | | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | T. 23 S., R. 2 W., Sec. 1 | | Protect water-power development potential/ PSR 661 | BLM | D | C |
| | | **Total Acres for OR 19115:** | **1,103.6** | | | | |
| OR 19116 | EO of 12/12/1917 | T. 18 S., R. 8 W., Sec. 28 | 40 | Protect water-power development potential/ PSR 662 | BLM | D | C |
| OR 19127 | EO of 2/19/1920 | T. 22 S., R. 1 W., Secs. 1*, 5, 9, 15†, 23, 27, 35 | 1,249.16 | Protect water-power development potential/ PSR 661 | BLM | D | C |
| OR 19127 | EO of 2/19/1920 | T. 23 S., R. 1 W., Secs. 1, 7 | | PSR 730 | BLM | D | C |
| OR 19014 | SO of 12/12/1917 | T. 15 S., R. 6 W., Sec. 7 | See total acres below | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 16 S., R. 2 E., Secs. 29, 33,* 35* | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 16 S., R. 7 W., Sec. 19 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 17 S., R. 2 E., Sec. 1* | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 17 S., R. 3 E., Secs. 3,* 5,* Sec. 9* | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 17 S., R. 8 W., Secs. 1*, 3* | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 18 S., R. 7 W., Secs. 31, 33 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 18 S., R. 8 W., Secs. 17*, 21, 27, 35 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 19 S., R. 6 W., Secs. 7, 9, 29, 31 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 19 S., R. 7 W., Secs. 1†, 3†, 5, 9, 11*, 19, 21, 27, 35 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 19 S., R. 8 W., Secs. 3, 11, 13 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 20 S., R. 2 W., Sec. 31 | | Protect water-power development potential/ WPD 14 | BLM | D | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 20 S., R. 6 W., Secs. 1, 3, 5, 9, 11 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 20 S., R. 7 W., Sec. 3 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 21 S., R. 1 W., Secs. 31†, 33, 35 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 21 S., R. 2 W., Secs. 3*, 7, 31 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 22 S., R. 1 W., Secs. 1*, 5, 9, 15†, 23, 27, 35 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 22 S., R. 2 W., Secs. 5, 15, 23 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 23 S., R. 1 W., Secs. 1, 7 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | T. 23 S., R. 2 W., Sec. 1 | | Protect water-power development potential/ WPD 14 | BLM | D | C |
| | | **Total Acres for OR 19014:** | **8,234.24** | | | | |
| OR 19016 | SO of 12/24/1919 | T. 23 S., R. 1 W., Sec. 1 | 80 | Protect water power and reservoir development potential/WPD 16 | BLM | D | C |
| OR 52939 | PLO 7445 | T. 20 S., R. 2 W., Secs. 30, 31, 32, 33, 34 | See total acres below | Row River Trail and associated recreation facilities | BLM | B | C |
| | | T. 20 S., R. 3 W., Sec. 25, 36 | | Row River Trail and associated recreation facilities | BLM | B | C |
| | | T. 21 S., R. 1 W., Secs. 19, 30, 31, 32 | | Row River Trail and associated recreation facilities | BLM | B | C |
| | | T. 21 S., R. 2 W., Secs. 2, 3, 11, 13, 14, 24 | | Row River Trail and associated recreation facilities | BLM | B | C |
| | | T. 21 S., R. 3 W., Sec. 1 | | Row River Trail and associated recreation facilities | BLM | B | C |
| | | T. 22 S., R. 1 W., Sec. 5 | | Row River Trail and associated recreation facilities | BLM | B | C |
| | | **Total Acres for OR 52939:** | **178.95** | | | | |
| OR 50856 | PLO 7215 | T. 18 S., R. 12 W., Sec. 2 | 36.52 | Pacific Coastline Highway 101 | BLM | B | C |

* Open to entry subject to Section 24 of the Federal Power Act

† Open to entry in part subject to Section 24 of the Federal Power Act

**Table K-4.** Withdrawals in the Klamath Falls Field Office

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| ORE 05433 | BO of 6/14/57 | T. 40 S., R. 10 E., Sec. 9 | 80 | Air Navigation/ANS 57 | FAA | A | R |
| | | T. 40 S., R. 10 E., Sec. 10 | 80 | Air Navigation/ANS 57 | FAA | A | Partial R/C |
| | | **Total Acres for ORE 05433:** | **160** | | | | |
| OR 36244 | BO of 2/11/47 | T. 39 S., R. 9 E., Sec. 21 | 51.12 | Kingsley Field | USAF | B | C |
| OR19001 | EO 5907 | T. 38 S., R. 13 E., Sec. 35 | 40 | Public Water Reserve 146 | BLM | E | C |
| OR 20219 | EO of 1/24/1914 | T. 41 S., R. 13 E., Sec. 6 | 52.14 | Public Water Reserve 15 | BLM | E | C |
| | | T. 40 S., R. 13 E., Secs. 19, 31 | 189.55 | Public Water Reserve 15 | BLM | E | C |
| | | T. 41 S., R. 12 E., Sec. 1 | 40 | Public Water Reserve 15 | BLM | E | C |
| | | T. 40 S., R. 12 E., Sec. 24 | 160 | Public Water Reserve 15 | BLM | E | C |
| | | **Total Acres for OR 20219:** | **441.69** | | | | |
| OR 9041 | EO 4/17/1926 | T. 40 S., R. 11 E., Sec. 11 | 80 | Public Water Reserve 107 | BLM | E | C |
| | | T. 41 S., R. 14.5 E., Sec. 1 | 40 | Public Water Reserve 107 | BLM | E | C |
| | | **Total Acres for OR 9041:** | **120** | | | | |
| ORE 016183E | PLO 3869 | T. 39 S., R. 13 E., Secs. 2, 11 | 160 | Gerber Reservoir Recreation Site | BLM | B | C |
| ORE 016183D | PLO 3869 | T. 38 S., R. 5 E., Sec. 21 | 40 | Surveyor Mountain Recreation Site | BLM | B | C |
| ORE 016183D | PLO 3869 | T. 40 S., R. 7 E., Sec. 6 | 14.35 | Topsy Recreation Site | BLM | B | C |
| ORE 012799 | PLO 3274 | T. 39 S., R. 9 E., Sec. 21 | 10.04 | Administrative Site | USFWS | B | R |
| OR 20243 | SO of 7/9/1904 | T. 39 S., R. 14 E., Secs. 5–8, 16–22 | 3,425.82 | Klamath Basin Reclamation Project | BR/BLM | B | R |
| | | T. 38 S., R. 14 E., Secs. 31, 32 | 160 | Klamath Basin Reclamation Project | BR/BLM | B | R |
| | | **Total Acres for OR 20243:** | **3,585.82** | | | | |
| | SO of 7/27/1904 | T. 38 S., R. 13 E., Sec. 35 | 120 | Klamath Basin Reclamation Project | BR/BLM | B | R |
| | | T. 39 S., R. 13 E., Secs. 1, 2, 11–14, 23, 26, 27, 33, 34 | 2,758.87 | Klamath Basin Reclamation Project | BR/BLM | B | R |
| | | **Total Acres for SO of 7/27/1904:** | **2,878.87** | | | | |
| OR 2870 | PL 88-567 | T. 34 S., R. 6 E., Secs. 1, 12, 13, 25, 26, 35, 36 | 2,636.09 | Upper Klamath National Wildlife Refuge and Klamath Basin Reclamation Project | USFWS | B | R |
| | | T. 35 S., R. 6 E., Secs. 1, 2, 12, 13, 24, 25, 35, 36, PB 37, 38 | 3,800.24 | Upper Klamath National Wildlife Refuge and Klamath Basin Reclamation Project | USFWS | B | R |
| | | T. 37 S., R. 8 E., Sec. 36 | 500.10 | Upper Klamath National Wildlife Refuge and Klamath Basin Reclamation Project | USFWS | Closed to homestead entry | R |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | **Total Acres for OR 2870:** | **6,936.43** | | | | |
| OR 4669 | PLO 1512 | T. 37 S., R. 7.5 E., Secs. 9, 10 | 6 | Upper Klamath National Wildlife Refuge, Addition | USFWS | | C |
| OR 20587 | EO 4851 | T. 35 S., R. 6 E., Secs. 1, 2, 12, 13, 24, 25, 35, 36, PB 37, 38 | 3,800.24 | Upper Klamath National Wildlife Refuge and Klamath Basin Reclamation Project | USFWS/ BR | B | R |
| | | T. 36 S., R. 6 E., Secs. 2, 3, 11–14, PB 37–42 | 3,120 | Upper Klamath National Wildlife Refuge and Klamath Basin Reclamation Project | USFWS/ BR | B | R |
| | | **Total Acres for OR 20587:** | **6,926.24** | | | | |
| OR 22625 | EO 924 | T. 37 S., R. 8 E., Secs. 23–28, 31–36 | See total acres below | Lower Klamath National Wildlife Refuge | USFWS | B | C |
| | | T. 40 S., R. 8 E., Secs. 1–16, 21–27, 34–36 | | Lower Klamath National Wildlife Refuge | USFWS | B | C |
| | | T. 40 S., R. 9 E., Secs. 6–8, 17–21, 27–35 | | Lower Klamath National Wildlife Refuge | USFWS | B | C |
| | | T. 41 S., R. 10 E., Secs. 7, 17, 18 | | Lower Klamath National Wildlife Refuge | USFWS | B | C |
| | | T. 41 S., R. 9 E., Secs. 1–6, 8–13 | | Lower Klamath National Wildlife Refuge | USFWS | B | C |
| | | T. 41 S., R. 8 E., Secs. 1–5, 9–16 | 95.9 | Lower Klamath National Wildlife Refuge | USFWS | B | C |
| | | **Total Acres for OR 22625:** | **Not available** | | | | |
| OR 20246 | SO of 1/28/1905 | T. 37 S., R. 8 E., Sec. 17 | 68.7 | Klamath Basin Reclamation Project | USFWS/ BR | B | R |
| OR 20249 | SO of 1/20/1910 | T. 34 S., R. 6 E., Secs. 1, 12, 13, 25, 26, 35, 36 | See total acres below | Klamath Basin Reclamation Project | BR | B | R |
| | | T. 35 S., R. 6 E., Secs. 1, 2, 12, 13, 24, 25, 35, 36, PB 37, 38 | | Klamath Basin Reclamation Project | BR | B | C |
| | | T. 36 S., R. 6 E., Secs. 2, 3, 11–14, PB 37–42 | | Klamath Basin Reclamation Project | BR | B | C |
| | | **Total Acres for OR 20249:** | **Not available** | | | | |
| OR 20253 | SO of 6/25/1919 | T. 41 S., R. 10 E., Secs. 15, 16 | See total acres below | Klamath Basin Reclamation Project | BR | B | C |
| | | T. 41 S., R. 9 E., Secs. 3–6, 8–10, 12, 14–18 | | Klamath Basin Reclamation Project | BR | B | C |
| | | T. 41 S., R. 8 E., Secs. 1, 4, 9, 11–16 | | Klamath Basin Reclamation Project | BR | B | C |
| | | T. 40 S., R. 8 E., Sec.25 | | Klamath Basin Reclamation Project | BR | B | C |
| | | **Total Acres for OR 20253:** | **Not available** | | | | |
| OR 20244 | SO of 7/19/1904 | T. 40 S., R. 9 E., Sec. 24 | See total acres below | Klamath Basin Reclamation Project | BR | B | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 41 S., R. 9 E., Secs. 3–6, 8–10, 12, 14–17 | | Klamath Basin Reclamation Project | BR | B | C |
| | | **Total Acres for OR 20244:** | **Not available** | | | | |
| OR 20246 | SO of 1/28/1905 | T. 41 S., R. 9 E., Secs. 3–6, 8–10, 12, 14–17 | | Klamath Basin Reclamation Project | BR | B | C |
| OR 20254 | SO of 7/31/1919 | T. 39 S., R. 11 E., Sec. 19 | 80 | Klamath Basin Reclamation Project | BR | B | R – Withdrawal relinquished, suitable for return to Public Domain |
| OR 20240 | SO of 6/20/1922 | T. 41 S., R. 14 E., Secs. 19, 20 | 29.55 | Klamath Basin Reclamation Project | BR | B | C |
| OR 20259 | SO of 2/25/1939 | T. 39 S., R. 12 E., Secs. 22, 26 | 120 | Klamath Basin Reclamation Project | BR | B | R – Withdrawal relinquished, suitable for return to Public Domain |
| OR 20261 | SO of 4/21/1940 | T. 40 S., R. 14 E., Sec. 5 | 41.04 | Klamath Basin Reclamation Project | BR | B | R – Withdrawal relinquished, suitable for return to Public Domain |
| OR 20239 | SO of 2/21/1946 | T. 41 S., R. 14 E., Secs. 15, 20–23 | 1,063.8 | Klamath Basin Reclamation Project | BR | B | C |
| OR 20264 | BO of 2/11/1947 | T. 39 S., R. 9 E., Secs. 20–22, 25, 27, 28, 31–34 | 60.14 | Klamath Basin Reclamation Project | BR | B | C |
| | | T. 40 S., R. 9 E., Sec. 3 | 278.41 | Klamath Basin Reclamation Project | BR | B | C |
| | | **Total Acres for OR 20264:** | **338.55** | | | | |
| OR 20263 | SO of 1/6/1944 | T. 40 S., R. 9 E., Sec. 15 | 160 | Klamath Basin Reclamation Project | BR | B | C |
| OR 20262 | SO of 6/18/1940 | T. 39 S., R. 12 E., Sec. 28 | 40 | Klamath Basin Reclamation Project | BLM | D | C |
| | SO of 3/31/1939 | T. 40 S., R. 14 E., Secs. 5*, 7*, 17* | 53.35 | Klamath Basin Reclamation Project | | | C |
| OR 19085 | EO 2/1/1917 | T. 41 S., R. 6 E., Secs. 2, 7, 10, 18 | 313.95 | Water Power Potential/PSR 579 | BLM | D | C |
| OR 44762 | | T. 40 S., R. 6 E., Secs.1, 12–14, 23, 26, 34, 35 | See total acres below | Klamath Wild and Scenic River | | Various | C |
| | | T. 40 S., R. 7 E., Sec.6 | | Klamath Wild and Scenic River | | | C |
| | | **Total Acres for OR 44762:** | **Not available** | | | | |
| OR 19054 | EO 4/13/1912 | T. 41 S., R. 6 E., Secs. 4, 8, 10 | See total acres below | Water Power Potential/PSR 258 | BLM | D | C |
| | | T. 40 S., R. 6 E., Sec. 12, 14, 26, 34 | | Water Power Potential/PSR 258 | BLM | D | C |
| | | T. 41 S., R. 5 E., Sec. 13 | | Water Power Potential/PSR 258 | BLM | D | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | **Total Acres for OR 19054:** | **1,611.34** | | | | |
| OR 18974 | FPC Order of 1/28/1954 | T. 39 S., R. 7 E., Secs. 26–29, 35, 36 | | J.C. Boyle Power Project/Power Project 2082 | FERC | | C |
| | | T. 40 S., R. 7 E., Sec. 6 | 14.47 | J.C. Boyle Power Project/Power Project 2082 | FERC | B | C |
| | | T. 40 S., R. 6 E., Secs. 1, 12–14, 23, 26, 27, 34, 35 | 23.41 | J.C. Boyle Power Project/Power Project 2082 | FERC | B | C |
| | | T. 41 S., R. 6 E., Secs. 3, 5, 6, 10 | | J.C. Boyle Power Project/Power Project 2082 | FERC | B | C |
| | | **Total Acres for OR 18974:** | **Not available** | | | | |
| OR 19131 | SO 5/19/1921 | T. 41 S., R. 5 E., Sec. 12 | 6.42 | Protect Water, Power, and Reservoir Development Potential/PSC 2 | BLM | B | C |

* Open to entry subject to Section 24 of the Federal Power Act

† Open to entry in part subject to Section 24 of the Federal Power Act

**Table K-5.** Withdrawals in the Medford District

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| ORE 016674 | PLO 5105 | T. 33 S., R. 1 E., Secs. 11, 13, 14, 23, 24, 27, 35 | See total acres below | Lost Creek Reservoir | COE | B | C |
| | | T. 33 S., R. 2 E., Secs. 11, 15, 19 | | Lost Creek Reservoir | COE | B | R (716.88 acres) |
| | | **Total Acres for ORE 016674:** | **2,483.48** | | | | |
| ORE 016753 | PLO 6373 | T. 32 S., R. 1 E., Sec. 33 | See total acres below | Elk Creek Reservoir | COE | B | C |
| | | T. 33 S., R. 1 E., Secs. 5, 9, 21, 29 | | Elk Creek Reservoir | COE | B | C |
| | | **Total Acres for ORE 016753:** | **840.59** | | | | |
| OR 49 | PLO 4132 | T. 35 S., R. 6 W., Sec. 9 | 200 | Sprague Orchard | BLM | B | C |
| OR 10729 | PLO 5481 | T. 36 S., R. 6 W., Sec. 3 | 160 | Sprague Orchard | BLM | B | C |
| ORE 04135 | PLO 1726 | T. 35 S., R. 6 W., Sec. | See total acres below | Recreation Area | BLM | B | R (519.8 acres) |
| | | T. 33 S., R. 10 W., Secs.9, 10, 16 | | Recreation Area | BLM | B | C |
| | | T. 33 S., R. 9 W., Secs. 8, 16–18, 22, 23, 26, 35, 36 | | Recreation Area | BLM | B | C |
| | | T. 33 S., R. 8 W., Secs. 32–35 | | Recreation Area | BLM | B | C |
| | | T. 33 S., R. 7 W., Sec. 31 | | Recreation Area | BLM | B | C |
| | | T. 33 S., R. 1 E., Secs. 23, 24, 32 | | Recreation Area | BLM | B | C |
| | | T. 33 S., R. 2 E., Secs. 11, 19 | | Recreation Area | BLM | B | C |
| | | T. 34 S., R. 9 W., Sec. 1, 2 | | Recreation Area | BLM | B | C |
| | | T. 34 S., R. 8 W., Secs. 1, 5, 6, 12, 13, 24, 25 | | Recreation Area | BLM | B | C |
| | | T. 34 S., R. 7 W., Secs. 6, 19, 30, 31 | | Recreation Area | BLM | B | C |
| | | T. 34 S., R. 1 W., Secs. 2, 3, 10 | | Recreation Area | BLM | B | C |
| | | T. 35 S., R. 8 W., Sec. 1 | | Recreation Area | BLM | B | C |
| | | T. 35 S., R. 7 W., Secs. 3–6, 9, 10, 24 | | Recreation Area | BLM | B | C |
| | | T. 36 S., R. 7 W., Secs. 2, 3, 11, 12 | | Recreation Area | BLM | B | C |
| | | T. 36 S., R. 3 W., Secs. 11–13 | | Recreation Area | BLM | B | C |
| | | T. 36 S., R. 2 W., Sec. 13 | | Recreation Area | BLM | B | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 39 S., R. 2 W., Secs.19, 23 | | Recreation Area | BLM | B | C |
| | | **Total Acres for ORE 04135:** | **15,481.14** | | | | |
| ORE 012261 | PLO 3165 | T. 33 S., R. 8 W., Sec. 33 | See total acres below | Recreation Area | BLM | B | C |
| | | T. 34 S., R. 8 W., Secs. 2, 3, 13, 25 | | Recreation Area | BLM | B | C |
| | | T. 35 S., R. 8 W., Sec. 1 | | Recreation Area | BLM | B | C |
| | | **Total Acres for ORE 012261:** | **174.21** | | | | |
| ORE 016183D | PLO 3869 | T. 32 S., R. 9 W., Sec. 16 | See total acres below | Recreation Area | BLM | B | R |
| | | T. 35 S., R. 9 W., Sec. 11 | | Recreation Area | BLM | B | R |
| | | T. 38 S., R. 7 W., Sec. 1 | | Recreation Area | BLM | B | R |
| | | T. 39 S., R. 2 W., Sec. 25 | | Recreation Area | BLM | B | R |
| | | T. 39 S., R. 3 E., Secs. 21, 22 | | Recreation Area | BLM | B | R |
| | | **Total Acres for ORE 016183D:** | **444.35** | | | | |
| OR 19008 | SO of 1/19/1917 | T. 38 S., R. 3 E., Sec. 25* | See total acres below | Water Power Potential/WPD 3 | BLM | C | R |
| | | T. 38 S., R. 4 E., Secs. 31*, 33 | | Water Power Potential/WPD 3 | BLM | C | R |
| | | T. 39 S., R. 3 E., Secs. 3*, 11*, 15* | | Water Power Potential/WPD 3 | BLM | C | R |
| | | T. 39 S., R. 4 E., Secs. 5*, 9, 15, 21†, 27† | | Water Power Potential/WPD 3 | BLM | C | R |
| | | **Total Acres for OR 19008:** | **5,631.54** | | | | |
| OR 19010 | SO of 4/27/1917 | T. 33 S., R. 1 E., Secs. 23, 27, 32, 33† | See total acres below | Water Power Potential/WPD 10 | BLM | C | C |
| | | T. 33 S., R. 2 E., Sec. 1*, 11*, 15, 17*, 19† | | Water Power Potential/WPD 10 | BLM | C | C |
| | | T. 33 S., R. 3 E., Sec. 7* | | Water Power Potential/WPD 10 | BLM | C | C |
| | | T. 34 S., R. 1 W., Sec. 3†, 15, 21*, 29* | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 34 S., R. 1 E., Secs. 3†, 11*, 13, 23*, 25†, 35 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 34 S., R. 2 E., Sec.7, 33† | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 35 S., R. 7 W., Secs. 3–5, 9–11, 13, 25*, 35* | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 35 S., R. 6 W., Sec. 19 | | Water Power Potential WPD 10 | BLM | C | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 35 S., R. 6 W., Secs. 5*, 9*, 13† | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 35 S., R. 1 E., Secs. 1, 3, 5, 17 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 35 S., R. 2 E., Sec. 13 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 35 S., R. 3 E., Sec. 7 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 36 S., R. 7 W., Sec. 11 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 36 S., R. 6 W., Sec. 21 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 36 S., R. 5 W., Secs. 21*, 23* | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 36 S., R. 7 W., Secs. 19, 21†, 25†, 29* | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 36 S., R. 3 W., Secs. 11, 13, 17*, 21* | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 36 S., R. 2 W., Secs. 1*, 13*, 15* | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 38 S., R. 8 W., Secs. 27, 35 | | Water Power Potential WPD 10 | BLM | C | C |
| | | T. 39 S., R. 8 W., Secs. 3, 5†, 9†, 17, 20*, 27*, 29 | | Water Power Potential WPD 10 | BLM | C | C |
| | | **Total Acres for OR 19010:** | **12,228.88** | | | | |
| OR 19013 | SO of 4/27/1917 | T. 32 S., R. 6 W., Sec. 23 | See total acres below | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 33 S., R. 6 W., Sec. 15 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 33 S., R. 1 E., Secs. 13, 32, 33 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 33 S., R. 2 E., Secs. 17–19 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 34 S., R. 5 W., Secs. 17, 29 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 34 S., R. 1 W., Sec. 21 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 34 S., R. 1 W., Secs. 9, 21, 29, 31 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 35 S., R. 5 W., Sec. 19 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 36 S., R. 5 W., Secs. 5, 23 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 36 S., R. 4 W., Sec. 21 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 36 S., R. 2 W., Sec. 1 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 39 S., R. 2 E., Sec. 17, 35 | | Transmission Line/WPD 13 | BLM | C | R |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 40 S., R. 3 E., Secs. 7, 17, 21, 27, 35 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 41 S., R. 3 E., Sec. 1 | | Transmission Line/WPD 13 | BLM | C | R |
| | | T. 41 S., R. 4 E., Secs. 7, 17 | | Transmission Line/WPD 13 | BLM | C | R |
| | | **Total Acres for OR 19013:** | **127.27** | | | | |
| OR 19018 | SO of 4/13/1942 | T. 33 S., R. 4 W., Sec. 31 | See total acres below | Water Power Potential/WPD 18 | BLM | C | C |
| | | T. 34 S., R. 5 W., Sec. 31 | | Water Power Potential/WPD 18 | BLM | C | C |
| | | T. 34 S., R. 4 W., Sec. 5 | | Water Power Potential/WPD 18 | BLM | C | C |
| | | T. 34 S., R. 3 W., Secs. 23, 25, 35 | | Water Power Potential/WPD 18 | BLM | C | C |
| | | **Total Acres for OR 19018:** | **872.35** | | | | |
| OR 19047 | EO of 12/1/1910 | T. 33 S., R. 1 E., Secs. 24, 32, 31† | See total acres below | Power Site Potential/PSR 161 | BLM | C | C |
| | | T. 34 S., R. 1 W., Secs. 2, 3, 10 | | Power Site Potential/PSR 161 | BLM | C | C |
| | | **Total Acres for OR 19047:** | **157.49** | | | | |
| OR 19048 | EO of 12/19/1910 | T. 35 S., R. 7 W., Secs. 4, 6, 10, 26 | See total acres below | Power Site Potential/PSR 167 | BLM | C | C |
| | | T. 36 S., R. 7 W., Secs. 2*, 12 | | Power Site Potential/ PSR 167 | BLM | C | C |
| | | T. 36 S., R. 3 W., Secs. 11, 12* | | Power Site Potential/PSR 167 | BLM | C | C |
| | | **Total Acres for OR 19048:** | **495.38** | | | | |
| OR 19078 | EO of 3/28/1916 | T. 36 S., R. 4 W., Secs. 22, 24* | 2.17 | Power Site Potential/PSR 528 | BLM | C | C |
| OR 19088 | EO of 1/19/1917 | T. 38 S., R. 3 E., Sec. 25† | See total acres below | Power Site Potential/PSR 583 | BLM | C | R |
| | | T. 38 S., R. 4 E., Secs. 31, 33 | | Power Site Potential/PSR 583 | BLM | C | R |
| | | T. 39 S., R. 4 E., Secs. 5†, 9, 15, 21, 27 | | Power Site Potential/PSR 583 | BLM | C | R |
| | | **Total Acres for OR 19088:** | **1,799.03** | | | | |
| OR 19089 | EO of 1/19/1917 | T. 39 S., R. 3 E., Secs. 3, 11, 15 | 160 | Power Site Potential/PSR 584 | BLM | C | R |
| OR 19094 | EO of 4/30/1917 | T. 34 S., R. 1 E., Secs. 3†, 11, 13, 23, 25, 35 | See total acres below | Power Site Potential/PSR 619 | BLM | C | C |
| | | T. 34 S., R. 2 E., Sec. 7 | | Power Site Potential/PSR 619 | BLM | C | C |
| | | T. 35 S., R. 1 W., Sec. 13 | | Power Site Potential/PSR 619 | BLM | C | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 35 S., R. 1 E., Secs. 1, 3, 5, 17 | | Power Site Potential/PSR 619 | BLM | C | C |
| | | T. 35 S., R. 2 E., Secs. 3, 13 | | Power Site Potential/PSR 619 | BLM | C | C |
| | | T. 35 S., R. 3 E., Sec. 7 | | Power Site Potential/PSR 619 | BLM | C | C |
| | | **Total Acres for OR 19094:** | **3,360.34** | | | | |
| OR 19096 | EO of 4/28/1917 | T. 33 S., R. 1 E., Secs. 23†, 27†, 33† | See total acres below | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 33 S., R. 2 E., Secs. 1, 11*, 15*, 17*, 19† | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 33 S., R. 3 E., Sec. 7* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 34 S., R. 1 W., Secs. 3†, 15*, 21*, 29* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 35 S., R. 7 W., Secs. 3, 5†, 9, 11, 13†, 25*, 35* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 35 S., R. 6 W., Secs. 19 | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 35 S., R. 1 W., Secs. 5*, 9* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 36 S., R. 7 W., Sec. 11* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 36 S., R. 6 W., Sec. 21 | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 36 S., R. 5 W., Secs. 21*, 23* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 36 S., R. 4 W., Secs. 19*, 21*, 25, 29* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 36 S., R. 3 W., Secs. 11†, 13, 17*, 21* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | T. 36 S., R. 2 W., Secs. 1*, 13*, 15* | | Power Site Potential/PSR 621 | BLM | C | C |
| | | **Total Acres for OR 19096:** | **5,379.4** | | | | |
| OR 19139 | SO of 5/8/1926 | T. 33 S., R. 10 W., Secs. 3, 9, 10, 12–14 | See total acres below | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 33 S., R. 9 W., Secs. 8, 16–18, 23, 26, 36 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 33 S., R. 8 W., Secs. 32, 34, 35 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 33 S., R. 7 W., Secs. 31†, 32† | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 33 S., R. 1 E., Secs. 13, 14*, 23 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 33 S., R. 2 E., Sec. 3* | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 34 S., R. 9 W., Sec. 2 | | Power Site Potential/PSC 143 | BLM | C | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 34 S., R. 8 W., Secs. 2, 6, 12, 13, 24, 25, 35 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 34 S., R. 7 W., Secs. 5, 6, 18, 19†, 30, 31 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 34 S., R. 1 E., Secs. 15, 23 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 34 S., R. 2 E., Sec. 33 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 35 S., R. 8 W., Sec. 1, 2 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 35 S., R. 7 W., Secs. 5–7 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 36 S., R. 7 W., Sec. 2* | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 36 S., R. 2 W., Sec. 18 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 37 S., R. 6 W., Secs.13, 15†, 23, 24 | | Power Site Potential/PSC 143 | BLM | C | C |
| | | T. 37 S., R. 5 W., Secs.17, 19* | | Power Site Potential/PSC 143 | BLM | C | C |
| | | **Total Acres for OR 19139:** | **22,948.95** | | | | |
| OR 19143 | SO of 12/10/1926 | T. 35 S., R. 7 W., Sec. 5 | See total acres below | Power Site Potential/PSC 158 | BLM | C | C |
| | | T. 36 S., R. 7 W., Sec. 15† | | Power Site Potential/PSC 158 | BLM | C | C |
| | | **Total Acres for OR 19143:** | **71.8** | | | | |
| OR 19154 | SO of 2/27/1929 | T. 38 S., R. 4 E., Sec. 32 | See total acres below | Power Site Potential/PSC 218 | BLM | C | R |
| | | T. 39 S., R. 2 E., Secs. 26, 35 | | Power Site Potential/PSC 218 | BLM | C | R |
| | | T. 39 S., R. 3 E., Secs. 11, 19, 20 | | Power Site Potential/PSC 218 | BLM | C | R |
| | | T. 39 S., R. 4 E., Secs. 5***, 15 | | Power Site Potential/PSC 218 | BLM | C | R |
| | | **Total Acres for OR 19154:** | **1,482.21** | | | | |
| OR 19173 | SO of 4/11/1942 | T. 33 S., R. 4 W., Sec. 31 | See total acres below | Power Site Potential/PSC 330 | BLM | C | C |
| | | T. 34 S., R. 5 W., Sec. 31 | | Power Site Potential/PSC 330 | BLM | C | C |
| | | T. 34 S., R. 4 W., Sec. 5 | | Power Site Potential/PSC 330 | BLM | C | C |
| | | T. 34 S., R. 3 W., Secs. 23, 25, 26, 35 | | Power Site Potential/PSC 330 | BLM | C | C |
| | | **Total Acres for OR 19173:** | **1,151.73** | | | | |
| OR 19174 | SO of 4/27/1943 | T. 33 S., R. 1 W., Secs. 29, 33, 35 | See total acres below | Power Site Potential/PSC 340 | BLM | C | C |
| | | T. 33 S., R. 1 E., Secs. 13, 17, 18, 23, 27, 31 | | Power Site Potential/PSC 340 | BLM | C | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 33 S., R. 2 E., Secs. 16, 17, 19 | | Power Site Potential/PSC 340 | BLM | C | C |
| | | T. 34 S., R. 1 W., Secs. 9, 15, 23, 27, 29, 31 | | Power Site Potential/PSC 340 | BLM | C | C |
| | | T. 33 S., R. 2 E., Secs. 3, 11, 15, 23 | | Power Site Potential/PSC 340 | BLM | C | C |
| | | T. 35 S., R. 1 W., Sec. 7 | | Power Site Potential/PSC 340 | BLM | C | C |
| | | **Total Acres for OR 19174:** | **5,207.45** | | | | |
| OR 19291 | PLO 3530 | T. 39 S., R. 6 W., Secs. 5, 6 | 210.36 | Brewer Spruce RNA | BLM | B | C |
| ORE 03644 | B.O. of 1-24-1956 | T. 34 S., R. 1 W., Sec. 10 | See total acres below | Rogue River Basin Project | BOR | B | C |
| | | T. 34 S., R. 2 W., Sec. 20 | | Rogue River Basin Project | BOR | B | C |
| | | T. 34 S., R. 3 E., Sec. 24 | | Rogue River Basin Project | BOR | B | C |
| | | T. 34 S., R. 4 E., Sec. 32 | | Rogue River Basin Project | BOR | B | C |
| | | T. 39 S., R. 4 E., Sec. 6 | | Rogue River Basin Project | BOR | B | C |
| | | **Total Acres for ORE 03644:** | **875.93** | | | | |
| ORE 011495 | PLO 4289 | T. 40 S., R. 7 W., Sec. 1[†] | 1,132.39 | Rogue River Basin Project | BOR | C | C |
| ORE 017844 | PLO 4037 | T. 39 S., R. 4 E., Sec. 6 | 162.5 | Rogue River Basin Project | BOR | B | C |
| OR 20519 | S.O. of 2-20-1943 | T. 33 S., R. 1 E., Sec. 32 | See total acres below | Medford/SV Project | BOR | B | R |
| | | T. 34 S., R. 1 W., Sec. 2 | | Medford/SV Project | BOR | B | R |
| | | **Total acres for OR 20519:** | **84.64** | | | | |
| OR 20572 | B.O. of 8-18-1950 | T. 35 S., R. 2 W., Secs. 34, 35 | 80 | Air Navigation Site | FAA | A | C |
| ORE 03801 | PLO 1189 | T. 34 S., R. 8 W., Sec. 2 | 395.5 | Recreation Area | USFS | B | R |
| OR 19110 | EO of 7/23/1917 | T. 32 S., R. 6 W., Sec. 23 | See total acres below | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 33 S., R. 6 W., Sec. 15 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 33 S., R. 1 E., Sec. 13 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 33 S., R. 2 E., Secs. 9, 17–19 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 34 S., R. 5 W., Secs. 17, 29 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 34 S., R. 1 W., Sec. 21 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 35 S., R. 5 W., Secs. 9, 21, 27, 29, 31 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 36 S., R. 5 W., Secs. 5, 23 | | Transmission Line/PSR 649 | BLM | C | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 36 S., R. 4 W., Sec. 21 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 36 S., R. 2 W., Sec. 1 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 39 S., R. 2 E., Secs. 17, 35 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 40 S., R. 3 E., Secs. 7, 17, 21, 27, 35 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 41 S., R. 3 E., Sec. 1 | | Transmission Line/PSR 649 | BLM | C | C |
| | | T. 41 S., R. 4 E., Secs. 7, 17 | | Transmission Line/PSR 649 | BLM | C | C |
| | | **Total Acres for OR 19110:** | **Not available** | | | | |
| OR 37299 | FO of 1/19/1983 | T. 31 S., R. 4 W., Secs. 27, 28, 34, 35 | See total acres below | Water Power Project/PP-7161 | FERC | C | C |
| | | T. 32 S., R. 4 W., Sec. 3 | | Water Power Project/PP-7161 | FERC | C | C |
| | | **Total Acres for OR 37299:** | **Not available** | | | | |
| OR 19014 | SO of 12/12/1917 | T. 33 S., R. 10 W., Secs. 9†, 10, 11, 13 | See total acres below | Water Power Potential/WPD 14 | FERC | C | C |
| | | T. 33 S., R. 9 W., Secs.17, 21, 23, 35 | | Water Power Potential/WPD 14 | FERC | C | C |
| | | T. 33 S., R. 8 W., Secs. 33†, 35 | | Water Power Potential/WPD 14 | FERC | C | C |
| | | T. 34 S., R. 9 W., Sec. 1 | | Water Power Potential/WPD 14 | FERC | C | C |
| | | T. 34 S., R. 8 W., Secs. 1, 3, 5 | | Water Power Potential/WPD 14 | FERC | C | C |
| | | **Total Acres for OR 19014:** | **Not available** | | | | |
| OR 19125 | EO of 12/27/1919 | T. 33 S., R. 10 W., Secs. 9†, 10, 11, 13 | See total acres below | Power Site Potential/PSR 728 | FERC | C | C |
| | | T. 33 S., R. 9 W., Secs. 17, 21, 23, 35 | | Power Site Potential/PSR 728 | FERC | C | C |
| | | T. 33 S., R. 8 W., Secs. 33†, 35 | | Power Site Potential/PSR 728 | FERC | C | C |
| | | T. 34 S., R. 9 W., Sec. 1 | | Power Site Potential/PSR 728 | FERC | C | C |
| | | T. 34 S., R. 8 W., Secs. 1, 3, 5 | | Power Site Potential/PSR 728 | FERC | C | C |
| | | **Total Acres for OR 19125:** | **Not available** | | | | |
| OR 4337 | PL 90-542 | T. 33 S., R. 10 W., Secs. 9–14 | See total acres below | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 33 S., R. 9 W., Secs. 8, 15–18, 21–23, 26, 27, 35, 36 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 33 S., R. 8 W., Secs. 31–36 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 33 S., R. 7 W., Sec. 31 | | Rogue Wild and Scenic River | BLM | A | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 34 S., R. 9 W., Secs. 1, 2 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 34 S., R. 8 W., Secs. 1–3, 5, 6, 12, 13, 24, 25, 36 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 34 S., R. 7 W., Secs. 6, 18, 19, 30, 31 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 35 S., R. 8 W., Sec. 1 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 35 S., R. 7 W., Secs. 3–11, 14, 15, 23–26, 35, 36 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 36 S., R. 7 W., Secs. 1, 2, 11–14, 24 | | Rogue Wild and Scenic River | BLM | A | C |
| | | T. 36 S., R. 6 W., Secs. 18, 19 | | Rogue Wild and Scenic River | BLM | A | C |
| | | **Total Acres for OR 4337:** | **Not available** | | | | |
| OR 57512 | FO of 6/6/2002 | T. 36 S., R. 6 W., Secs. 19, 20, 29–31 | Not available | Water Power Project/PP-12205 | FERC | B | R |
| OR 19098 | EO of 5/7/1917 | T. 33 S., R. 2 E., Sec. 1* | See total acres below | Power Site Potential/PSR 623 | BLM | C | C |
| | | T. 35 S., R. 7 W., Secs. 6†, 10 | | Power Site Potential/PSR 623 | BLM | C | C |
| | | T. 36 S., R. 7 W., Sec. 12 | | Power Site Potential/PSR 623 | BLM | C | C |
| | | **Total Acres for OR 19098:** | **Not available** | | | | |
| OR 49212 | PLO 7136 | T. 34 S., R. 8 W., Sec. 35 | See total acres below | Galice Creek Recreation Area | BLM | B | E |
| | | T. 35 S., R. 8 W., Secs. 2, 3 | | Galice Creek Recreation Area | BLM | B | E |
| | | **Total Acres for OR 49212:** | **290** | | | | |
| ORE 012261 | PLO 3259 | T. 36 S., R. 3 W., Sec. 11 | 79.73 | Protection of R&PP/Recreation Area | BLM | B | C |
| OR 49218 | PLO 7103 | T. 37 S., R. 7 W., Sec. 36 | See total acres below | Protection of Scenic, Fisheries, Wildlife, and Recreation Values | BLM | B | C |
| | | T. 37 S., R. 6 W., Sec. 31 | | Limestone Caves and Crook Creek | BLM | B | C |
| | | T. 39 S., R. 8 W., Sec. 11 | | Fisheries Area | BLM | B | C |
| | | **Total Acres for OR 49218:** | **758.46** | | | | |
| OR 19138 | SO of 1/7/1926 | T. 38 S., R. 8 W., Secs. 9, 26*, 27, 28, 34, 35 | See total acres below | Power Site Potential/PSC 123 | BLM | C | C |
| | | T. 39 S., R. 8 W., Secs. 5†, 15, 27†, 29, 33, 34†, 35 | | Power Site Potential/PSC 123 | BLM | C | C |
| | | T. 40 S., R. 8 W., Secs. 5†, 9 | | Power Site Potential/PSC 123 | BLM | C | C |
| | | **Total Acres for OR 19138:** | **Not available** | | | | |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 19093 | EO of 4/28/1917 | T. 38 S., R. 8 W., Secs. 27, 35 | See total acres below | Power Site Potential/PSR 618 | BLM | C | C |
| | | T. 39 S., R. 8 W., Secs. 3, 4*, 5, 9†, 17†, 21†, 27*, 29* | | Power Site Potential/PSR 618 | BLM | C | C |
| | | **Total Acres for OR 19093:** | **Not available** | | | | |
| OR 19092 | EO of 4/28/1917 | T. 38 S., R. 8 W., Sec. 28 | 27.90 | Power Site Potential/PSR 617 | BLM | C | C |
| OR 56726 | FO of 5/21/2001 | T. 39 S., R. 2 E., Secs. 34, 35 | See total acres below | Water Power Project/PP-12022 | FERC | C | R |
| | | T. 40 S., R. 2 E., Sec. 2 | | Water Power Project/PP-12022 | FERC | C | R |
| | | **Total Acres for OR 56726:** | **Not available** | | | | |
| OR 18974 | FPC Orders OF 4/22/1959, 2/25/1975 | T. 39 S., R. 2 E., Secs. 28, 35 | See total acres below | Transmission Line/PP-2082 | FERC | C | C |
| | | T. 40 S., R. 2 E., Sec. 1 | | Transmission Line/PP-2082 | FERC | C | C |
| | | T. 40 S., R. 3 E., Secs. 6, 17 | | Transmission Line/PP-2082 | FERC | C | C |
| | | T. 41 S., R. 3 E., Sec. 1 | | Transmission Line/PP-2082 | FERC | C | C |
| | | T. 41 S., R. 4 E., Secs. 6–9, 12, 17 | | Transmission Line/PP-2082 | FERC | C | C |
| | | **Total Acres for OR 18974:** | **Not available** | | | | |
| | Act of 12/30/1982 | T. 40 S., R. 2 E., Secs. 31, 32 | See total acres below | BLM Wilderness Study Area | BLM | | C |
| | | T. 41 S., R. 3 E., Secs. 5, 6 | | BLM Wilderness Study Area | BLM | | C |
| | | **Total Acres for Act of 12/30/1982:** | **Not available** | | | | |

* Open to entry subject to Section 24 of the Federal Power Act

† Open to entry in part subject to Section 24 of the Federal Power Act

**Table K-6.** Withdrawals in the Roseburg District

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 19101 | EO of 8/7/1917 | T. 20 S., R. 7 W., Secs. 25, 27†, 33*, 35 | 600 | Water Power Potential/PSR 629 | BLM | D | C |
| | | T. 21 S., R. 7 W., Secs. 5, 9 | 392.59 | Water Power Potential/PSR 629 | BLM | D | C |
| | | **Total Acres for OR 19101:** | **992.59** | | | | |
| OR 19011 | SO of 7/13/1959 | T. 20 S., R. 7 W., Secs. 25, 27†, 33*, 35 | 600 | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 21 S., R. 7 W., Secs. 5, 9 | 392.59 | Water Power Potential/WPD 11 | BLM | | C |
| | | T. 22 S., R. 7 W., Secs. 19, 31 | 47.45 | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 23 S., R. 7 W., Secs. 5, 9*, 15, 23, 27 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 24 S., R. 7 W., Secs. 3, 11, 13*, 15*, 17, 21*, 23, 29*, 33 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 25 S., R. 7 W., Secs. 5*, 7†, 9, 15, 17, 21†, 23, 27 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 26 S., R. 2 W., Secs. 7, 13, 15, 17, 23 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 26 S., R. 3 W., Secs. 1, 9*, 11, 17* | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 26 S., R. 4 W., Sec. 7 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 26 S., R. 6 W., Secs. 5*, 7 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 30 S., R. 3 W., Secs. 25†, 29*, 31, 33†, 35 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | T. 30 S., R. 4 W., Secs. 15, 21, 23, 25†, 27 | | Water Power Potential/WPD 11 | BLM | D | C |
| | | **Total Acres for OR 19011:** | **992.59** | | | | |
| OR 19105 | EO of 7/24/1917 | T. 22 S., R. 7 W., Secs. 19, 31 | 47.45 | Water Power Potential/PSR 633 | BLM | D | C |
| | | T. 23 S., R. 7 W., Secs. 5, 9*, 15, 23, 27 | | Water Power Potential/PSR 633 | BLM | D | C |
| | | T. 24 S., R. 7 W., Secs. 3, 11, 13*, 15*, 17, 21*, 23, 29*, 33 | | Water Power Potential/PSR 633 | BLM | D | C |
| | | T. 25 S., R. 7 W., Secs. 5*, 7†, 9, 15, 17, 21†, 23, 27 | | Water Power Potential/PSR 633 | BLM | D | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | T. 26 S., R. 6 W., Secs. 5*, 7 | | Water Power Potential/PSR 633 | BLM | D | C |
| | | **Total Acres for OR 19105:** | **Not available** | | | | |
| OR 19057 | EO of 6/4/1912 | T. 23 S., R. 7 W., Secs. 21, 32 | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 24 S., R. 7 W., Secs. 20*, 28 | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 25 S., R. 7 W., Secs. 6†, 7* | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 26 S., R. 2 W., Sec. 21 | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 26 S., R. 3 W., Sec. 9* | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 26 S., R. 4 W., Sec. 18* | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 26 S., R. 6 W., Sec. 8 | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 30 S., R. 2 W., Sec. 28 | | Water Power Potential/PSR 280 | BLM | D | C |
| | | T. 30 S., R. 4 W., Sec. 25* | | Water Power Potential/PSR 280 | BLM | D | C |
| | | **Total Acres for OR 19057:** | **Not available** | | | | |
| OR 19341 | PLO 754 | T. 24 S., R. 7 W., Secs. 20, 21 | 28.28 | Timber Preservation | BLM | A | C |
| ORE 016183B | PLO 3869 | T. 21 S., R. 6 W., Sec. 1 | 80 | Gunter Recreation Site | BLM | B | C |
| | | T. 24 S., R. 7 W., Sec. 13 | 23.7 | Tyee Recreation Site | BLM | B | C |
| | | T. 25 S., R. 1 W., Sec. 23 | 20 | Scaredman Recreation Site | BLM | B | C |
| | | T. 25 S., R. 1 W., Sec. 24 | 40 | Recreation Site | BLM | B | C |
| | | T. 25 S., R. 1 W., Sec. 25 | 20 | Scaredman Recreation Site | BLM | B | C |
| | | T. 25 S., R. 1 W., Sec. 30 | 40 | Recreation Site | BLM | B | C |
| | | T. 25 S., R. 2 W., Sec. 15 | 160 | Rock Creek Recreation Site | BLM | B | C |
| | | T. 25 S., R. 2 W., Sec. 21 | 320 | Mill Pond Recreation Site | BLM | B | C |
| | | T. 26 S., R. 2 W., Sec. 14 | 160 | Susan Creek Falls | BLM | B | C |
| | | T. 26 S., R. 3 W., Sec. 9 | 6.44 | Lone Rock | BLM | B | C |
| | | T. 27 S., R. 2 W., Sec. 16 | 178.53 | Wolf Creek Trail | BLM | B | C |
| | | T. 27 S., R. 3 W., Sec. 23 | 80 | Cavitt Creek Forest | BLM | B | C |
| | | T. 31 S., R. 8 W., Sec. 35 | 20 | Island Creek Day-Use Area | BLM | B | C |
| | | **Total Acres for ORE 016183B:** | **Not available** | | | | |
| OR 1102 | EO of 6/29/1917 | T. 25 S., R. 7 W., Sec. 6 | | Water Power Potential/PSR 630 | BLM | D | C |
| OR 3660A | PLO 4537 | T. 25 S., R. 7 W., Secs. 9, 10, 15 | 91.88 | Umpqua Recreation Site | BLM | B | C |
| OR 19144 | SO of 1/20/1970 | T. 25 S., R. 8 W., Sec.12 | 20.8 | Water Power Potential/PSC 162 | BLM | D | C |
| | | T. 26 S., R. 6 W., Sec. 30* | | Water Power Potential/PSC 162 | BLM | D | C |
| | | T. 26 S., R. 5 W., Sec. 26 | | Water Power Potential/PSC 162 | BLM | D | C |
| | | **Total Acres for OR 19144:** | **Not available** | | | | |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 19153 | SO of 6/29/1928 | T. 26 S., R. 3 W., Sec. 17* | | Water Power Potential/PSC 202 | BLM | D | C |
| OR 44740 | PL 100-557 | T. 26 S., R. 2 W., Secs. 7, 8, 13–18, 20–24 | 1,620 | North Umpqua Wild and Scenic River | BLM | Various | C |
| OR 18874 | FPC Orders of 12/28/1948 and 5/18/1953 | T. 26 S., R. 3 W., Sec. 35 | | 100 foot wide electric transmission line/PP 1927 | BLM | B | C |
| | | T. 26 S., R. 2 W., Secs. 7, 13–15, 17, 21, 29–31 | 110.11 | 100 foot wide electric transmission line/PP 1927 | FERC | B | C |
| | | **Total Acres for OR 18874:** | **Not available** | | | | |
| OR 19103 | EO of 7/10/1917 | T. 26 S., R. 2 W., Secs. 7, 13, 15, 17, 23 | 397.3 | Water Power Potential/PSR 631 | BLM | D | C |
| | | T. 26 S., R. 3 W., Secs. 1, 9*, 11, 17* | | Water Power Potential/PSR 631 | BLM | D | C |
| | | T. 26 S., R. 4 W., Sec. 7 | | Water Power Potential/PSR 631 | BLM | D | C |
| | | **Total Acres for OR 19103:** | **Not available** | | | | |
| OR 19184 | SO of 5/29/1951 | T. 26 S., R. 2 W., Secs. 14, 22, 24 | 300 | Water Power Potential/PSC 416, | BLM | D | C |
| OR 19016 | SO of 10/24/1919 | T. 26 S., R. 2 W., Sec. 21 | 33.78 | Water Power Potential/WPD 16 | BLM | D | C |
| OR 18874 | FPC Order of 3/30/1945 | T. 26 S., R. 3 W., Secs. 1, 35 | 12.17 | 100 foot wide electric transmission line/PP 1927 | FERC | B | |
| OR 5263 | PLO 4848 | T. 26 S., R. 3 W., Sec. 1 | 80 | Swiftwater Recreation Site | BLM | B | C |
| | | T. 27 S., R. 2 W., Sec. 1 | 80 | Emile Creek Recreation Site | BLM | B | |
| | | T. 27 S., R. 2 W., Sec. 8 | 80 | Little River Wayside | BLM | B | |
| | | **Total Acres for OR 5263:** | **585.95** | | | | |
| ORE 013683 | PLO 4448 | T. 29 S., R. 7 W., Secs. 17, 21 | 60.22 | Umpqua River Reclamation Project | BR | B | C |
| | | T. 30 S., R. 7 W., Secs. 5, 6 | 50.15 | Umpqua River Reclamation Project | BR | B | C |
| | | **Total Acres for ORE 013683:** | **110.37** | | | | |
| OR 19113 | EO of 12/12/1917 | T. 20 S., R. 7 W., Sec. 3 | 40 | Water Power Potential/PSR 659 | BLM | D | C |
| | | T. 29 S., R. 9 W., Sec. 35 | 40 | Water Power Potential/PSR 659 | BLM | D | C |
| | | T. 30 S., R. 3 W., Secs. 25†, 29*, 31, 33†, 35 | | Water Power Potential/PSR 659 | BLM | D | C |
| | | T. 30 S., R. 4 W., Secs. 15, 21, 23, 25†, 27 | | Water Power Potential/PSR 659 | BLM | D | C |
| | | T. 30 S., R. 9 W., Sec. 3 | | Water Power Potential/PSR 659 | BLM | D | C |
| | | **Total Acres for OR 19113:** | **Not available** | | | | |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 19014 | SO of 12/12/1917 | T. 20 S., R. 7 W., Sec. 3 | | Water Power Potential/WPD 14 | BLM | D | C |
| | | T. 29 S., R. 9 W., Sec. 35 | 40 | Water Power Potential/WPD 14 | BLM | D | C |
| | | T. 30 S., R. 9 W., Sec. 3 | | Water Power Potential/WPD 14 | BLM | D | C |
| | | **Total Acres for OR 19014:** | **Not available** | | | | |
| OR 19152 | SO of 2/15/1928 | T. 30 S., R. 2 W., Secs. 23, 29, 31 | | Water Power Potential/PSC 198 | BLM | D | C |
| | | T. 30 S., R. 4 W., Sec. 15* | | Water Power Potential/PSC 198 | BLM | D | C |
| | | **Total Acres for OR 19152:** | **Not available** | | | | |
| OR 19171 | SO of 1/6/1940 | T. 30 S., R. 2 W., Sec. 12 | | Water Power Potential/PSC 315 | BLM | D | C |
| | | T. 30 S., R. 3 W., Secs. 19, 29 | | Water Power Potential/PSC 315 | BLM | D | C |
| | | T. 30 S., R. 4 W., Sec. 29 | | Water Power Potential/PSC 315 | BLM | D | C |
| | | T. 31 S., R. 3 W., Sec. 3 | 83.61 | Water Power Potential/PSC 315 | BLM | D | C |
| | | **Total Acres for OR 19171:** | **Not available** | | | | |
| OR 53486 | PLO 7413 | T. 31 S., R. 7 W., Sec. 4 | | Iron Mountain Gold Panning Area | BLM | B | C |
| | | T. 30 S., R. 2 W., Sec. 23 | | Pickett Bridge Recreation Site | BLM | B | C |
| | | T. 30 S., R. 7 W., Sec. 5 | | Olalla-Thompson Creek Day Use Area | BLM | B | C |
| | | T. 31 S., R. 7 W., Sec. 1 | | Island Creek Recreation Site | BLM | B | C |
| | | **Total Acres for OR 53486:** | **143.32** | | | | |

* Open to entry subject to Section 24 of the Federal Power Act

† Open to entry in part subject to Section 24 of the Federal Power Act

**Table K-7.** Withdrawals in the Salem District

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 23947 | PL 96-199 | T. 10 S., R. 11 W., Sec. 30 | 100 | Yaquina Head | BLM, USCG | A | C |
| OR 8920 | PLO 5372 | T. 8 S., R. 6 W., Sec. 33 | 80 | Little Sink RNA | BLM | B | C |
| OR 37275 | PL 98-328 | T. 7 S., R. 3 E., Secs. 12–14; | See total acres below | Table Rock Wilderness | BLM | A | C |
| | | T. 7 S., R. 4 E., Secs. 7–12, 15–22 | | Table Rock Wilderness | BLM | A | C |
| | | **Total Acres for OR 37275:** | **5,500** | | | | |
| ORE 05555 | BO of 7/12/1957 | T. 15 S., R. 7 W., Sec. 7 | 110.9 | Air Navigation/ANS-58-1, Prairie Mtn. | FAA | B | C |
| ORE 03060 | PLO 989 | T. 3 S., R. 5 E., Secs. 26–28 | 600 | Fish Hatchery and Eagle Creek | USFWS | B | C |
| ORE 015487 | PLO 3609 | T. 4 S., R. 3 E., Sec. 13 | 320 | Walter Horning Seed Orchard | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 3 S., R. 7 W., Sec. 32 | 35 | Alder Glenn Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 14 S., R. 7 W., Secs. 25, 26 | 40 | Alsea Falls Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 9 S., R. 3 E., Sec. 7 | 80 | Canyon Creek Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 12 S., R. 3 E., Sec. 3 | 80 | Dogwood Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 9 S., R. 3 E., Sec. 9 | 120 | Elkhorn Valley Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 9 S., R. 2 E., Sec. 25 | 160 | Fishermen's Bend Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 3 N., R. 3 W., Sec. 21 | 20 | Little Bend Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 7 S., R. 6 W., Secs. 4, 9 | | Mill Creek Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 14 S., R. 9 W., Sec. 13 | 40 | Missouri Bend Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 3 S., R. 4 E., Sec. 11 | 160 | North Fork Eagle Creek Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 4 N., R. 3 W., Sec. 7 | 30 | Scaponia Recreation Site | BLM | B | C |
| ORE 016183 | PLO 3869 | T. 11 S., R. 4 E., Sec. 19 | 80 | Yellowbottom Recreation Site | BLM | B | C |
| OR 6363 | PLO 5136 | T. 12 S., R. 7 W., Sec. 28 | 40 | Mary's Peak Administrative Site | USFS | B | C |
| OR 50856 | PLO 7215 | T 3 S., R. 10 W., Sec. 30 | See total acres below | Pacific Coast Highway | BLM | B | C |
| | | T 4 S., R. 10 W., Secs. 19, 29 | | Pacific Coast Highway | BLM | B | C |
| | | T 5 S., R. 10 W., Secs. 5, 6, 20 | | Pacific Coast Highway | BLM | B | C |
| | | T 8 S., R. 11 W., Sec. 3 | | Pacific Coast Highway | BLM | B | C |
| | | T 9 S., R. 11 W., Sec. 4 | | Pacific Coast Highway | BLM | B | C |
| | | T .13 S., R. 11 W., Sec. 28 | | Pacific Coast Highway | BLM | B | C |
| | | T 14 S., R. 12 W., Sec. 35 | | Pacific Coast Highway | BLM | B | C |
| | | **Total Acres for OR 50856:** | **1,007.2** | | | | |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 18842 | FPC Order of 11/17/1924 | T. 2 S., R. 4 E., Sec. 1 | 24 | Electric Power Generator/Sandy River - Marmot Dam Bull Run Project/PP 477 | FERC | C | C |
| | | T. 2 S., R. 5 E., Secs. 1, 15 | 24 | Electric Power Generator/Sandy River - Marmot Dam Bull Run Project/PP 477 | FERC | C | C |
| | | **Total Acres for OR 18842:** | **48** | | | | |
| OR 19146 | SO of 2/26/1927 | T. 7 S., R. 3 E., Secs. 1, 5, 11–13, 15, 22–24 | | Potential Power Development/Molalla River PSC 170 | BLM | D | R |
| OR 19147 | SO of 2/26/1927 | T. 8 S., R. 8 W., Sec. 35 | 957 | Potential Power Development/Siletz River/PSC 171 | BLM | D | R |
| OR 19166 | SO of 1/3/1938 | T. 5 N., R. 6 W., Sec. 6 | 10 | Potential Power Development/Nehalem River/PSC 304 | BLM | D | R |
| | | T. 5 N., R. 7 W., Sec. 10 | 40 | Potential Power Development/Nehalem River/PSC 304 | BLM | D | R |
| | | **Total Acres for OR 19166:** | **50** | | | | |
| OR 19183 | DO of 11/9/1950 | T. 14 S., R. 8 W., Secs. 15, 19, 21, 29 | 240 | Potential Power Development/Alsea River/PSC 413 | BLM | D | R |
| | | T. 15 S., R. 8 W., Sec. 7 | 76 | Potential Power Development/Alsea River/PSC 413 | BLM | D | R |
| | | T. 15 S., R. 9 W., Sec. 1 | 40 | Potential Power Development/Alsea River/PSC 413 | BLM | D | R |
| | | **Total Acres for OR 19183:** | **356** | | | | |
| OR 19038 | EO of 7/2/1910 | T. 3 N., R. 8 W., Secs. 10, 18 | 61 | Potential Power Development/Nehalem River/PSR 89 | BLM | D | R |
| OR 19074 | EO of 10/23/1914 | T. 12 S., R. 1 W., Sec. 34 | 11 | Potential Power Development/Santiam River/PSR 458 | BLM | D | R |
| OR 19113, OR 19014 | EO of 12/12/1917, SO of 12/12/1917 | Various | 6,149 | Potential Power Development/Alsea, Nehalem, Scappoose and Trask Rivers/PSR 659, WPD 14 | BLM | D | R |
| OR 19115, OR 19014 | EO of 12/12/1917, SO of 12/12/1917 | Various | 10,370 | Potential Power Development/Clackamas River/PSR 661, WPD 14 | BLM | D | R |
| OR 19118 | EO of 12/12/1917, | Various | 1,143 | Potential Power Development/Eagle Creek, So. Yamhill, Molalla and N. Santiam Rivers/ PSR 664 | BLM | D | R |
| OR 19127, OR 19014, OR 19016 | EO 2/19/1920, SO 12/12/1917, SO of 12/24/1919 | Various | 1,900 | Potential Power Development/Clackamas, Nestucca, Sandy, Santiam Rivers/ PSR 730, WPD 14 and WPD 16 | BLM | D | R |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| OR 1572 | PLO 4305 | T. 14 S., R. 7 W., Sec. 25 | 132.5 | Alsea Falls Recreation Site | BLM | B | C |
| OR 3660 | PLO 4537 | T. 2 S., R. 7 E., Sec. 31 | 280 | Wildwood Recreation Site | BLM | B | C |
| | | T. 8 S., R. 4 E., Sec. 31 | 160 | Salmon Falls Recreation Site | BLM | B | C |
| | | T. 14 S., R. 9 W., Sec. 13 | 10 | Missouri Bend Recreation Site | BLM | B | C |
| | | **Total Acres for OR 3660:** | **450** | | | | |
| OR 19116 | EO of 12/12/1917 | T. 1 S., R. 6 W., Sec. 28 | 80 | Protect Water Power and Reservoir Potential/PSR 662 | BLM | D | C |
| | | T. 3 S., R. 6 W., Secs. 8, 18 | 188 | Protect Water Power and Reservoir Potential/PSR 662 | BLM | D | C |
| | | T. 1 S., R. 7 W., Sec. 26 | 160 | Protect Water Power and Reservoir Potential/PSR 662 | BLM | D | C |
| | | T. 3 S., R. 7 W., Secs. 24, 26, 28, 32 | 1,003 | Protect Water Power and Reservoir Potential/PSR 662 | BLM | D | C |
| | | T. 1 S., R. 8 W., Secs. 21, 22, 28, 29, 30 | | Protect Water Power and Reservoir Potential/PSR 662 | BLM | D | C |
| | | **Total Acres for OR 19116:** | **Not available** | | | | |
| OR 19187 | DO of 1/21/1958 | T. 12 S., R. 3 E., Secs. 10, 17, 19, 20, 27, 30 | See total acres below | Protect Water Power and Reservoir Potential/PSC 442 | BLM | D | C |
| | | T. 12 S., R. 4 E., Sec. 19 | | Protect Water Power and Reservoir Potential/PSC 442 | BLM | D | C |
| | | **Total Acres for OR 19187:** | **Not available** | | | | |
| OR 44742 | PL 100-557 | T. 11 S., R. 3 E., Secs. 23–26, 35, 36 | See total acres below | Quartzville Creek Wild and Scenic River | BLM | B | C |
| | | T. 12 S., R. 3 E., Secs. 2, 3, 9, 10 | | Quartzville Creek Wild and Scenic River | BLM | B | C |
| | | **Total Acres for OR 44742:** | **Not available** | | | | |
| OR 59658 | PLO 7685 | T. 11 S., R. 3 E., Secs. 25, 26, 35 | See total acres below | Quartzville Creek | BLM | B | C |
| | | T. 12 S., R. 3 E., Secs. 2, 3, 9, 10 | | Quartzville Creek | BLM | B | C |
| | | **Total Acres for OR 59658:** | **Not available** | | | | |
| OR 44744 | PL 100-557 | T. 03 S., R. 7 E., Sec. 1 | Not available | Salmon Wild and Scenic River | BLM | B | C |
| OR 59546 | PL 104-208 | T. 3 S., R. 10 W., Secs. 6, 7, 18, 19, 30, | See total acres below | Oregon Islands Wilderness Additions | BLM | A | C |
| | | T. 5 N., R. 11 W., Sec. 1 | | Oregon Islands Wilderness Additions | BLM | A | C |
| | | **Total Acres for OR 59546:** | **95** | | | | |
| OR 44746 | PL 100-557 | T. 1 S., R. 4 E., Sec. 1 | Not available | Sandy Wild and Scenic River | BLM | B | C |
| OR 53424 | PL 104-333 | T. 9 S., R. 3 E., Sec. 1 | See total acres below | Elkhorn Creek Wild and Scenic River | BLM | B | C |
| | | T. 9 S., R. 4 E., Secs. 5, 6, 7 | | Elkhorn Creek Wild and Scenic River | BLM | B | C |

| Serial Number | Order Number | Legal Description | Acres | Purpose Name | Managing Agency | Segregation Effect | Recommendation |
|---|---|---|---|---|---|---|---|
| | | **Total Acres for OR 53424:** | **Not available** | | | | |
| OR 11517 | PLO 6287 | Various | Not available | Oregon Islands National Wildlife Refuge | USFWS | B | C |
| ORE 11235 | PLO 2952 | T. 12 S., R. 3 E. | 860 | Green Peter Reservoir | COE | C | C |

* Open to entry subject to Section 24 of the Federal Power Act

† Open to entry in part subject to Section 24 of the Federal Power Act

## Land Tenure Zone 3 Lands

**Table K-8** through **Table K-13** contains Zone 3 lands that are available for disposal.

**Table K-8.** Land Tenure Zone 3 lands in the Coos Bay District

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 19 S. | 12 W. | 1 | Lots 1 and 2 | 40.48 | PD |
| 20 S. | 09 W. | 33 | Lot 7 | 3.98 | OC |
| 20 S. | 10 W. | 31 | Por. lot 10 | 5.98 | PD |
| 20 S. | 11 W. | 36 | Por. lot 9 | | |
| 21 S. | 11 W. | 31 | Lot 18 | 37.22 | PD |
| 21 S. | 11 W. | 32 | Lots 16 and 23 | 59.01 | PD |
| 22 S. | 08 W. | 15 | Lots 9 and 10 | 25.30 | OC |
| 22 S. | 08 W. | 21 | Lots 7 and 14 | 2.42 | OC |
| 22 S. | 13 W. | 14 | Lots 1 and 2 | 71.10 | PD |
| 25 S. | 11 W. | 30 | Lot 5 | 39.92 | PD |
| 25 S. | 13 W. | 7 | Lots 6, 8, 13 – 15 | 92.78 | PD |
| 25 S. | 13 W. | 18 | Lot 7, E½NE¼NW¼, E½SE¼NW¼ | 56.15 | PD |
| 26 S. | 08 W. | 10 | SE¼NE¼ | 40 | PD |
| 26 S. | 11 W. | 8 | NW¼NE¼ | 40 | PD |
| 26 S. | 12 W. | 9 | Por. SE¼SW¼ | 4 | ACQ |
| 26 S. | 14 W. | 3 | Por. Lots 1 and 2, SE¼NW¼ | 62.18 | PD |
| 26 S. | 14 W. | 28 | NW¼NE¼ | 40 | PD |
| 28 S. | 12 W. | 19 | SE¼SE¼ | 40 | CBWR |
| 30 S. | 12 W. | 5 | Lot 6 | 1.80 | OC |
| 30 S. | 12 W. | 6 | Lots 3 and 4 | 1.14 | PD |
| 30 S. | 13 W. | 21 | N½NE¼NW¼ | 20 | PD |
| 32 S. | 14 W. | 7 | N½SW¼NE¼NW¼ | 5 | PD |
| 32 S. | 15 W. | 4 | NE¼SE¼NE¼, S½NE¼NE¼, W1/2SE¼NE¼, Lots 1 – 4 | 71.75 | PD |
| 39 S. | 12 W. | 8 | W½NW¼ | 80 | PD |
| | | | **Grand Total** | **840.21** | - |

**Table K-9.** Land Tenure Zone 3 lands in the Eugene District

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 14S. | 1E. | 19 | W½NE¼ | 80 | PD |
| 14S. | 1E. | 26 | SE¼NE¼ | 40 | PD |
| 14S. | 1E. | 33 | NE¼SE¼ | 40 | OC |
| 14 S. | 2 E. | 6 | NE¼SW¼ | 40 | PD |
| 14 S. | 3 E. | 19 | Lot 1 | 37.02 | PD |
| 15 S. | 2 W. | 25 | Por. SE¼SE¼ | 16.19 | OC |
| 16 S. | 5 W. | 33 | Lots 4, 7, and 8, and un-numbered lot | 5.66 | OC |
| 16 S. | 6 W. | 7 | Lot 6 | 3.76 | OC |
| 16 S. | 2 E. | 27 | S½SE¼, NE¼NW¼ | 120 | OC |
| 16 S. | 2 ½ E. | 1 | All | 32.81 | PD |
| 17 S. | 1 W. | 19 | NW¼NE¼ | 40 | OC |
| 17 S. | 1 W. | 31 | Lot 3, SW¼SW¼, SW¼SE¼ | 125.58 | OC |
| 17 S. | 3 W. | 15 | Lot 6 | 0.85 | OC |

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 17 S. | 6 W. | 35 | SE¼SE¼ | 40 | OC |
| 17 S. | 11 W. | 19 | Lot 1 | 44.82 | PD |
| 18 S. | 1 W. | 5 | Por. lot 8 | 0.84 | OC |
| 18 S. | 1 W. | 26 | Lot 7 | 1.68 | PD |
| 18 S. | 2 W. | 1 | Lots 1 - 4, SW¼NW¼ | 270.41 | OC |
| 18 S. | 4 W. | 33 | SW¼NW¼ | 40 | OC |
| 18 S. | 4 W. | 35 | SE¼NE¼ | 40 | OC |
| 18 S. | 5 W. | 15 | NW¼NW¼ | 40 | OC |
| 18 S. | 5 W. | 23 | SW¼NW¼, W½SW¼ | 120 | OC |
| 18 S. | 7 W. | 11 | Por. NE¼NE¼ | 3 | OC |
| 18 S. | 9 W. | 7 | SE¼SW¼ | 40 | OC |
| 18 S. | 10 W. | 11 | Lot 9 | 6.24 | PD |
| 18 S. | 11 W. | 18 | SE¼SE¼ | 40 | PD |
| 18 S. | 12 W. | 15 | SE¼NE¼ | 40 | PD |
| 19 S. | 3 W. | 29 | SE¼SW¼ | 40 | OC |
| 19 S. | 3 W. | 35 | Lot 3 | 2.79 | OC |
| 19 S. | 4 W. | 29 | Por. NE¼SW¼ | 0.36 | OC |
| 19 S. | 4 W. | 31 | Lot 1, SW¼SE¼ | 81.33 | OC |
| 19 S. | 5 W. | 1 | S½SW¼ | 80 | OC |
| 20 S. | 4 W. | 6 | NE¼NE¼ | 40.23 | PD |
| 20 S. | 4 W. | 25 | SE¼SW¼ | 40 | OC |
| 21 S. | 2 W. | 7 | Lot 1 | 41.37 | OC |
| 21 S. | 1 W. | 31 | Lot 13 | 1.42 | OC |
| 21 S. | 4 W. | 1 | N½NE¼, NW¼NW¼ | 120 | OC |
| 22 S. | 1 W. | 5 | Por. lot 18 | 2.20 | OC |
| 22 S. | 3 W. | 7 | Lots 1 and 2 | 91.46 | OC |
| | | | **Grand Total** | **1,850.02** | - |

**Table K-10.** Land Tenure Zone 3 lands in the Klamath Falls Field Office

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 37 S. | 14 E. | 10 | W½NE¼ | 80 | PD |
| 38 S. | 8 E. | 31 | Lot 4 | 10.3 | PD |
| 38 S. | 11 E. | 17 | NW¼NE¼, E½SE¼ | 120 | PD |
| 38 S. | 11 E. | 32 | NE¼SW¼, NW¼SE¼ | 80 | PD |
| 39 S. | 8 E. | 6 | Lot 8 | 27.2 | PD |
| 39 S. | 8 E. | 7 | Lot 5 | 16.9 | PD |
| 39 S. | 11 E. | 2 | Lot 1 | 40.24 | PD |
| 39 S. | 12 E. | 28 | NE¼SW¼ | 40 | PD |
| 40 S. | 8 E. | 17 | SW¼SE¼ | 40 | PD |
| 40 S. | 8 E. | 33 | NE¼SW¼ | 40 | PD |
| 40 S. | 9 E. | 23 | SW¼NW¼ | 40 | PD |
| 40 S. | 11 E. | 9 | N½NW¼, SE¼NW¼, SE¼NE¼ | 160 | PD |
| 40 S. | 11 E. | 10 | SE¼NE¼, S½NW¼, E½SW¼, W½SE¼ | 280 | PD |
| 40 S. | 11 E. | 14 | NW¼NE¼, NE¼NW¼, S½NW¼, N½SW¼ | 240 | PD |
| 40 S. | 12 E. | 10 | SE¼NW¼, W½SE¼ | 120 | PD |
| 40 S. | 12 E. | 14 | SE¼NW¼, N½SW¼, SW¼SW¼, | 200 | PD |

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| | | | NW¼SE¼ | | |
| 40 S. | 12 E. | 15 | N½NE¼, SE¼SW¼, N½SW¼ | 200 | PD |
| 40 S. | 12 E. | 21 | NE¼SE¼ | 40 | PD |
| 40 S. | 12 E. | 22 | SW¼NE¼, SE¼NW¼ | 80 | PD |
| 40 S. | 13 E. | 35 | SW¼NE¼ | 40 | PD |
| 41 S. | 7 E. | 13 | Lot 4, NE¼NE¼ | 64.69 | PD |
| 41 S. | 11 E. | 8 | Lot 6 | 7.12 | PD |
| | | | **Grand Total** | **2,006.45** | - |

**Table K-11.** Land Tenure Zone 3 lands in the Medford District

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 33 S. | 2 E. | 1 | SE¼SW¼ | 40 | PD |
| 34 S. | 2 E. | 29 | SE¼NE¼ | 40 | PD |
| 34 S. | 6 W. | 22 | NW¼SE¼ | 40 | PD |
| 34 S. | 6 W. | 33 | SW¼SW¼, E½SW¼ | 120 | OC |
| 34 S. | 6 W. | 35 | NW¼NE¼ | 40 | OC |
| 34 S. | 8 W. | 26 | Lot 3 | 24.23 | PD |
| 35 S. | 1 W. | 15 | NW¼SE¼ | 40 | OC |
| 35 S. | 5 W. | 31 | SE¼NW¼, SW¼, W½SE¼ | 281.12 | OC |
| 35 S. | 5 W. | 32 | SW¼NE¼, W½SE¼, NE¼SE¼ | 160 | PD |
| 35 S. | 6 W. | 11 | E½NE¼, SW¼NE¼, NE¼SE¼ | 160 | OC |
| 35 S. | 6 W. | 14 | NW¼SE¼ | 40 | PD |
| 35 S. | 6 W. | 17 | NE¼NE¼, NW¼NW¼ | 80 | OC |
| 35 S. | 6 W. | 19 | NE¼, N½NW¼ | 239.94 | OC |
| 35 S. | 6 W. | 21 | NE¼NE¼ | 40 | OC |
| 35 S. | 6 W. | 29 | NW¼NW¼ | 40 | OC |
| 35 S. | 6 W. | 30 | S½SW¼ | 80 | PD |
| 35 S. | 6 W. | 31 | SW¼NE¼, W½, NW¼SE¼ | 403.96 | OC |
| 35 S. | 6 W. | 33 | E½NE¼, E½NW¼, NW¼NW¼, SE¼SE¼ | 240 | OC |
| 35 S. | 6 W. | 5 | S½NE¼, SE¼SW¼, SE¼ | 280 | OC |
| 35 S. | 6 W. | 7 | NE¼NE¼, N½NW¼, SW¼NW¼, SE¼NE¼ | 198.71 | OC |
| 36 S. | 1 E. | 6 | SE¼SE¼ | 40 | PD |
| 36 S. | 2 E. | 34 | SE¼SW¼, SW¼SE¼ | 80 | PD |
| 36 S. | 3 W. | 21 | NE¼SW¼ | 40 | OC |
| 36 S. | 3 W. | 33 | SW¼SW¼ | 40 | OC |
| 36 S. | 3 W. | 33 | NW¼SE¼SW¼ | 10 | PD |
| 36 S. | 3 W. | 35 | NE¼NE¼ | 40 | OC |
| 36 S. | 4 W. | 25 | SE¼SW¼, S½SW¼SE¼ | 60 | OC |
| 36 S. | 4 W. | 35 | Lot 5, W½SW¼ | 112.4 | OC |
| 36 S. | 5 W. | 29 | S½SW¼ | 80 | OC |
| 36 S. | 5 W. | 4 | E½NW¼, N½SW¼ | 159.26 | PD |
| 36 S. | 5 W. | 5 | SE¼NE¼, NE¼SE¼ | 80 | OC |
| 36 S. | 5 W. | 9 | W½E½, E½W½, E½NW¼SW¼ | 340 | OC |
| 36 S. | 6 W. | 1 | Lots 2 – 4, S½NE¼, N½SW¼, SE¼NW¼, W½SE¼, SE¼SE¼ | 440.2 | OC |

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 36 S. | 6 W. | 11 | NW¼NE¼ | 40 | OC |
| 36 S. | 6 W. | 17 | N½N½ | 160 | OC |
| 36 S. | 6 W. | 3 | SW¼, S½SE¼ | 240 | OC |
| 36 S. | 6 W. | 30 | NW¼SW¼ | 37.78 | PD |
| 36 S. | 6 W. | 31 | NW¼NW¼ | 37.47 | OC |
| 36 S. | 6 W. | 33 | SE¼NE¼ | 40 | OC |
| 36 S. | 6 W. | 4 | W½W½ | 161.06 | PD |
| 36 S. | 6 W. | 5 | E½SE¼, SW¼NW¼, W½SW¼ | 200 | OC |
| 36 S. | 6 W. | 8 | W½SE¼, SE¼SE¼ | 120 | PD |
| 36 S. | 6 W. | 9 | N½NW¼, SW¼NW¼, E½SE¼ | 200 | OC |
| 37 S. | 1 E. | 15 | SE¼NW¼ | 40 | OC |
| 37 S. | 3 W. | 1 | Lot 8 | 13.82 | PD |
| 37 S. | 3 W. | 4 | Lot 2 | 4.28 | PD |
| 37 S. | 3 W. | 5 | Lot 7 | 39.69 | PD/OC |
| 37 S. | 3 W. | 5 | Lot 8 | 30.72 | PD/OC |
| 37 S. | 3 W. | 5 | Lot 9 | 4.78 | PD |
| 37 S. | 5 W. | 18 | W½SW¼ | 90.4 | PD |
| 37 S. | 5 W. | 5 | NE¼NW¼, SW¼NW¼, NW¼SW¼ | 118.87 | OC |
| 37 S. | 5 W. | 7 | W½SW¼ | 90.15 | OC |
| 37 S. | 6 W. | 11 | N½NW¼ | 80 | OC |
| 37 S. | 6 W. | 13 | SW¼SE¼, E½SE¼ | 120 | OC |
| 37 S. | 6 W. | 15 | NE¼NE¼, SW¼NE¼, SE¼NW¼ | 120 | OC |
| 37 S. | 6 W. | 24 | NW¼NE¼ | 40 | PD |
| 37 S. | 6 W. | 3 | SE¼NE¼, NE¼SE¼ | 80 | OC |
| 37 S. | 6 W. | 8 | NE¼NE¼ | 40 | PD |
| 37 S. | 6 W. | 9 | NE¼, N½SW¼, SE¼SW¼, W½SE¼, NE¼SE¼ | 400 | OC |
| 38 S. | 1 E. | 3 | SW¼NW¼ | 40 | OC |
| 38 S. | 1 E. | 5 | SE¼NE¼ | 40 | OC |
| 38 S. | 1 W. | 21 | Lot 1, NE¼SW¼, S½SW¼ | 147.04 | OC |
| 38 S. | 2 E. | 34 | SW¼NW¼, NW¼SW¼ | 80 | PD |
| 38 S. | 2 W. | 10 | NE¼NW¼ | 40 | PD |
| 38 S. | 2 W. | 28 | Lot 1 | 5 | PD |
| 38 S. | 4 W. | 17 | NE¼NE¼ | 40 | OC |
| 38 S. | 4 W. | 25 | Lot 7 | 9.26 | PD |
| 39 S. | 1 W. | 1 | NE¼NE¼ | 40.23 | OC |
| 39 S. | 2 W. | 18 | NW¼NE¼SW¼ | 10 | PD |
| 40 S. | 8 W. | 1 | Lots 7 and 8 | 11.53 | OC |
| 40 S. | 8 W. | 5 | Lots 6 and 7 | 21.21 | OC |
| | | | **Grand Total** | **7,143.11** | - |

**Table K-12.** Land Tenure Zone 3 lands in the Roseburg District

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 24 S. | 5 W. | 29 | Lot 5 | 28 | OC |
| 24 S. | 6 W. | 27 | W½, SW¼SE¼ | 360 | OC |
| 25 S. | 6 W. | 3 | NW¼NE¼, NE¼SW¼, NE¼SE¼ | 122 | OC |
| 25 S. | 6 W. | 33 | SE¼SE¼ | 40 | OC |

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 26 S. | 2 W. | 17 | NE¼NE¼SE¼SE¼ (part North of Highway 138) | 0.3 | OC |
| 26 S. | 4 W. | 10 | Lot 1 | 7 | PD |
| 26 S. | 4 W. | 17 | Lots 9 and 10 | 12 | OC |
| 26 S. | 6 W. | 17 | Lot 2, SE¼NW¼, SE¼SW¼, SW¼SE¼ | 126 | OC |
| 26 S. | 6 W. | 3 | SE¼NE¼, NE¼SE¼ | 80 | OC |
| 27 S. | 4 W. | 7 | Lot 2 | 4 | OC |
| 28 S. | 4 W. | 29 | SE¼NE¼ | 40 | OC |
| 28 S. | 5 W. | 28 | NW¼NW¼ | 40 | PD |
| 28 S. | 5 W. | 29 | E½NE¼ | 80 | OC |
| 30 S. | 2 W. | 34 | SE¼SW¼ | 40 | PD |
| 30 S. | 4 W. | 1 | Lot 9 | 4 | OC |
| 30 S. | 6 W. | 18 | Lots 1 and 2 | 39 | PD |
| | | | **Grand Total** | **1,022.3** | - |

**Table K-13.** Land Tenure Zone 3 lands in the Salem District

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 3 N. | 1 W. | 9 | Lot 8 | 1.24 | Ot |
| 3 N. | 8 W. | 10 | NW¼NE¼ | 40 | PD |
| 3 N. | 8 W. | 11 | Lot 2 | 0.01 | PD |
| 5 N. | 6 W. | 6 | Lot 9 | 2.12 | PD |
| 5 N. | 7 W. | 10 | SW¼NE¼ | 40 | PD |
| 7 N. | 4 W. | 6 | Lot 7 | 0.03 | PD |
| 1 S. | 3 W. | 7 | Lot 1 | 0.18 | OC |
| 1 S. | 3 W. | 8 | Lot 1 | 0.05 | PD |
| 2 S. | 2 E. | 4 | Lot 2 | 0.04 | PD |
| 2 S. | 2 E. | 9 | Lot 7 | 0.11 | Ot |
| 2 S. | 3 E. | 23 | Lots 8 and 12 | 6.25 | OC |
| 2 S. | 3 E. | 25 | Lots 7 and 8 | 1.69 | OC |
| 2 S. | 3 W. | 13 | N½SW¼ | 80 | OC |
| 2 S. | 3 W. | 23 | N½NE¼, NE¼NW¼ | 120 | OC |
| 2 S. | 4 W. | 31 | Lot 1 | 1.30 | OC |
| 3 S. | 2 E. | 7 | Lot 1 | 0.87 | OC |
| 3 S. | 4 W. | 33 | Lot 4 | 0.11 | OC |
| 3 S. | 9 W. | 20 | NW¼NE¼ | 40 | PD |
| 3 S. | 9 W. | 28 | SW¼SE¼ | 40 | PD |
| 3 S. | 9 W. | 33 | NW¼NE¼ | 40 | PD |
| 3 S. | 10 W. | 30 | Lot 15 | 0.45 | PD |
| 4 S. | 1 E. | 21 | Lot 1 | 0.49 | OC |
| 4 S. | 2 E. | 11 | NE¼NE¼, SW¼NE¼, E½SW¼, NW¼SE¼ | 200 | OC |
| 4 S. | 2 E. | 15 | NW¼SE¼ | 40 | OC |
| 4 S. | 2 E. | 33 | Lot 1 | 0.1 | OC |
| 4 S. | 3 E. | 9 | SW¼NE¼, NW¼SE¼ | 80 | OC |
| 4 S. | 3 E. | 19 | Un-numbered lot in SW¼SW¼ | 47.31 | OC |
| 4 S. | 3 E. | 21 | E½NE¼, SW¼NW¼, N½SW¼ | 200 | OC |
| 4 S. | 3 E. | 29 | E½NE¼ | 80 | OC |

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 4 S. | 3 E. | 31 | S½NE¼, NW¼SE¼ | 120 | OC |
| 4 S. | 1 W. | 22 | Un-numbered lot | 0.5 | PD |
| 4 S. | 3 W. | 2 | Lot 1 | 0.25 | PD |
| 4 S. | 3 W. | 34 | Lots 1 and 2 | 4.4 | PD |
| 4 S. | 10 W. | 28 | Lot 3 | 0.53 | PD |
| 5 S. | 3 W. | 4 | Lot 1 | 1.16 | PD |
| 5 S. | 5 W. | 13 | Lot 3 | 0.05 | OC |
| 5 S. | 5 W. | 31 | Lot 1 | 3.57 | OC |
| 5 S. | 5 W. | 34 | Lot 1 | 0.93 | PD |
| 5 S. | 5 W. | 35 | Lot 1 | 8 | OC |
| 6 S. | 3 W. | 2 | Lot 2 | 0.2 | PD |
| 6 S. | 3 W. | 5 | Lot 1 | 2 | OC |
| 6 S. | 1 E. | 13 | E½NW¼, SW¼NW¼ | 120 | OC |
| 6 S. | 1 E. | 25 | NW¼NE¼, SE¼NW¼ | 80 | OC |
| 6 S. | 9 W. | 32 | W½SE¼ | 80 | PD |
| 6 S. | 9 W. | 34 | NW¼SE¼ | 40 | PD |
| 6 S. | 10 W. | 35 | SE¼NE¼ | 40 | PD |
| 7 S. | 1 E. | 1 | SE¼SW¼ | 40 | OC |
| 7 S. | 3 W. | 29 | Lot 3 | 5.42 | OC |
| 7 S. | 6 W. | 34 | SW¼SE¼ | 40 | OC |
| 8 S. | 1 E. | 3 | SW¼NW¼, SW¼ | 200 | OC |
| 8 S. | 1 E. | 27 | NE¼SW¼ | 40 | OC |
| 8 S. | 1 E. | 35 | Lots 1 and 2, NW¼NW¼, S½ | 400.22 | OC |
| 8 S. | 4 W. | 24 | M&B | 1.54 | Ot |
| 8 S. | 4 W. | 25 | M&B | 8 | Ot |
| 8 S. | 10 W. | 20 | W½NW¼NW¼ | 20 | PD |
| 8 S. | 11 W. | 3 | Lot 8 | 4.73 | PD |
| 9 S. | 1 W. | 21 | Lot 7, NW¼NE¼ | 84.21 | OC |
| 9 S. | 3 W. | 21 | Lot 3 | 0.08 | Ot |
| 9 S. | 3 W. | 24 | Un-numbered lot | 1.4 | PD |
| 9 S. | 3 W. | 32 | Lot 2 | 4.6 | PD |
| 9 S. | 4 W. | 9 | Lot 5 | 1.16 | OC |
| 9 S. | 4 W. | 14 | Lot 9 | 0.17 | PD |
| 9 S. | 9 W. | 19 | Por. lot 29 | 10 | PD |
| 9 S. | 9 W. | 33 | Lot 17 | 20 | PD |
| 9 S. | 9 W. | 34 | W½NW¼SW¼ | 20 | PD |
| 9 S. | 10 W. | 26 | SW¼NW¼ | 40 | PD |
| 9 S. | 10 W. | 36 | Por. Lots 5 and 6 | 10 | PD |
| 9 S. | 11 W. | 1 | Lot 6 | 1.46 | PD |
| 9 S. | 11 W. | 4 | SW¼SW¼ | 40 | PD |
| 10 S. | 2 W. | 8 | Lot 1 | 6.13 | PD |
| 10 S. | 3 W. | 24 | Lot 6 | 0.9 | PD |
| 10 S. | 4 W. | 11 | Lot 5 | 1.52 | OC |
| 10 S. | 5 W. | 19 | Lots 1 – 4, NE¼, E½NW¼, E½SW¼ | 480 | OC |
| 10 S. | 5 W. | 23 | Lot 4 | 0.79 | OC |
| 10 S. | 6 W. | 22 | Lots 2 and 3 | 15.7 | PD |
| 10 S. | 7 W. | 18 | SW¼NE¼, SE¼SW¼, W½SE¼ | 160 | PD |
| 10 S. | 10 W. | 2 | Lot 20 | 20 | PD |

| Township | Range | Section | Subdivision | Acres | Status |
|---|---|---|---|---|---|
| 11 S. | 8 W. | 6 | NE¼SW¼, NW¼SE¼, SE¼SE¼ | 120 | PD |
| 11 S. | 9 W. | 31 | Lot 2 | 43.25 | PD |
| 11 S. | 10 W. | 12 | N½NE¼, NW¼SW¼, NE¼SE¼ | 160 | PD |
| 11 S. | 10 W. | 14 | Lot 1 | 2.87 | PD |
| 11 S. | 10 W. | 23 | NE¼SE¼ | 40 | PD |
| 11 S. | 10 W. | 24 | SW¼SW¼ | 40 | PD |
| 11 S. | 10 W. | 25 | Lot 1 | 37.22 | PD |
| 11 S. | 10 W. | 35 | SE¼SE¼ | 40 | PD |
| 12 S. | 4 E. | 30 | SE¼SW¼ | 40 | PD |
| 12 S. | 4 E. | 31 | Lot 1, NE¼NW¼ | 84.81 | PD |
| 12 S. | 2 W. | 13 | Lot 6 | 7.04 | Ot |
| 12 S. | 6 W. | 35 | Lot 3 | 0.2 | Ot |
| 12 S. | 8 W. | 6 | Lot 7 | 40.18 | PD |
| 12 S. | 8 W. | 7 | Lots 1 and 2 | 79.04 | PD |
| 12 S. | 9 W. | 29 | E½NE¼, SE¼SE¼ | 120 | PD |
| 12 S. | 9 W. | 32 | E½NE¼, SW¼NE¼ | 120 | PD |
| 12 S. | 9 W. | 34 | NE¼NW¼ | 40 | PD |
| 12 S. | 9 W. | 35 | NE¼NW¼, S½SW¼ | 120 | PD |
| 12 S. | 10 W. | 6 | SW¼SE¼ | 40 | PD |
| 12 S. | 10 W. | 14 | NE¼NE¼ | 40 | PD |
| 12 S. | 11 W. | 10 | Lots 3 and 4 | 76.16 | PD |
| 12 S. | 11 W. | 17 | Lot 5 | 38.84 | PD |
| 13 S. | 3 E. | 9 | NE¼NE¼ | 40 | PD |
| 13 S. | 2 E. | 24 | N½NE¼, SE¼NE ¼ | 120 | PD |
| 13 S. | 2 W. | 21 | NW¼NE¼ | 40 | OC |
| 13 S. | 4 W. | 30 | Lot 5 | 8.49 | PD |
| 13 S. | 5 W. | 29 | Lot 1 | 0.84 | OC |
| 13 S. | 9 W. | 10 | E½NE¼, NE¼SE¼ | 120 | PD |
| 13 S. | 9 W. | 13 | NW¼NW¼ | 40 | PD |
| 13 S. | 11 W. | 3 | SW¼SE¼ | 40 | PD |
| 13 S. | 11 W. | 28 | Lot 9 | 7.6 | PD |
| 13 S. | 11 W. | 33 | NE¼SE¼ | 40 | PD |
| 14 S. | 5 W. | 25 | Lot 1 | 0.26 | OC |
| 14 S. | 11 W. | 3 | Lots 1, 2, and 25 | 111.5 | PD |
| 14 S. | 11 W. | 4 | Lots 29 and 30 | 84.3 | PD |
| 14 S. | 11 W. | 5 | Lot 10 | 40.62 | PD |
| 14 S. | 11 W. | 6 | Lot 16 | 40 | PD |
| 14 S. | 11 W. | 10 | Lots 1, 11–13, and 17 | 210.21 | PD |
| 14 S. | 11 W. | 15 | NE¼SE¼ | 40 | PD |
| 14 S. | 12 W. | 35 | SE¼NE¼ | 40 | PD |
| 15 S. | 5 W. | 6 | Lot 5 | 1.46 | PD |
| | | | **Grand Total** | **5,596.86** | - |

# Inventory of Communication Sites

**Table K-14** through **Table K-19** contains information on existing communication sites. **Appendix B** contains management direction related to management of communication sites.

**Table K-14.** Communication sites in the Coos Bay District

| Site Name | Township | Range | Section | Quarter Section |
|---|---|---|---|---|
| Roman Nose | 19 S. | 9 W. | 23 | NE¼ and NW¼ |
| John's Peak | 23 S. | 9 W. | 27 | SW¼ |
| Blue Ridge | 26 S. | 12 W. | 35 | SW¼ |
| Signal Tree | 29 S. | 9 W. | 33 | SW¼ |
| Anderson Mountain | 29 S. | 11 W. | 21 | SW¼ |
| Sugar Loaf | 29 S. | 12 W. | 23 | NE¼ |
| Bennett Butte | 30 S. | 13 W. | 20 | NW¼ |
| Edson Butte | 31 S. | 14 W. | 23 | NW¼ |
| Grizzly Mountain | 37 S. | 14 W. | 4 | SE¼ |
| Bosley Butte | 39 S. | 13 W. | 10 | SE¼ |
| Palmer Butte | 40 S. | 13 W. | 10 | SE¼ |
| Black Mound | 40 S. | 13 W. | 20 | SW¼ |

**Table K-15.** Communication sites in the Eugene District

| Site Name | Township | Range | Section | Quarter Section |
|---|---|---|---|---|
| Horse Rock | 15 S. | 2 W. | 1 | NW¼ |
| Mt. Tom | 15 S. | 2 W. | 31 | SW¼ |
| Buck Mountain | 16 S. | 2 W. | 7 | NW¼ |
| South McGowan | 16 S. | 2 W. | 31 | NW¼ |
| Amy Road | 16 S. | 7 W. | 1 | NW¼ and SW¼ |
| Elk Mountain | 16 S. | 8 W. | 26 | NE¼ |
| Windy Peak | 16 S. | 8 W. | 27 | SW¼ |
| Black Canyon | 17 S. | 2 W. | 7 | SW¼ |
| Camp Creek Ridge | 17 S. | 2 W. | 15 | NE¼ |
| Badger Mountain | 17 S. | 7 W. | 35 | NE¼ |
| Vaughn Hill | 18 S. | 6 W. | 5 | SE¼ and NE¼ |
| Brickerville | 18 S. | 10 W. | 3 | NW¼ |
| High Point | 19 S. | 6 W. | 23 | NW¼ |
| Eagle's Rest | 20 S. | 1 W. | 12 | NE¼ |
| Cougar Mountain | 20 S. | 3 W. | 1 | NE¼ |
| Hawley Butte | 21 S. | 1 W. | 29 | NE¼ |
| Hobart Butte | 22 S. | 3 W. | 1 | NW¼ |
| Laurel Butte | 22 S. | 3 W. | 23 | SE¼ |
| Huckleberry Mountain | 24 S. | 1 W. | 6 | SW¼ |

**Table K-16.** Communication sites in the Klamath Falls Field Office

| Site Name | Township | Range | Section | Quarter Section |
|---|---|---|---|---|
| Yaniax | 37 S. | 12 E. | 26 | SW¼ |
| Harpold | 39 S. | 11 E. | 19 | SE¼ and SW¼ |
| Hamaker | 40 S. | 7 E. | 26 | NW¼ |
| Stukel | 40 S. | 10 E. | 10 | SW¼ |
| | | | 15 | NW¼ |
| Buck Butte | 40 S. | 12 E. | 20 | NW¼ |
| Brady Butte | 41 S. | 14 ½ E. | 14 | NW¼ |

**Table K-17.** Communication sites in the Medford District

| Site Name | Township | Range | Section | Quarter Section |
|---|---|---|---|---|
| Cedar Springs | 32 S. | 4 W. | 25 | NE¼ |
| Ninemile Mountain | 32 S. | 9 W. | 13 | SW¼ |
| Buck Rock | 33 S. | 1 W. | 15 | NW¼ |
| King Mountain | 33 S. | 5 W. | 24 | NE¼ |
| Peavine Lookout | 34 S. | 8 W. | 21 | NE¼ |
| Flounce Rock | 33 S. | 2 E. | 5 | SE¼ |
| Mt. Isabelle | 37 S. | 3 W. | 31 | SW¼ |
| Mt. Sexton | 34 S. | 6 W. | 24 | SW¼ |
| Elk Mountain | 35 S. | 5 W. | 11 | SE¼ |
| Manzanita/Round Top | 37 S. | 6 W. | 31 | SE¼ |
| Anderson Butte | 38 S. | 2 W. | 34 | NE¼ |
| Nugget Butte | 36 S. | 3 W. | 9 | SE¼ |
| Tin Pan Peak | 36 S. | 4 W. | 23 | SW¼ |
| Squires Peak | 38 S. | 3 W. | 34 | SE¼ |
| Woodrat | 38 S. | 3 W. | 36 | NW¼ |
| Gilbert Peak | 35 S. | 5 W. | 33 | NW¼ |
| Fielder Mountain | 36 S. | 4 W. | 7 | SE¼ |
| Beacon Hill | 36 S. | 5 W. | 9 | SE¼ |
| Mt. Bluie | 37 S. | 5 W. | 3 | SE¼ |
| Table Mountain | 39 S. | 3 E. | 8 | NW¼ |
| Chestnut Mountain | 39 S. | 3 E. | 35 | NW¼ |
| Mt. Baldy | 36 S. | 5 W. | 27 | NW¼ |
| Tallowbox | 39 S. | 4 W. | 11 | NW¼ |
| Rock Creek | 39 S. | 5 W. | 21 | NE¼ and NW¼ |
| Little Grayback Lockout | 39 S. | 7 W. | 2 | SE¼ |
| Soda Mountain | 40 S. | 3 E. | 28 | NW¼ |

**Table K-18.** Communication sites in the Roseburg District

| Site Name | Township | Range | Section | Quarter Section |
|---|---|---|---|---|
| Yellow Butte | 23 S. | 6 W. | 27 | NW¼ |
| Lane Mountain | 27 S. | 4 W. | 25 | NE¼ |
| Kenyon Mountain | 30 S. | 9 W. | 3 | NW¼ |
| Canyon Mountain | 31 S. | 5 W. | 3 | SW¼ |

**Table K-19.** Communication sites in the Salem District

| Site Name | Township | Range | Section | Quarter Section |
|---|---|---|---|---|
| Lookout Point | 1 S. | 5 E. | 13 | SE¼ |
| Blind Cabin Ridge | 1 S. | 5 W. | 31 | NE¼ |
| Dixie Mountain | 2 N. | 2 W. | 27 | NE¼ |
| Brightwood | 2 S. | 6 E. | 14 | NW¼ |
| Trask Mountain | 2 S. | 6 W. | 29 | NW¼ |
| High Heaven | 3 S. | 5 W. | 33 | SE¼ |
| Bald Mountain | 3 S. | 6 W. | 29 | SW¼ |
| Goat Mountain | 5 S. | 4 E. | 14 | SW¼ |
| Prospect Hill | 8 S. | 4 W. | 24 | SE¼ |
| Mt. Horeb | 9 S. | 4 E. | 17 | NE¼ |
| Snow Peak | 11 S. | 2 E. | 5 | NW¼ |
| Yellowstone Mountain | 11 S. | 3 E. | 32 | NW¼ |
| Prairie Mtn. East | 15 S. | 7 W. | 4 | SE¼ |
| Prairie Mtn. | 15 S. | 7 W. | 7 | SW¼ |
| Prairie Mtn. West | 15 S. | 7 W. | 7 | SW¼ |

# Appendix L – Livestock Grazing

This appendix summarizes the information for allotments in the Klamath Falls Field Office and the Medford District. **Table L-1** and **Table L-2** contain detailed information about these livestock grazing allotments including acres derived from the BLM allotment and pasture boundary (GRA) theme. See **Appendix B** for all allotments the BLM would make unavailable to livestock grazing.

**Table L-1.** Available Klamath Falls Field Office grazing allotments

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chase Mountain | 00101 | 9,283 | 195 | - | 5/15-8/13 | C | 2001 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 1,681, Horses 100 | Critical deer winter range habitat occurs within the allotment. Allotment contains a portion of the HMA. |
| Edge Creek | 00102 | 5,975 | 207 | - | 5/1-9/1 | I | 2000 | Not Meeting Standards; Grazing is not a factor. | Deferred-Rotation | | Range Improvement Potential, common allotment, exclosures or other areas closed to grazing, portion proposed for closure. |
| Buck Mountain* | 00103 | 7,416 | 204 | - | 5/15-9/1 | I | 2000 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 1,643 | None |
| Buck Lake | 00104 | 12,019 | 280 | - | 6/15-10/15 | C | 2000 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 2,129 | Range Improvement Potential, common allotment, exclosures or other areas closed to grazing. |
| Johnson Prairie | 00105 | 119 | 12 | - | 5/1-10/1 | C | 2000 | Not Meeting Standards; Grazing is not a factor. | Yearly | | None |
| Dixie* | 00107 | 4,439 | 320 | 100 | 5/1-8/15 | I | 2002 | Not Meeting Standards; Grazing is a factor. | Yearly | Deer 928, Elk 100, Horses 50 | Range Improvement Potential, exclosures or other areas closed to grazing. Allotment contains portion of the HMA. Continue monitoring grazing and make adjustments to improve rangeland health. |
| Dry Lake | 00140 | 101 | 10 | - | 5/1-6/30 | C | 2001 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 10 | None |
| Chicken Hills | 00141 | 3,520 | 80 | - | 5/15-9/15 | C | 2001 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 931 | None |
| Long Lake | 00142 | 367 | 18 | - | 6/16-9/30 | C | 2000 | Meeting All Standards | Yearly | | None |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Grubb Springs | 00147 | 3,564 | 130 | - | 5/1-9/30 | C | 2000 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 650 | None |
| Adams | 00800 | 40 | 6 | - | 4/15-7/15 | C | 2005 | Not Meeting Standards, Grazing is a factor | Yearly | | Continue monitoring grazing and make adjustments to improve rangeland health. |
| Haught | 00801 | 401 | 27 | - | 5/1-7/31 | C | Not Completed | Not Completed | Yearly | Deer 7 | None |
| Stock Drive | 00802 | 40 | 2 | - | 5/1-6/30 | C | 2006 | Meeting All Standards | Yearly | | None |
| J Spring | 00803 | 241 | 7 | - | 5/1-6/30 | C | 2003 | Meeting All Standards | Yearly | Deer 6 Antelope 2 | None |
| Bar CL | 00804 | 481 | 20 | 22 | 5/1-5/31 | C | Not Completed | Not Completed | Yearly | Deer 10 | None |
| SE 80 | 00805 | 80 | 8 | - | 5/1-10/31 | C | 2006 | Meeting All Standards | Yearly | Deer 1 | None |
| Two Mile | 00806 | 659 | 56 | - | 5/1-9/30 | C | 2006 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 16 Elk 16 | None |
| Barnwell | 00807 | 1,635 | 75 | - | 5/1-6/15 | C | Not Completed | Not Completed | Yearly | Deer 80 | Range Improvement Potential |
| Lee | 00808 | 40 | 10 | - | 6/1-8/15 | C | Not Completed | Not Completed | Yearly | | None |
| Brown | 00809 | 81 | 30 | - | 6/1-8/30 | C | Not Completed | Not Completed | Yearly | Deer 1 | None |
| Brenda | 00810 | 120 | 18 | - | 5/16-6/30 | C | 2006 | Meeting All Standards | Yearly | Deer 24 Elk 24 | None |
| Cheyne | 00811 | 809 | 51 | - | 5/1-6/15 | C | 2004 | Meeting All Standards | Yearly | Deer 40 | None |
| Stukel-Coffin | 00812 | 730 | 55 | - | 5/1-7/1 | C | 2002 | Meeting All Standards | Yearly | Deer 14, Elk 5 | None |
| Cunningham | 00814 | 839 | 108 | - | 5/1-6/15 | C | Not Completed | Not Completed | Yearly | Deer 14 | None |
| Stukel-Dehlinger C. | 00815 | 1,684 | 240 | - | 4/15-8/8 | I | 2002 | Meeting All Standards | Yearly | Deer 31, Elk 11 | None |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Stukel-Dehlinger H. | 00816 | 388 | 30 | - | 5/10-8/10 | C | 2002 | Meeting All Standards | Yearly | Deer 8 | None |
| Drew | 00817 | 766 | 72 | - | 5/1-6/30 | C | 2005 | Meeting All Standards | Yearly | Deer 34, Elk 14 | None |
| Duncan | 00818 | 202 | 15 | - | 5/1-6/15 | C | Not Completed | Not Completed | Yearly | Deer 4 | None |
| Dupont | 00819 | 78 | 7 | - | 4/15-6/1 | C | Not Completed | Not Completed | Yearly | | None |
| North Horsefly | 00821 | 1,287 | 68 | - | 5/1-6/15 | C | 2007 | Meeting All Standards | Yearly | Deer 18 | None |
| Stukel-O'Neill | 00822 | 3,405 | 210 | - | 5/1-7/15 | I | 2002 | Meeting All Standards | Yearly | Deer 59, Elk 20 | Exclosures or other areas closed to grazing |
| North Horsefly | 00823 | 569 | 60 | - | 6/16-8/1 | C | 2007 | Meeting All Standards | Yearly | Deer 17 | None |
| Jeld-Wen | 00824 | 313 | 36 | - | 6/1-7/15 | C | 2006 | Meeting All Standards | Yearly | Deer 7 | None |
| Naylox | 00825 | 757 | 76 | - | 5/1-6/30 | C | 2005 | Meeting All Standards | Yearly | Deer 14 | None |
| Haskins | 00826 | 567 | 80 | - | 5/1-7/15 | C | 2004 | Meeting All Standards | Yearly | Deer 11 | None |
| Stukel-High | 00827 | 348 | 17 | - | 5/1-6/15 | C | 2003 | Meeting All Standards | Yearly | Deer 5 | None |
| Stukel-Hill | 00828 | 975 | 60 | - | 5/1-6/15 | C | 2002 | Meeting All Standards | Yearly | Deer 18, Elk 7 | None |
| Horton | 00829 | 758 | 26 | - | 4/21-6/30 | C | Not Completed | Not Completed | Yearly | Deer 36 | Range Improvement Potential |
| Hungry Hollow | 00830 | 281 | 40/H | - | 6/1-8/30 | C | 2005 | Meeting All Standards | Yearly | Deer 5 | Proposed for conversion from horse to livestock |
| Warlow | 00831 | 560 | 50 | - | 5/1-9/30 | C | 2007 | Meeting All Standards | Yearly | Deer 8, Elk 3 | None |
| Jesperson | 00832 | 1,559 | 158 | - | 5/1-7/1 | C | Not Completed | Not Completed | Yearly | Deer 30, Elk 30 | None |
| Johnson | 00833 | 25 | 6 | -- | 5/1-6/30 | C | Not Completed | Not Completed | Yearly | | None |
| Kellison | 00834 | 352 | 19 | - | 5/1-6/13 | C | 2004 | Not Meeting Standards; Grazing is not a factor. | Yearly | Deer 6 | None |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ketcham | 00835 | 281 | 20 | - | 5/1-6/15 | C | Not Completed | Not Completed | Yearly | Deer 16 | Range Improvement Potential |
| Harpold Chaining | 00836 | 851 | 96 | - | 5/1-5/30 | C | 2007 | Not Meeting Standards; Grazing is a factor. | Yearly | Deer 101 | Range Improvement Potential; continue monitoring grazing and make adjustments to improve rangeland health |
| Bryant-Horton | 00837 | 1,211 | 130 | - | 6/1-7/9 | C | 2006 | Meeting All Standards | Yearly | Deer 24, Elk 8 | None |
| Windy Ridge | 00838 | 602 | 52 | - | 5/1-5/31 | C | Not Completed | Not Completed | Yearly | Deer 11 | Range Improvement Potential |
| Bryant-Loveness | 00839 | 3,307 | 490 | - | 5/1-6/30 | C | Not Completed | Not Completed | Yearly | Deer 161 Elk 21 | Range Improvement Potential |
| Bryant-Lyon | 00840 | 569 | 38 | - | 5/1-9/30 | C | Not Completed | Not Completed | Yearly | Deer 11 | None |
| Marshall | 00841 | 351 | 14 | - | 4/21-5/30 | C | Not Completed | Not Completed | Yearly | Deer 17 | None |
| Short Lake | 00842 | 428 | 40 | - | 5/1-6/30 | C | 2005 | Not Meeting Standards; Grazing is a factor. | Yearly | Deer 42 | Range Improvement Potential; continue monitoring grazing and make adjustments to improve rangeland health |
| McAuliffe | 00843 | 87 | 10 | - | 4/16-6/15 | C | Not Completed | Not Completed | Yearly | Deer 1 | None |
| Paddock | 00844 | 399 | 31 | - | 5/1-6/30 | M | 2003 | Meeting All Standards | Deferred-Rotation | Deer 8, Antelope 3 | None |
| Klamath Hills | 00845 | 198 | 55 | - | 4/1-5/31 | C | Not Completed | Not Completed | Yearly | Deer 10 | None |
| OK | 00846 | 1,290 | 105 | 35 | 5/1-6/15 | C | Not Completed | Not Completed | Yearly | Deer 24 | Range Improvement Potential |
| Swede Cabin | 00847 | 2,018 | 108 | - | 5/1-6/15 | I | 2007 | Meeting All Standards | Yearly | Deer 36 | Range Improvement Potential |
| Pope | 00848 | 446 | 48 | - | 5/1-7/31 | C | 2007 | Meeting All Standards | Yearly | Deer 19 | None |
| Rajnus Bros. | 00849 | 239 | 16 | - | 5/1-6/17 | C | Not Completed | Not Completed | Yearly | Deer 10 | None |
| Wilkinson | 00850 | 398 | 18 | - | 5/1-6/5 | C | Not Completed | Not Completed | Yearly | Deer 6 | None |
| Harpold Ridge | 00851 | 1,049 | 108 | - | 4/21-6/30 | M | 2006 | Meeting All Standards | Yearly | Deer 49 | None |
| Rodgers | 00852 | 2,449 | 235 | - | 5/1-7/1 | I | 2003 | Meeting All Standards | Yearly | Deer 48, Elk 17 | Exclosures or other areas closed to grazing |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7C | 00853 | 646 | 104 | - | 5/1-6/30 | C | 2007 | Meeting All Standards | Yearly | Deer 13 | None |
| Jump | 00854 | 200 | 20 | - | 5/1-5/30 | C | 2007 | Meeting All Standards | Yearly | Deer 4 | None |
| Bryant-Smith | 00855 | 1,217 | 109 | - | 5/15-8/31 | C | 2007 | Meeting All Standards | Yearly | Deer 22, Elk 7 | None |
| Bryant-Stastny | 00856 | 444 | 70 | - | 5/10-9/30 | C | 2007 | Meeting All Standards | Yearly | Deer 8, Elk 3 | None |
| Bryant-Taylor | 00857 | 765 | 74 | - | 4/15-9/30 | C | 2007 | Meeting All Standards | Yearly | Deer 14, Elk 4 | None |
| Swan Lake Rim | 00858 | 6,524 | 300 | - | 5/1-6/30 | M | 2006 | Meeting All Standards | Rest-Rotation | Deer 121, Elk 116 | Common allotment |
| Cunard | 00859 | 468 | 60/H | - | 5/1-7/31 | C | 2002 | Meeting All Standards | Rest-Rotation | Deer 7 | Proposed for conversion from horse to livestock |
| McCartie | 00860 | 556 | 83 | - | 5/1-5/30 | C | 2004 | Meeting All Standards | Rest-Rotation | Deer 25 | None |
| Yainax Butte | 00861 | 2,920 | 120 | - | 7/1-9/30 | M | 2005 | Meeting All Standards | Deferred-Rotation | Deer 119 | Exclosures or other areas closed to grazing |
| Klamath Forest Estates | 00862 | 2,743 | 47 | - | 5/1-5/31 | M | 2005 | Meeting All Standards | Yearly | Deer 47 | None |
| Wirth | 00863 | 1,361 | 100 | - | 4/15-10/15 | C | Not Completed | Not Completed | Yearly | Deer 25 | None |
| Rajnus & Son | 00864 | 1,460 | 110 | - | 5/1-6/30 | C | 2007 | Not Meeting Standards Grazing is not a factor | Yearly | Deer 28 | None |
| Mills Creek | 00865 | 283 | 40 | - | 5/1-6/14 | C | Not Completed | Not Completed | Yearly | Deer 5 | Range Improvement Potential |
| Bear Valley | 00876 | 5,054 | 415 | - | 7/1-8/9 | I | 2000/2003 | Meeting All Standards | Deferred-Rotation | Deer 94, Antelope 34 | Common allotment, exclosures or other areas closed to grazing |
| Bumpheads | 00877 | 9,385 | 420 | 265 | 4/21-6/30 | I | 2003 | Not Meeting Standards; Grazing is a factor. | Deferred-Rotation | Deer 173, Antelope 63 | Exclosures or other areas closed to grazing |
| Campbell | 00878 | 1,371 | 47/H | 13 | 5/1-10/26 | C | 2002 | Meeting All Standards | Yearly | Deer 28, Antelope 10 | Proposed for conversion from horse to livestock |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DeVaul | 00879 | 378 | 12 | 15 | 5/1-8/30 | C | 2003 | Meeting All Standards | Yearly | Deer 5, Antelope 2 | None |
| Goodlow | 00881 | 349 | 32 | 52 | 5/1-8/31 | C | 2003 | Meeting All Standards | Yearly | Deer 6, Antelope 2 | None |
| Horsefly | 00882 | 26,906 | 2,656 | 2,075 | 4/15-6/30, 10/1-11/15 | I | 1999/2003 | Meeting All Standards | Rest-Rotation/ High Intensity-Short Duration | Deer 495, Elk 30, Antelope 181 | Exclosures or other areas closed to grazing, common allotment |
| Horton | 00883 | 1,005 | 58 | 211 | 4/21-5/20 | C | 2002 | Meeting All Standards | Yearly | Deer 41, Antelope 6 | None |
| Pankey Basin | 00884 | 309 | 43 | 38 | 5/15-8/31 | C | 2003 | Not Meeting Standards; Grazing is a factor. | Yearly | Deer 5, Antelope 2 | Range Improvement Potential, exclosures or other areas closed to grazing |
| Dry Prairie | 00885 | 8,026 | 642 | 358 | 5/1-9/30 | I | 1999/2003 | Meeting All Standards | Rest-Rotation | Deer 149, Antelope 55 | Exclosures or other areas closed to grazing, common allotment, proposed range improvement |
| Horse Camp Rim | 00886 | 8,822 | 445 | 281 | 5/1-7/31 | I | 2003 | Meeting All Standards | Rest-Rotation | Deer 172, Antelope 63 | Exclosures or other areas closed to grazing |
| Pitchlog | 00887 | 9,376 | 434 | 796 | 5/10-6/30 | I | 1999/2003 | Meeting All Standards | Rest-Rotation/ High Intensity-Short Duration | Deer 174, Elk 37, Antelope 64 | Exclosures or other areas closed to grazing |
| Rock Creek | 00888 | 2,522 | 216 | 639 | 5/1-5/31 | I | 2003 | Meeting All Standards | Rest-Rotation | Deer 130, Antelope 19 | None |
| Timber Hill | 00889 | 2,542 | 270 | 134 | 6/21-7/31 | I | 1999/2003 | Meeting All Standards | Yearly | Deer 55, Antelope 20 | None |
| Willow Valley | 00890 | 19,925 | 1,225 | 506 | 4/15-6/30 | I | 2000/2003 | Not Meeting Standards, Grazing is a factor | Rest-Rotation | Deer 960, Antelope 141 | Exclosures or other areas closed to grazing, common allotment. |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use | Selective Management Category‡ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding§ | Grazing System | Wildlife AUM's | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Williams | 00892 | 1,854 | 75 | - | 5/1-5/31 | M | 2004 | Meeting All Standards | Yearly | Deer 34, Antelope 12 | None |
| Fields | 00893 | 26 | 6 | - | 4/21-5/20 | C | 2005 | Meeting All Standards | Yearly | Deer 4, Antelope 1 | None |
| Voight | 00894 | 112 | 8 | - | 5/1-6/15 | C | 2003 | Meeting All Standards | Yearly | Deer 2 | None |
| Harpold Canyon | 00895 | 1,085 | 76 | - | 5/1-9/30 | C | 2006 | Meeting All Standards | Yearly | Deer 20 | None |
| McFall | 00896 | 577 | 60 | - | 5/1-6/30 | C | 2006 | Meeting All Standards | Yearly | Deer 11 | Common allotment |
| Bly Mountain | 01800 | 120 | 9 | - | 6/1-8/31 | C | Not Completed | Not Completed | Yearly | | None |

* All or a portion of the allotment is located within the Cascade-Siskiyou National Monument
† Active Use is livestock AUMs, unless specified as H for domestic horse use.
‡ Selective Management Categories: Improve (I)-managed to resolve a high level of resource conflicts and concerns and receive the highest priority for funding and management actions; Maintain (M)-managed to maintain satisfactory resource conditions and will be actively managed to ensure that resource values do not decline; Custodial (C)-managed custodially to protect resource conditions and values.
§ In allotments where grazing was a factor to nonattainment of a RHA standard, within one year of the assessment, a change to livestock grazing was implemented to eliminate livestock grazing as a contributing factor.

**Table L-2.** Available Medford District grazing allotments

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use‡ | Selective Management Category§ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding‖ | Grazing System | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|
| Heppsie Mountain | 00126 | 4,105 | 294 | - | Sp, Su, F | I | 2007 | Not Meeting Standards, Grazing is not a factor | Yearly | Combined with South Heppsie Mountain Allotment (10125, 800 acres). Continue to collect utilization data to establish combined stocking level. |
| Lost Creek | 10001 | 9,962 | 382 | - | Sp, Su, F | I | 2001 | Not Meeting Standards, Grazing is not a factor | Yearly | Common Allotment |
| Flat Creek | 10002 | 12,066 | 328 | - | Sp, Su, F | C | 2000 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Longbranch | 10004 | 324 | 22 | - | Sp | C | 2002 | Meeting All Standards | Yearly | Portion Proposed for Closure |
| Meadows | 10007 | 1,563 | 92 | - | Sp, Su | I | 2003 | Meeting All Standards | Yearly | None |
| Neil-Tarbell | 10008 | 518 | 56 | - | Sp, Su | C | 2015 | Meeting All Standards | Yearly | None |
| North Sams Valley | 10009 | 120 | 8 | - | Su | C | 2002 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Lick Creek | 10015 | 201 | 15 | - | Sp, Su | C | 2003 | Meeting All Standards | Yearly | None |
| Brownsboro Park | 10016 | 382 | 68 | - | Sp, Su | I | 2002 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Kanutchan Fields | 10017 | 2,427 | 177 | - | Sp, Su | I | 2002 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Sugarloaf | 10019 | 1,570 | 15 | - | Sp, Su | C | 2002 | Meeting All Standards | Yearly | None |
| Section 9 | 10021 | 404 | 25 | - | Sp, Su | C | 2003 | Meeting All Standards | Yearly | None |
| Section 7 | 10022 | 374 | 11 | - | Sp, Su | C | 2003 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Bull Run | 10023 | 40 | 5 | - | Sp, Su | C | 2011 | Meeting All Standards | Yearly | None |
| Big Butte | 10024 | 21,802 | 1,663 | - | Sp, Su, F | I | 2000 | Not Meeting Standards, Grazing is not a factor | Deferred-Rotation | Common Allotment |
| Reese Creek | 10027 | 40 | 7 | - | Sp, Su | C | 1999 | Meeting All Standards | Yearly | Common Allotment |
| Derby Road Sawmill | 10029 | 524 | 45 | - | Sp, Su | C | 2003 | Meeting All Standards | Yearly | None |
| Summit Prairie | 10031 | 30,579 | 1,165 | - | Sp, Su, F | I | 2000 | Not Meeting Standards, Grazing is not a factor | Deferred-Rotation | Common Allotment |
| Vestal Butte | 10035 | 2,243 | 120 | - | Sp, Su | I | 2015 | Meeting all Standards | Yearly | None |
| Bear Mountain | 10037 | 1,006 | 81 | - | Sp, Su | I | 2015 | Meeting All Standards | Yearly | None |
| Crowfoot | 10038 | 7,400 | 365 | - | Sp, Su | I | 2015 | Meeting All Standards | Yearly | None |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use‡ | Selective Management Category§ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding‖ | Grazing System | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|
| Crowfoot Creek | 10039 | 516 | 70 | - | Sp, Su | C | 2008 | Meeting All Standards | Yearly | None |
| Cobleigh Road | 10040 | 89 | 14 | - | Sp, Su | C | 2003 | Meeting All Standards | Yearly | None |
| Moser Mountain | 10041 | 40 | 3 | - | Sp | C | 2011 | Meeting All Standards | Yearly | None |
| Devon South | 10043 | 412 | 33 | - | Sp, Su | C | 2008 | Meeting All Standards | Yearly | None |
| Salt Creek | 10044 | 463 | 85 | - | Sp, Su | I | 2002 | Meeting All Standards | Yearly | None |
| Cove Creek | 10112 | 1,290 | 88 | - | Sp, Su | I | 2011 | Not Meeting Standards, Grazing is a factor | Yearly | Continue to monitor grazing and make adjustments to improve rangeland health. |
| Buckpoint | 10114 | 3,845 | 150 | - | Su | C | 2008 | Not Meeting Standards, Grazing is not a factor | Yearly | Permit bought-out/retired February 2015. |
| Howard Prairie | 10116 | 24 | 61 | - | F, W | M | 2012 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Grizzly | 10119 | 5,153 | 378 | 225 | Sp, Su, F | I | 1999 | Not Meeting Standards, Grazing is not a factor | Yearly | Common Allotment, Continue to monitor to set stocking level. |
| Lake Creek Spring | 10121 | 4,250 | 447 | - | Sp, Su | I | 2009 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Lake Creek Summer | 10122 | 4,442 | 550 | - | Su, F | I | 2009 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Deer Creek-Reno Lease | 10124 | 4,062 | 314 | - | Sp, Su, F | C | 2009 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Hunger Flat | 10129 | 1,089 | 220 | | | | Not Completed | Not Completed | Yearly | Currently Vacant Allotment |
| Antelope Road | 10132 | 403 | 19 | - | Sp, Su | C | 2003 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Brownsboro | 10133 | 80 | 8 | - | Sp, Su | C | 2003 | Not Meeting Standards, Grazing is not a factor | Yearly | Continue to monitor grazing and make adjustments to improve rangeland health |
| Yankee Reservoir | 10134 | 121 | 15 | - | Sp | C | 2003 | Not Meeting Standards, Grazing is a factor | Yearly | Continue to monitor grazing and make adjustments to improve rangeland health. |
| Canal | 10136 | 442 | 58 | - | Sp | C | 2003 | Not Meeting Standards, Grazing is a factor | Yearly | Continue to monitor grazing and make adjustments to improve rangeland health |
| Cove Ranch | 10143 | 80 | 20 | - | Sp, Su, F | C | 2009 | Not Meeting Standards, Grazing is not a factor | Yearly | None |

| Allotment Name | Allotment Number | BLM Acres | Active Use (AUMs)† | Suspended (AUMs) | Season-of-Use‡ | Selective Management Category§ | Rangeland Health Assessment Completed | Rangeland Health Assessment Finding‖ | Grazing System | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|
| North Cove Creek | 10148 | 284 | 20 | - | Su, F | C | 2009 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Deadwood* | 20106 | 7,967 | 788 | - | Su | I | 2008 | Not Meeting Standards, Grazing is a factor | Yearly | Common Allotment |
| Poole Hill | 20113 | 1,731 | 50 | - | F | C | 2007 | Not Meeting Standards, Grazing is not a factor | Yearly | None |
| Conde Creek | 20117 | 5,491 | 592 | - | Sp, Su, F | I | 2009 | Not Meeting Standards, grazing is a factor | Yearly | Common Allotment, continue to monitor livestock grazing and make adjustments to improve rangeland health |
| Lower Big Applegate | 20206 | 11,909 | 258 | - | Sp, Su | I | 2012 | Not Meeting Standards, Grazing is not a factor. | Yearly | Continue to monitor livestock grazing and make adjustments to improve rangeland health |
| Foots Creek | 20219 | 115 | 12 | - | Sp, Su | C | 2009 | Meeting All Standards | Yearly | None |

* A portion of the allotment is located within the Cascade-Siskiyou National Monument.
† Active Use is livestock AUMs.
‡ Season of use categories for Medford W= winter (Nov–Jan), Sp=spring (Feb–Apr), Su=summer (May–Aug), F=fall (Sept–Oct)
§ Selective Management Categories: Improve (I)-managed to resolve a high level of resource conflicts and concerns and receive the highest priority for funding and management actions; Maintain (M)-managed to maintain satisfactory resource conditions and will be actively managed to ensure that resource values do not decline; Custodial (C)-managed custodially to protect resource conditions and values.
‖ In allotments where grazing was a factor to nonattainment of a RHA standard, within one year of the assessment, a change to livestock grazing was implemented to eliminate livestock grazing as a contributing factor.

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# Appendix M – Energy and Minerals

This appendix contains the following:

- Trends in salable mineral developments
- Trends in locatable mineral developments and regulation for locatable mineral exploration and development activity
- Reasonably foreseeable leasable fluid mineral developments and proposed stipulations on leasable fluid mineral exploration and development activity
- Rankings of prospective mineral occurrence or development of special areas recommended for withdrawal from locatable mineral entry

## Trends in Salable Mineral Developments

**Table M-1** shows the estimated number of new quarries that would be developed or the existing sites that would require expansion for development per district over a 10-year period. Based on past BLM data, the BLM assumed 0.5 acres would be disturbed for each new site or expansion of an existing site. In this context, expansion means development beyond the existing quarry footprint. As **Table M-1** shows, the BLM estimates that 37 quarry developments or expansions would utilize 18.5 acres in the next 10 years.

**Table M-1.** Salable mineral development 10-year scenario for new or expanded quarry development

| Quarries | Coos Bay | Eugene | Klamath Falls | Medford | Roseburg | Salem | Totals |
|---|---|---|---|---|---|---|---|
| Number of quarries | 7 | 4 | 2 | 9 | 6 | 9 | **37** |
| Acres | 3.5 | 2 | 1 | 4.5 | 3 | 4.5 | **18.5** |

Note: The BLM assumes 0.5 acres per quarry.

## Trends in Locatable Mineral Development and Regulation

**Table M-2** and **Table M-3** show the estimated number of new or renewed Notices and new Plans of Operation that the BLM forecasts will be filed over the next ten years. This number does not include Notices or Plans of Operation for suction dredging. The BLM used past data to estimate the number of proposals and the acres per operation. This data showed that the average Notices is about 0.25 of an acre and the average Plan of Operation is about 3 acres. Based on the number of past submittals of mining proposals, the BLM estimates that 86 Notices and 24 Plans of Operation will be submitted over a 10-year period (**Table M-2**). These Notices would cover a total of 21 acres, with the majority in the Medford District. Approximately 24 Plans of Operation would cover 72 acres, also with the majority in the Medford District (**Table M-3**). New and renewed Notices or new Plans of Operation would utilize 93 acres over the next 10 years in the decision area.

**Table M-2.** Locatable mineral development 10-year scenario Notices

| Notices | Coos Bay | Eugene | Klamath Falls | Medford | Roseburg | Salem | Totals |
|---|---|---|---|---|---|---|---|
| Number of new and renewed Notices | 4 | 4 | - | 70 | 4 | 4 | **86** |
| Acres | 1 | 1 | - | 17 | 1 | 1 | **21** |

**Table M-3.** Locatable mineral development 10-year scenario Plans of Operation

| Plans | Coos Bay | Eugene | Klamath Falls | Medford | Roseburg | Salem | Totals |
|---|---|---|---|---|---|---|---|
| Number of Plans of Operation | 1 | 1 | - | 20 | 1 | 1 | **24** |
| Acres | 3 | 3 | - | 60 | 3 | 3 | **72** |

Mining is regulated by the Surface Management Regulations (43 CFR 3809) and Use and Occupancy under the Mining Laws (43 CFR 3715). It is the responsibility of the mining claimant/operator to prevent "unnecessary or undue degradation" (as defined in 43 CFR 3809.5 and 43 CFR 3809.415), to perform all necessary reclamation work, and to comply with relevant Federal and State regulations.

The BLM considers operations ordinarily resulting in negligible disturbance as defined in 43 CFR 3809.5 to be casual use, and the BLM does not require the operator to provide the BLM with notification. Operators of all mining activities exceeding casual use must file a Notice or Plan of Operation.

## Reasonably Foreseeable Leasable Mineral Developments and Proposed Restrictions

The Reasonably Foreseeable Mineral and Energy Developments from the 2008 FEIS (USDI BLM 2008, Appendix Q, pp. 564, 568–622) are incorporated here by reference.

The BLM has completed a review in 2015 of the fluid mineral reasonably foreseeable development scenarios (RFDs) for the 2008 FEIS. The intent of the review was to determine if the RFDs could be included into this EIS by reference. The review focused on whether the circumstances or research completed in the RFDs had substantially altered since 2008.

Discussions with Dr. Allan Niem (personal communication, 2013), the author or co-author of the predominantly referenced materials in this EIS, indicate that the geologic settings and interpreted petroleum plays and systems have not altered substantially. Dr. Niem's current work is focusing on detailing his original research. No substantial publications have been issued since 2008 that would alter the RFDs interpretations. There are no concerns in incorporating by reference the fluid mineral resource portion of the RFDs from the 2008 FEIS.

Potential reasonably foreseeable development scenarios of the Coos Basin Coalbed Natural Gas (CBNG) Play, as described in the 2008 FEIS, were dependent upon industry interest and development, as well as natural gas prices, occurring in 2008. Between 2008 and the present, the gas prices have dropped more than three-fold, the original company involved with the Coos Basin development has gone into receivership through bankruptcy, and the current holder of the Coos Basin developments another company. The new holder has retained property interests, but intends to abandon permanently all but five wells, which are located in the shallow gases. The remaining five wells will be kept in long-term suspension (Bob Houston, Oregon Department of Geology and Mineral Industries, personal communication-multiple events, 2014 and 2015). Therefore, based on this more current information, the projected development of CBNG would have less disturbance than was projected in 2008.

However, a change in the development scenario of CBNG for this EIS is not warranted. Analysis of the projected infrastructure was completed, with resulting stipulations. Analysis does not guarantee development; any development less than the analysis do not create an exceedance of impact. A great many unknowns may occur within the life of this EIS and future RMP. Neither the geologic setting nor the mineral potential for CBNG has altered since 2008. The current operator is maintaining resource extraction capabilities for future development. That development could occur under many highly feasible circumstances. The first is the potential development of a natural gas export facility in Coos Bay. Such systems would increase the market value of the Coos Basin CBNG and provide an immediate connection to market. Secondly, the domestic value of natural gas could increase. During the research of 2008, natural gas prices ranged up to $15.00/MMcf at wellhead. It has since reached lows below $3.00/MMcf. These market fluctuations illustrate that increases in the price of CBNG could make development of the Coos Basin viable. Based on this reasoning, the development scenarios within the 2008 FEIS is still valid and is incorporated here by reference.

## Proposed Stipulations on Leasable Fluid Mineral Exploration and Development Activity

Apply the following special stipulations for all forms of leasable fluid minerals, including geothermal, on specifically designated tracts of land as identified below.

**No Surface Occupancy**
*Resource*: Eligible Wild and Scenic River segments
*Stipulation*: Surface occupancy and use are prohibited within all eligible Wild and Scenic River segments.
*Objective*: To protect eligible Wild and Scenic River segments.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.
*Modification*: The boundaries of the stipulated area may be modified by the Authorized Officer, if the eligible Wild and Scenic River segment boundaries are changed.
*Waiver*: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains eligible Wild and Scenic River segments.

**No Surface Occupancy**
*Resource*: District-Designated Reserve – Lands Managed for Their Wilderness Characteristics
*Stipulation*: Surface occupancy and use are prohibited within District-Designated Reserve – Lands Managed for Their Wilderness Characteristics.
*Objective*: To protect District-Designated Reserve – Lands Managed for Their Wilderness Characteristics lands.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.
*Modification*: The boundaries of the stipulated area may be modified by the Authorized Officer, if the District-Designated Reserve – Lands Managed for Their Wilderness Characteristics boundaries are changed.
*Waiver*: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains District-Designated Reserve – Lands Managed for Their Wilderness Characteristics

**No Surface Occupancy**
*Resource*: Land Use Authorizations
*Stipulation*: Surface occupancy and use is prohibited on Recreation and Public Purposes (R&PP) and FLPMA leases.
*Objective*: To protect uses on existing R&PP and FLPMA leases.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

*Modification*: The area affected by this stipulation may be modified by the Authorized Officer, if the land use authorization boundaries are modified.
*Waiver*: This stipulation may be waived by the Authorized Officer, if all land use authorizations within the leasehold have been terminated, canceled, or relinquished.

**No Surface Occupancy**
*Resource*: Recreation Management Areas
*Stipulation*: Surface occupancy and use are prohibited within Recreation Management Areas.
*Objective*: To protect developed recreation areas.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.
*Modification*: The boundaries of the stipulated area may be modified by the Authorized Officer, if the Recreation Management Area boundaries are changed.
*Waiver*: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains Recreation Management Areas.

**No Surface Occupancy**
A 30-day public notice period will be required prior to modification or waiver of this stipulation.
*Resource*: Special Areas
*Stipulation:* Surface occupancy and use are prohibited within Areas of Critical Environmental Concern (ACEC).
*Objective*: To protect important historic, cultural, scenic values, natural resources, natural systems or processes, threatened and endangered plant species, and/or natural hazard areas of the ACEC.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.
*Modification*: The boundaries of the stipulated area may be modified by the Authorized Officer, if the ACEC boundaries are changed.
*Waiver*: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains designated ACECs.

**No Surface Occupancy**
*Resource*: Progeny test sites
*Stipulation*: Surface occupancy and use are prohibited within progeny test sites.
*Objective*: To protect progeny test sites.
*Exception*: None.
*Modification*: The boundaries of the stipulated area may be modified by the Authorized Officer, if the progeny test site boundaries are changed.
*Waiver*: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains progeny test sites.

**No Surface Occupancy**
A 30-day public notice period will be required prior to modification or waiver of this stipulation.
*Resource*: Visual Resource Management (VRM) Class I
*Stipulation*: Surface occupancy and use are prohibited in VRM Class I areas.
*Objective*: To preserve the existing character of the landscape.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

*Modification*: The boundaries of the stipulated area may be modified by the Authorized Officer, if the boundaries of the VRM Class I area are changed.
*Waiver*: This stipulation may be waived by the Authorized Officer, if all VRM Class I areas within the leasehold are reduced to a lower VRM class. Areas reduced to VRM Class II will be subject to the Controlled Surface Use stipulation for visual resources, and areas reduced to VRM Class III will be subject to standard lease stipulations.

**Controlled Surface Use**
*Resource*: Soils
*Stipulation*: Prior to disturbance of any suspected unstable slopes or slopes over 60 percent, an engineering/reclamation plan must be approved by the Authorized Officer. This plan must demonstrate how the following will be accomplished:

- Restoration of site productivity
- Adequate control of surface runoff
- Protection of off-site areas from accelerated erosion, such as rilling, gullying, piping, and mass wasting

In addition, water quality and quantity will be in conformance with State and Federal water quality laws, surface-disturbing activities will not be conducted during extended wet periods, and construction will not be allowed when soils are frozen.
*Objective:* To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, and to avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan, which demonstrates that the impacts from the proposed action are acceptable or can be adequately mitigated.
*Modification*: The area affected by this stipulation may be modified by the Authorized Officer, if it is determined that portions of the area do not include suspected unstable slopes or slopes over 60 percent.
*Waiver*: This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include any suspected unstable slopes or slopes over 60 percent.

**Controlled Surface Use**
A 30-day public notice period will be required prior to modification or waiver of this stipulation.
*Resource*: Visual Resource Management (VRM) Class II.
*Stipulation*: All surface-disturbing activities and semi-permanent and permanent facilities in VRM Class II areas may require special design features including altering the location and painting and camouflage to blend with the natural surroundings to meet the visual quality objectives for the area.
*Objective*: To control the visual impacts of activities and facilities within acceptable levels.
*Exception*: None.
*Modification:* None.
*Waiver*: This stipulation may be waived, if the Authorized Officer determines that there are no longer any VRM Class II areas in the leasehold.

**Controlled Surface Use**
*Resource*: Riparian Reserve
*Stipulation*: Unless otherwise authorized, drill site construction and access through Riparian Reserve within this leasehold will be limited to established roadways.
*Objective*: To protect riparian vegetation and reduce sedimentation.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan, which demonstrates that impacts from the proposed action are acceptable or can be adequately mitigated.

*Modification*: The area affected by this stipulation may be modified by the Authorized Officer, if it is determined that portions of the area do not include Riparian Reserve.
*Waiver*: This stipulation may be waived by the Authorized Officer, if it is determined that the entire leasehold no longer includes Riparian Reserve.

**Controlled Surface Use**
*Resource*: Late-Successional Reserve
*Stipulation*: Unless otherwise authorized, drill site construction and access through Late-Successional Reserve within this leasehold will be limited to established roadways.
*Objective*: To protect vegetation and to retain and/or restore structurally-complex forest characteristics.
*Exception*: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan, which demonstrates that impacts from the proposed action are acceptable or can be adequately mitigated.
*Modification*: The area affected by this stipulation may be modified by the Authorized Officer, if it is determined that portions of the area do not include Late-Successional Reserve.
*Waiver*: This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include Late-Successional Reserve.

## Ranking of the Prospective Mineral Occurrence and/or Development of Each Special Area Recommended for Withdrawal from Locatable Mineral Entry

**Table M-4** through **Table M-7** list the estimated prospective mineral occurrence or development ranking of each eligible Wild and Scenic River segment, District-Designated Reserve – Lands Managed for their Wilderness Characteristics, ACEC, and RMA that the BLM would recommend for withdrawal from locatable mineral entry. Recommendations vary by alternative and the Proposed RMP. Some proposals have multiple polygons, in which case, each polygon was analyzed separately. As a result, some sites have multiple rankings. Chapter 3 contains information on which areas the BLM would recommend for withdrawal from mineral entry by alternative and the Proposed RMP and how the BLM determined these rankings.

**Table M-4.** Ranking of District-Designated Reserve – Lands Managed for their Wilderness Characteristics lands that the BLM would recommended for withdrawal from locatable mineral entry

| District-Designated Reserve –<br>Lands Managed for their Wilderness Characteristics | Ranking |
|---|---|
| Berry Creek | Low |
| Bull of the Woods-Opal Creek Add - Evans Mountain | High |
| Bull of the Woods-Opal Creek Add - Nasty Rock | High |
| Burton-Ninemile | High |
| Clackamas Wilderness Add - Memaloose Creek | Low |
| Clackamas Wilderness Add - South Fork Clackamas #1 | Low |
| Clackamas Wilderness Add - South Fork Clackamas #2 | Low |
| Dakubetede | High |
| Round Top Mountain | High |
| Salmon Huckleberry Add - Boulder Creek | Low |
| Salmon Huckleberry Add - Eagle River | Low |
| Salmon Huckleberry Add - Salmon River | Low |

| District-Designated Reserve – Lands Managed for their Wilderness Characteristics | Ranking |
|---|---|
| Table Rock Wilderness Add | Low |
| Wasson Creek | Low |
| Wellington Mountain | High |
| Whiskey Creek | High |
| Wild Rogue | High |
| Wild Rogue Additions | High |

**Table M-5.** Ranking of eligible Wild and Scenic River segments that the BLM would recommend for withdrawal from locatable mineral entry

| Eligible Wild and Scenic River Segment | Ranking |
|---|---|
| Alsea River | Low |
| Antelope Creek | Medium |
| Applegate River | High |
| Big Butte Creek (including South Fork Big Butte) | Medium |
| Cheney Creek | Medium |
| Clackamas River | Low |
| Cow Creek | High |
| Drift Creek | Low |
| Drift Creek Segment A and B | Low |
| Elk Valley Creek | High |
| Fall Creek - Eugene | Low |
| Fall Creek - Salem | Low/Low |
| Kilches River | Low |
| Lake Creek | Low |
| Left Fork Foots Creek | High |
| Little Applegate River | High |
| Little Luckiamute River | Medium |
| Little North Santiam River | High |
| Lobster Creek | Low |
| Lobster Creek Segment B | Low |
| McKenzie River | Low |
| Middle Santiam River | Low |
| Nehalem River | Low |
| Nelson Creek | Low |
| Nestucca River Segment B | Low |
| North Fork Clackamas River | Low |
| North Fork Gate Creek | Low |
| North Fork Siletz River | Low |
| North Fork Trask River | Low |
| North Santiam | Medium |
| Quines Creek | High |

| Eligible Wild and Scenic River Segment | Ranking |
|---|---|
| Riffle Creek | High |
| Rogue River | High |
| Sam's Creek | High |
| Sandy River Segments A and B | Low |
| Siletz River | Low |
| Sixes River | High |
| South Fork Coos River | Low |
| South Fork Coquille River | High |
| South Fork Gate Creek | Low |
| South Fork Little Butte Creek | Low |
| South Fork Trask River | Low |
| South Umpqua River | High |
| South Yamhill River | Medium |
| Table Rock Fork Molalla River | Medium |
| Trask River | Low |
| Tualatin River | Low |
| Umpqua River | Medium |
| West Fork Illinois River | High |
| Willamette River | Low |
| Wilson River | Low |
| Yaquina River | Low |

**Table M-6.** Ranking of Areas of Environmental Concern that the BLM would recommend for withdrawal from locatable mineral entry

| Area of Critical Environmental Concern | Ranking |
|---|---|
| Baker Cypress | Low |
| Bear Gulch | High |
| Beatty Creek | High |
| Beaver Creek | Low |
| Bobby Creek | Low |
| Brewer Spruce | Medium/High |
| Brownson Ridge | Low |
| Bumpheads | Low |
| Bushnell-Irwin Rocks | Low |
| Callahan Meadows | Medium |
| Camas Swale | Low |
| Cherry Creek | Low |
| China Wall | Low |
| Cobleigh Road | Low |
| Cottage Grove Old Growth | Low |
| Coburg Hills | Low |
| Cougar Mountain Yew Grove | Low |

| Area of Critical Environmental Concern | Ranking |
|---|---|
| Crabtree Complex | Medium |
| Dakubetede | Medium/High |
| Deer Creek | Medium |
| Dorena Lake | Low |
| Dorena Prairie | Low |
| East Fork Whiskey Creek | High |
| Eight Dollar Mountain | Medium/High |
| Elk Creek | Low |
| Esmond Lake | Low |
| Euphoria Ridge | Low |
| Ferguson Creek | low |
| Forest Peak | Low |
| Fox Hollow | Low |
| French Flat | Medium |
| Garoutte Prairie | Low |
| Grandmother's Grove | Low |
| Grass Mountain | Low |
| Grassy Mountain | Low |
| Grayback Glades | Medium |
| Green Springs Mt Scenic | Low |
| Heceta Sand Dunes | Medium |
| High Peak - Moon Creek | Low |
| Hole-In-The-Rock | Low |
| Holton Creek | Medium |
| Horse Rock Ridge | Low |
| Hoxie Creek | Low |
| Hult Marsh | Low |
| Hunter Creek Bog | High |
| Iron Creek | High |
| Jordan Creek | Low |
| King Mountain Rock Garden | High |
| Lake Creek Falls | Low |
| Little North Fork Wilson River | Medium |
| Little Sink | Low |
| Lorane Ponderosa Pine | Low |
| Lost Lake | Low |
| Lost Prairie | Low/Low |
| Lower Scappoose Eagle | Low/Medium |
| Low Elevation Headwaters of the McKenzie River | Low |
| Mary's Peak | Low/Medium |
| McCully Mountain | Low |
| McGowan Meadow | Low |

| Area of Critical Environmental Concern | Ranking |
|---|---|
| Middle Santiam Terrace | Low |
| Mill Creek Ridge | Low |
| Mohawk | Low |
| Molalla Meadows | Low |
| Moon Prairie | Low |
| Myrtle Island | Low |
| Nails Creek | Low |
| Nestucca River | Low |
| New River | Medium/High |
| North Bank | Low |
| North Fork Chetco | Medium |
| North Fork Coquille River | Low |
| North Fork Hunter Creek | Low/High |
| North Fork Silver Creek | High |
| North Myrtle Creek | Medium |
| North Santiam | Low |
| North Spit | Medium |
| North Spit Addition | Medium |
| Oak Basin Prairies | Low |
| Oak Basin Prairies | Low |
| Old Baldy | Low |
| Pickett Creek | Medium |
| Pipe Fork | Medium |
| Poverty Flat | Low |
| Red Pond | Low |
| Reeves Creek | Medium |
| Rickreall Ridge | Low |
| Rocky Peak | Medium |
| Roman Nose | Low |
| Rough and Ready | Medium/High |
| Round Top Butte | Low |
| Saddle Bag Mountain | Medium |
| Sandy River | Low |
| Silt Creek | Low |
| Snow Peak | Medium |
| Soosap Meadows | Low |
| Spencer Creek | Low |
| Steel Creek | Low |
| Sterling Mine Ditch | High |
| Surveyor | Low |
| Table Rocks | Low/Medium |
| Tater Hill | High |

| Area of Critical Environmental Concern | Ranking |
|---|---|
| The Butte | Low |
| Tin Cup | Low |
| Tioga Creek | Low |
| Tunnel Creek | Low |
| Upper Elk Meadows | Low |
| Upper Klamath River | Low/Medium |
| Upper Klamath River Addition | Low |
| Upper Rock Creek | Low |
| Upper Willamette Valley Margin | Low/Medium |
| Valley of the Giants | Low |
| Waldo-Takilma | High |
| Walker Flat | Low |
| Wassen Creek | Low |
| Waterloo | Low |
| West Fork Illinois River | Medium/High |
| White Rock Fen | Low |
| Wilhoit Springs | Medium |
| Willamette Valley Prairie Oak and Pine Area | Low |
| Williams Lake | Low |
| Woodcock Bog | Medium |
| Yainax Butte | Low |
| Yaquina Head | Low |
| Yellowstone Creek | High |

**Table M-7.** Ranking of Special Recreational Management Areas that the BLM would recommend for withdrawal from locatable mineral entry

| Recreation Management Area | Ranking |
|---|---|
| Alder Glen Campground | Low |
| Alsea Falls - Zone A | Low |
| Alsea Falls - Zone B | Low |
| Armstrong Gulch Trailhead | Medium |
| Aquila Vista | Low |
| Barlow Creek Trail and Trailhead | Low |
| Bastendorff Beach | Low |
| Bear Gulch Trailhead | Medium |
| Bolt Mountain Trail | Medium |
| Burma Pond Campground | High |
| Canyon Creek | Low |
| Carpenter Bypass Mountain Bike Trail | Low |
| Carpenter Bypass Staging Area | Low |
| Cascade View OHV Complex | Low |
| Cathedral Hills | Medium |

| Recreation Management Area | Ranking |
|---|---|
| Cathedral Hills Trails | Medium |
| Cavitt Creek Falls Recreation Site | Low |
| Cedar Grove | Low |
| Clay Creek Recreation Site | Low |
| Clay Creek Trail | Low |
| Coos Head | Low |
| Cow Creek Backcountry Byway Kiosk | Low |
| Cow Creek Recreational Gold Panning Area | Low |
| Crooked Creek OHV Staging Site | Low |
| Culp Creek Expansion Site | Low |
| Culp Creek Trailhead | Low |
| Dean Creek Elk Viewing Area | Low |
| Deer Creek Education/Interpretive Area | Medium |
| Dogwood | Medium |
| Dorena Dam Trail Access Site | Low |
| Dovre | Low |
| Eagleview Group Campground | Low |
| Eagles Rest Hiking/Biking Trail | Low |
| Edson Creek Campground | Low |
| Eight Dollar Mountain | High |
| Eight Dollar Mountain Interpretive Site | High |
| Elderberry Flat Campground | Medium |
| Elk Bend | Low |
| Elkhorn Creek WSR | Medium |
| Elkhorn Valley Campground | Medium |
| Emerald Trail | Low |
| E-Mile Day-Use Area | Low |
| Esmond lake Trailhead and Trail | Low |
| Fan Creek | Low |
| Fawn Creek Campground | Low |
| Fishermen's Bend Recreation Site | Low |
| Flores Lake | Medium |
| Gerber Recreation Area | Low |
| Gold Nugget Waysides | High |
| Grizzly Peak | Medium |
| Grizzly Peak Trail | Medium |
| Hill Creek Trail | Low |
| Hill Creek Wayside | Low |
| Hinsdale Garden | Low |
| Hogback Mountain | Medium |
| Hult Equestrian Staging Area | Low |
| Hult Reservoir Non-motorized Trail | Low |

| Recreation Management Area | Ranking |
|---|---|
| Hult Reservoir Recreation Area | Low |
| Hunter Creek Trail System | High |
| Hyatt Lake Campground | Low |
| Island Creek Day-use Area | Medium |
| Ivors Wayside | Low |
| Jacksonville Woodlands Trails | High |
| Kenney Meadows Recreation Site | High |
| King Mountain Trail | High |
| Klamath River Campground | Low |
| Klamath River WSR | Low/Medium |
| Lake Selmac | Medium |
| Lodgepole | Low |
| Lone Rock Drift Boat Launch | Low |
| Loon Lake Recreation Area | Low |
| Lost Creek Trails | Low |
| Lower Lake Creek Falls | Low |
| Marmot Recreation Site | Low |
| Martin Rapids Overlook | Low |
| McGowan Creek Environmental Education Area Trail | Low |
| McGowan Creek Environmental Education Area | Low |
| McKenzie River Campground | Low |
| McKercher Park (R&PP Lease) | Low |
| Mill Creek | Low |
| Mill Creek Recreation Site | Low |
| Miller Creek Camp | Low |
| Millpond/Lone Pine Recreation Site | Low |
| Missouri Bend | Low |
| Mosby Creek Trailhead | Low |
| Mount Bolivar Trailhead | High |
| Mountain of the Rogue | High |
| Nestucca River | Low |
| North Bank - Comstock Day Use Area | Low |
| North Bank Habitat Management Area | Low |
| North Bank- Western Trailhead | Low |
| North Bowl Campground | Low |
| North Fork Eagle Creek Campground | Low |
| North Fork Santiam County Park | Low |
| North Spit Beach and Ponds Unit | Medium |
| North Spit Boat Ramp | Low |
| North Umpqua Trail - Swiftwater | Low/Medium |
| North Umpqua Trail - Tioga | Low |
| North Umpqua Wild Scenic River Corridor | Low/Medium |

| Recreation Management Area | Ranking |
|---|---|
| Northwest Hills | Medium |
| Old Miners Meadow | Medium |
| Osprey Boat Ramp | Medium |
| Oxbow Regional Park | Low |
| Pacific Crest Trail (PCT) 1 and 2 | Low |
| Pacific Crest Trail (PCT) Corridor | Low |
| Park Creek Campground | Low |
| Potholes Camp | Low |
| Provolt Seed Orchard | High |
| Quartz Creek | High |
| Rennie Boat Landing | Low |
| Rock Creek Recreation Site | Low |
| Rocky Peak Trail | Medium |
| Rogue Wild and Scenic River | Medium/High |
| Rough and Ready Trail | Medium |
| Roundtop Mountain | Medium |
| Row River Trail | Low/Medium |
| Row River Trail Expansion | Low/Medium |
| Sandy Ridge Trail System | Low |
| Sandy Ridge Trailhead | Low |
| Sawmill Trail | Low |
| Scaponia Park | Low |
| Scaredman Recreation Site | Low |
| Sharps Creek Recreation Site | Medium |
| Shotgun Creek Recreation Site | Low |
| Shotgun Non-Motorized Trail System | Low |
| Shotgun OHV Trail System | Low |
| Silver Creek Boat and McKenzie River Watchable Wildlife Site | Low |
| Silver Falls State Park | Low |
| Siuslaw Bend Campground | Low |
| Sixes River Campground | Medium |
| Skull Creek Campground | Medium |
| Smith Creek | Low |
| Smith River Falls Campground | Low |
| Spring Island River Access | Low |
| Stan H Spring | Low |
| Sterling Mine Ditch Trail | High |
| Stick Beach | Medium |
| Storm Ranch | Medium |
| Surveyor Campground | Low |
| Swiftwater Day-use Area | Medium |

| Recreation Management Area | Ranking |
|---|---|
| Table Mountain Snow Play Area | Low |
| Table Rocks | Low/Medium |
| Taylor landing Recreation Site | Low |
| Three Bears - Hardy Creek | Low |
| Topsy Recreation Site | Low |
| Tucker Flat Campground | High |
| Tyee Recreation Area | Low |
| Tyrrell Seed Orchard Interpretive Trail | Low |
| Upper Lake Creek ERMA | Low |
| Vincent Creek Campground | Low |
| Whiskey Creek Overlook | Medium |
| Whitewater Day-Use Area | Low |
| Whitewater Day-Use Area | Low |
| Whittaker Creek Recreation Area | Low |
| Whittaker Creek Trail | Low |
| Wild Rogue Canyon | Low/Medium/High |
| Wildcat Creek Trail System | Low |
| Wildwood Recreation Site | Low |
| Wilhoit Springs | Medium |
| Willamalane Non-Motorized Trails | Low |
| Willamette River Greenway (R&PP Lease) | Low |
| Willow Valley Reservoir Boat Ramp | Low |
| Wolf Creek Environmental Education Site and Trail | Low |
| Wolf Creek Falls Trail | Low |
| Woodrat Mtn Gliding Sites | High |
| Yaquina Head ONA | Low |
| Yellowbottom | Medium |

## References

USDI BLM. 2008. Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts. Bureau of Land Management, Oregon State Office, Portland, OR. http://www.blm.gov/or/plans/wopr/fmal_eis/.

# Appendix N – Rare Plants and Fungi

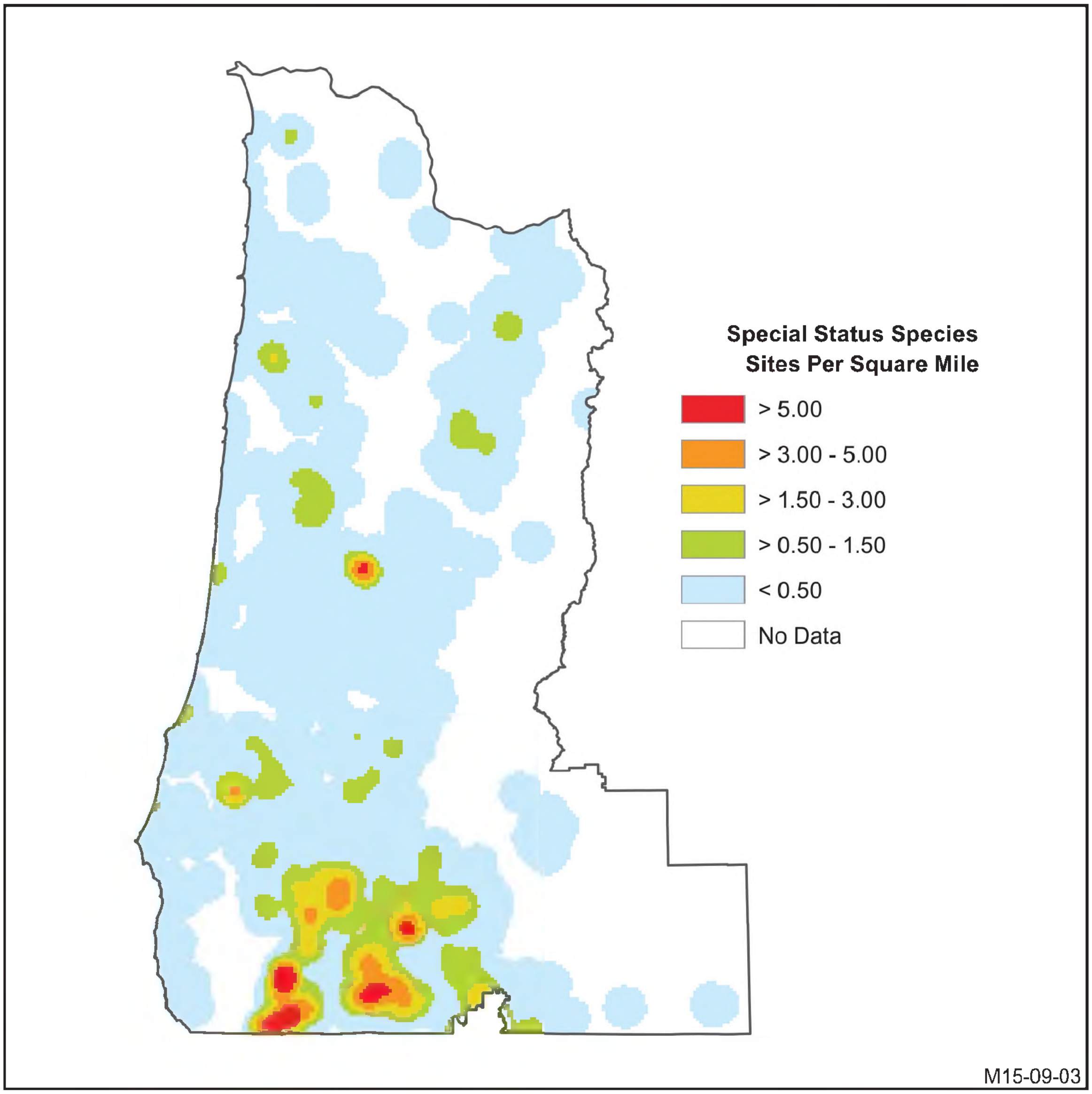


**Figure N-1.** Special Status Species 'hot spots' within the decision area

**Table N-1.** Existing conservation strategy and agreements for Bureau Special Status plant species

| BLM District | Other Agencies Involved | Species | Date | Title | Summary of BLM Management Actions |
|---|---|---|---|---|---|
| Coos Bay | U.S. Forest Service (Siuslaw National Forest), Oregon Parks and Recreation Department | Pink sandverbena | 2006 | Conservation Strategy for Pink sandverbena (*Abronia umbellata* ssp. *breviflora*) | Reduce competition from non-native plants; Monitor populations; Augment existing populations; Restore habitat and reintroduce the species into suitable habitat |
| Eugene, Medford, Roseburg | U.S. Fish and Wildlife Service, U.S. Forest Service (Rogue River-Siskiyou National Forest) | Wayside aster | 2006 | Interagency Conservation Agreement for *Eucephalus vialis* (Wayside aster) | Survey potential habitat; Monitor populations; Improve habitat conditions; Research effects of fire, grazing, and changes in canopy cover |
| Medford | U.S. Fish and Wildlife Service | Cook's lomatium | 2003 | Conservation Agreement for Cook's lomatium (*Lomatium cookii*) in the Illinois Valley | Reduce shrub and conifer cover; Survey potential habitat; Monitor populations; Maintain and install fences and gates to reduce human impacts |
| Medford | U.S. Fish and Wildlife Service, U.S. Forest Service (Klamath National Forest), California Department of Forestry and Fire Protection | Siskiyou mariposa lily | 2012 | Conservation Agreement between the U.S. Fish and Wildlife Service and the U.S. Forest Service and U.S. Bureau of Land Management for *Calochortus persistens* (Siskiyou mariposa lily) | Monitor populations; Control non-native plants; Prevent impacts from recreation and public motorized vehicle use; Augment populations |
| Medford | U.S. Fish and Wildlife Service | Gentner's fritillary | 2015 | Conservation Agreement for Gentner's fritillary (*Fritillaria gentneri*) in Southwestern Oregon | Designate a minimum of eight Fritillary Management Areas (FMAs) within recovery units; Survey, assess, and monitor each FMA; Manage FMAs to minimize threats, maintain habitat, encourage natural population recruitment, and meet population size and stability criteria |
| Medford, Coos Bay | U.S. Fish and Wildlife Service, U.S. Forest Service (Rogue River-Siskiyou National Forest, Six Rivers National Forest) | Largeflower rushlily, Purple rushlily, Mendocino gentian, Grants Pass willowherb, Bog white violet | 2006 | Conservation Agreement for *Hastingsia bracteosa*, *H. atropurpurea*, *Gentiana setigera*, *Epilobium oreganum*, and *Viola primulifolia* ssp. *occidentalis* and serpentine *Darlingtonia* wetlands and fens from Southwestern Oregon and Northwestern California | Manage all *Darlingtonia* wetlands to protect their biological values and function; Manage all *Darlingtonia* wetlands that support *Hastingsia bracteosa*, *H. atropurpurea*, *Gentiana setigera*, *Epilobium oreganum*, and *Viola primulifolia* ssp. *occidentalis* to maintain and enhance these species; Survey potential habitat for these species; Monitor populations and habitat |

| BLM District | Other Agencies Involved | Species | Date | Title | Summary of BLM Management Actions |
|---|---|---|---|---|---|
| Roseburg | U.S. Fish and Wildlife Service, U.S. Forest Service (Umpqua National Forest) | Kincaid's lupine | 2006 | Programmatic Conservation Agreement for Kincaid's Lupine (*Lupinus sulphureus* spp. *kincaidii*) in Douglas County | Conserve and actively manage populations and habitat; Identify suitable habitat for development of new populations; Augment existing populations as necessary; Monitor all populations |
| Roseburg | U.S. Fish and Wildlife Service | Crinite mariposa lily | 2004 | Conservation Agreement for *Calochortus coxii* (Crinite mariposa lily) | Restore meadow habitat through invasive plant control, prescribed fire, reducing shrub and conifer cover, and planting native species; Monitor populations |
| Roseburg | U.S. Fish and Wildlife Service, U.S. Forest Service (Umpqua National Forest) | Umpqua mariposa lily | 1996 | Conservation Agreement for *Calochortus umpquaensis* (Umpqua Mariposa Lily) | Install gates and fences to protect populations from livestock and vehicles; Maintain meadow habitat through prescribed fire and tree thinning; Inventory potential habitat; Monitor populations |

**Table N-2.** BLM sensitive plants and fungi within the planning area (BLM Oregon/Washington State Director's Sensitive Species List, July 2015)

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| FU | *Albatrellus avellaneus* | Fungus | CF | Endemic to coastal lowlands from Northern California to Canada; occurs principally in coastal Sitka spruce, western hemlock and in Pacific silver fir old-growth forest, at elevations of 112–1,260 feet. |
| FU | *Bridgeoporus nobilissimus* | Fungus | CF | Ranges from the Olympic Mountains and the western Cascade Range. Fruiting bodies occur on large, dying and dead noble fir and Pacific silver fir in late-successional old-growth forests and on remnant stumps and snags in young and mature second-growth forests in the Pacific silver fir and western hemlock zones in western Washington and Oregon (Cowden 2002, Redberg *et al*. 2003). |
| FU | *Bryoglossum gracile* | Fungus | CF | Known from Scandinavia and North America. Grows on moist living mosses on soil and rocks in alpine and arctic environments. In the Pacific Northwest, known from the Willamette National Forest. |
| FU | *Chamonixia caespitosa* | Fungus | CF | Known from Europe, Asia, and North America. In the Pacific Northwest, it is found with hemlock species and Pacific silver fir at high elevation and western hemlock, Douglas-fir, and Sitka spruce in coastal forests. |
| FU | *Choiromyces venosus* | Fungus | CF | Known from Europe and both North American coasts; however, it is known from only three sites in North America. The one Oregon population occurs in the western hemlock wetlands association at 1,677 feet elevation. |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| FU | *Cortinarius barlowensis* | Fungus | CF | Widely distributed in the western Cascades of both Oregon and Washington and the coast of Washington. In Oregon and Washington, principally in montane Pacific silver fir and coastal western hemlock series at elevations of 25–4,729 feet. |
| FU | *Cortinarius pavelekii* | Fungus | CF | Endemic to coastal forests in the Pacific Northwest under mature Sitka spruce and lodgepole pine from sea level (17 ft.) to around 588 ft.in Oregon. |
| FU | *Cystangium idahoensis* | Fungus | CF | Known from only two locations in Oregon and one location in Idaho. Found in wetland areas within Pacific silver fir, and western hemlock plant association from 2,738 to 3,455 feet in elevation. |
| FU | *Dermocybe humboldtensis* | Fungus | CF | Known from Humboldt County, California, to Douglas County, Oregon. Occurs in white fir - grand fir vegetation zones at elevations of 1,337–1,781 feet. Associated species include Douglas-fir and ponderosa pine within Klamath and Oregon Coast Range provinces. |
| FU | *Gastroboletus vividus* | Fungus | CF | Known from the Sierra Nevada in California to the Washington Cascades. Found in mountain hemlock (67%), Douglas-fir (17%) and white fir - grand fir (17%) vegetation zones at elevations of 4,266–6,747 feet. |
| FU | *Gastrolactarius camphoratus* | Fungus | CF | Known from approximately 20 sites in Oregon. Occurs principally in soil and litter in western hemlock, tanoak, live oak, sugar pine, Douglas-fir, Pacific madrone, California black oak, Port-Orford-cedar and Sitka spruce series at elevations of 3–3,385 feet. |
| FU | *Gymnomyces fragrans* | Fungus | CF | Known from California, Idaho, and Oregon in the Pacific silver fir, mountain hemlock and Shasta red fir plant associations. Populations range from 4,803 to 6,853 feet in elevation. |
| FU | *Helvella crassitunicata* | Fungus | CF | Known from the Pacific Northwest and occurs primarily in mountain hemlock and Pacific silver fir vegetation zones at elevations of 1,533–9,673 feet. |
| FU | *Mythicomyces corneipes* | Fungus | CF, RI | Known from the Pacific Northwest, Canada, England, and Scandinavia primarily in western hemlock and Pacific silver fir vegetation zones at elevations of 969–6,081 feet. |
| FU | *Phaeocollybia californica* | Fungus | CF | Endemic to the Pacific Northwest from western central Oregon, south to extreme northern California. In coastal to inland lowlands associated with the roots of Pacific silver fir, Sitka spruce, Douglas-fir, and western hemlock within an elevation range of 206–3,855 feet. |
| FU | *Phaeocollybia gregaria* | Fungus | CF | Endemic to Oregon and Northern California, in coastal rainforests. Associated with the roots of western hemlock, Sitka spruce and Douglas-fir in coastal rainforests at 486–3,628 feet elevation. |
| FU | *Phaeocollybia oregonensis* | Fungus | CF | Known from western Oregon to British Columbia Soil in association with roots of Douglas-fir, western hemlock, and Pacific silver fir; 721–3,916 feet elevation. |
| FU | *Pseudorhizina californica* | Fungus | CF | Known from Oregon and Washington primarily in Pacific silver fir, white fir - grand fir, and mountain hemlock vegetation zones at elevations of 668–6,515 feet. |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| FU | *Ramaria amyloidea* | Fungus | CF | Endemic to western Oregon and Washington and northwest California. Occurs in mountain hemlock, Pacific silver fir, western hemlock, and white fir - grand fir vegetation zones at elevations of 1,592–5,729 feet |
| FU | *Ramaria rubella forma blanda* | Fungus | CF | Known from the Pacific Northwest and Tennessee. Associated with western hemlock rainforest from 442 to 1,813 feet elevation |
| FU | *Rhizopogon alexsmithii* | Fungus | CF | Endemic to the Pacific Northwest. Known from mountain hemlock, Pacific silver fir, and western hemlock vegetation zones at elevations of 2,852–5,805 feet |
| FU | *Rhizopogon chamaleontinus* | Fungus | CF | Known from the Klamath Mountains Physiographic Province within Douglas-fir/tanoak series/incense-cedar forests at approximately 1,050 feet elevation |
| FU | *Rhizopogon ellipsosporus* | Fungus | CF | Known in Oregon in the Klamath Mountains Physiographic Province and in California in the Sierra Nevada Mountains. In Oregon, it is found primarily within Douglas-fir, western red cedar, and white fir - grand fir associations from 1,040–4,116 feet elevation. |
| FU | *Rhizopogon exiguus* | Fungus | CF | Known from Oregon and Washington within Douglas-fir, white fir/grand fir, western red cedar, and western hemlock associations at 54–3,844 feet elevation. |
| FU | *Rhizopogon inquinatus* | Fungus | CF | Known in western Oregon and Idaho within mountain hemlock and western hemlock associations from 1,490–4,507 feet elevation |
| FU | *Stagnicola perplexa* | Fungus | CF | Known from the boreal forests of North America and Europe. Associated with Pacific silver fir and more moist forest, but has also been documented in shrub-steppe habitat. |
| BR | *Anastrophyllum minutum* | Liverwort | CF | Circumboreal on peaty soil at relatively high elevation (>5,500 ft.), ledges of north-facing cliffs of peaks and ridges |
| BR | *Andreaea schofieldiana* | Moss | CF, RK | Endemic to the Pacific Northwest from southwestern British Columbia to Siskiyou and Del Norte Counties, California. Forming mats on dry and exposed to moist, shaded igneous rocks, montane to subalpine within Pacific silver fir, subalpine fir, noble fir, Douglas-fir, western hemlock, and mountain hemlock associations. |
| BR | *Anthelia julacea* | Liverwort | SW | Widespread around the northern hemisphere in boreal and montane regions, reaching its southern limit in western North America in Oregon. Grows on peaty soil, in Oregon associated with low ericaceous shrubs. |
| BR | *Blepharostoma arachnoideum* | Liverwort | CF | Known from the Pacific Northwest in moist habitats within old-growth forests, where it most often grows on rotten logs. |
| BR | *Bruchia flexuosa* | Moss | MG | Occurs in North America and Europe. In the Pacific Northwest, it is restricted to low elevation prairie and mud flats around reservoirs in the interior valleys west of the Cascade Range. |
| BR | *Bryoerythrophyllum columbianum* | Moss | SC | Occurs in British Columbia, California, Idaho, Oregon, Washington, Bolivia. In the Pacific Northwest, *Bryoerythrophyllum columbianum* is a component of biological soil crusts in arid shrub-steppe and grassland habitat. |

| Taxon Group[*] | Scientific Name | Common Name | Habitat Group[†] | Habitat[‡] |
|---|---|---|---|---|
| BR | *Bryum calobryoides* | Moss | RI, RK | Endemic to western North America. Occurs on both acid and basic rocks and soil in shaded to exposed boulder fields, montane to alpine meadows, cliffs, and outcrops from 3000 to 7,000 ft. elevation. |
| BR | *Calypogeia sphagnicola* | Liverwort | SW, SE | Circumboreal and bipolar. Occurs in poor fens containing sphagnum, acidic fen habitats, and in a fen on ultramafic soils. |
| BR | *Campylopus schmidii* | Moss | CF, RI, SW, MZ | Known from coastal Oregon (Lane County) and northern California (Del Norte and Mendocino Counties), Mexico, Hawaii, Asia, Africa, Australia. Occurs on nutrient-poor sandy substrates near coast. |
| BR | *Cephaloziella spinigera* | Liverwort | SW | Occurs in bogs and fens around the northern hemisphere in boreal and montane regions. In western North America reaching the southern edge of its range in northern California. |
| BR | *Cryptomitrium tenerum* | Liverwort | CF, RK, RI | Known from southwestern Oregon and California, west of the Cascade Range and Sierra Nevada, Mexico, South America, and India. Occurs on bare, usually shaded and humid soil on hillsides, rock outcrops, and streambanks. |
| BR | *Encalypta brevicollis* | Moss | RK | Known from the Pacific Northwest, Canada, Greenland, and Europe. Occurs on soil in shaded crevices and overhanging rock outcrops. |
| BR | *Encalypta brevipes* | Moss | RK | Interruptedly circumboreal. In the Pacific Northwest known from Alberta, British Columbia, Washington, and Oregon on soil in shaded crevices in igneous rocks, along ridge tops subject to frequent fog penetration. |
| BR | *Entosthodon fascicularis* | Moss | RI, MG, OHW, SC, RK | Known from British Columbia, Idaho, Washington, Oregon, California, Arizona, Europe, and North Africa. Occurs on seasonally wet, exposed soil in seeps or along intermittent streams below 3,000 ft. |
| BR | *Ephemerum crassinervium* | Moss | SW | Known from Oregon, eastern North America, Germany, Japan, and New Zealand. Occurs on damp disturbed soil, often in old fields, paths, river banks or spots of open bare ground. |
| BR | *Ephemerum serratum* | Moss | SW, ME | Known from North America, Brazil, Sardinia, China, South Africa, and New Zealand. Occurs on damp disturbed soil, often in old fields, pastures, and along the edges of ponds. |
| BR | *Fissidens fontanus* | Moss | RI | Known from North America, Mexico, West Indies, Central America, Europe, and Africa. It is an aquatic species attached to rocks, logs, sticks in stagnant or slow-moving water or in areas where the water level fluctuates. |
| BR | *Gymnomitrion concinnatum* | Liverwort | CF, RK | Circumboreal and bipolar, in both eastern and western North America. Occurs on peaty soil of cliffs and rock outcrops. |
| BR | *Haplomitrium hookeri* | Liverwort | CF | Occurs in both northern and southern hemispheres. In western North American reaches its southern limit in Oregon. Grows on soil in full sun, intermixed with other liverworts and hornworts. |
| BR | *Harpanthus flotovianus* | Liverwort | SW | Widespread around the northern hemisphere in boreal and montane regions. In western North America reaching the southern edge of its range in Oregon. Occurs in bogs and fens. |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| BR | *Herbertus aduncus* ssp. *aduncus* | Liverwort | CF, RK | Endemic to Pacific coastal area of North America. This species is found only on cliffs in Oregon. |
| BR | *Limbella fryei* | Moss | CF, RI, MZ | Endemic to the Pacific Northwest and known only from two sites in coastal Oregon (Lane and Curry Counties). On wet rotten wood, leaf litter and lower trunks of tall shrubs, in dense coastal shrub swamps below 200 ft. |
| BR | *Lophozia gillmanii* | Liverwort | SW, RK | Widespread around the northern hemisphere in boreal and montane regions, in western North America south to Tulare County, California. Occurs on peaty soil, usually associated with cliffs or ledges. It requires lime or alkaline soil. |
| BR | *Lophozia laxa* | Liverwort | MZ, SW | Interruptedly circumboreal, in North America as far south as Oregon, Michigan, and New Jersey. Occurs in well-developed hummocks of *Sphagnum* in fens and bogs along coast and in Cascades, 0–5,000 ft. elevation. |
| BR | *Marsupella emarginata* var. *aquatica* | Liverwort | RI | Known from North America, northern Europe, Great Britain, and Greenland. Restricted to streams with relatively fast moving water and rocky bottoms in subalpine, montane situations. |
| BR | *Metzgeria violacea* | Liverwort | CF, MZ | Known from northwestern and southeastern North America, Europe, and Asia. Occurs on tree trunks and shrubs in coastal rainforest at 0–1,000 ft. elevation. |
| BR | *Orthodontium pellucens* | Moss | CF, MZ | Known from southeastern and western United States, Central and South America, Caribbean, and the Hawaiian Islands. Occurs on stumps, rotten logs, bark of living redwood trees, confined to redwood groves near the ocean. |
| BR | *Phymatoceros phymatodes* | Liverwort | SW | Known from the central coast and Sierra Nevada of California to Curry and Douglas Counties, Oregon. Occurs on bare, mineral soil which remains moist until late spring or summer, from near sea level to 650 m. |
| BR | *Polytrichum strictum* | Moss | SW | Circumboreal and bipolar. In the Pacific Northwest, known from British Columbia, Alberta, Montana, Washington, Oregon, and California. Grows on organic soils, particularly on top of *Sphagnum* hummocks, in coastal and montane bogs and fens. |
| BR | *Porella bolanderi* | Liverwort | CF, RK, OHW | Endemic to western North America and known only from California, Oregon, and Utah. Occurs on variety of rock types and trunks of oak, California bay laurel, and big leaf maple, 500–3,000 ft. elevation. |
| BR | *Preissia quadrata* | Liverwort | RK | Circumboreal in temperate to boreal regions. In western North America extending south to California. Occurs on soil with little organic material, typically on ledges on cliffs or in crevices in rocky areas. |
| BR | *Pseudocalliergon trifarium* | Moss | SW | Circumboreal but rare throughout much of its range. In the Pacific Northwest, known from British Columbia, Alberta, Montana, and Oregon. Occurs in medium to rich montane fens where it grows submerged to emergent in pools or on saturated ground, usually in full sunlight. Elevations range from 5,000 to 6,000 feet. |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| BR | *Racomitrium depressum* | Moss | CF, RI, OHW | Known only from the Sierra Mountains of California and Nevada, and the southern Cascade and Klamath mountains of southwestern Oregon and northwestern California. It forms mats on rocks in perennial or intermittent streams, and in the spray zone of waterfalls at 400–11,000 feet elevation. Habitats are subject to scour at high water. |
| BR | *Rivulariella gemmipara* | Liverwort | RI | Known from Alaska, Oregon, California, and Utah. Grows attached to rocks in moderately fast moving water. |
| BR | *Scapania obscura* | Liverwort | RI | Scattered in northern Europe, Alps and the Nordic countries, and possibly in eastern Russia, North America from Greenland and Baffin Island to the Pacific Northwest. On peaty soil close to streams below cold water springs and in snow melt seepage channels. It may be submerged much of the year. |
| BR | *Schistidium cinclidodonteum* | Moss | RK, RI | Known from Washington, Idaho, Oregon, California, Nevada, and Europe. Occurs on wet or dry rocks or on soil in crevices of rocks and boulders, often along intermittent streams, at elevations of 5,000–11,000 feet. |
| BR | *Tetraphis geniculata* | Moss | CF | Known from northern California to Alaska. Grows on rotten stumps and logs in shaded, humid locations (USDA FS and USDI BLM 2005). |
| BR | *Tortula mucronifolia* | Moss | CF, RK | Known throughout the Northern Hemisphere, Turkey, Africa, and New Zealand. Occurs on soil, tree roots, and sheltered ledges and crevices of rock outcrops, 5,000–7,000 ft. elevation. |
| BR | *Trematodon asanoi* | Moss | RI | Known from British Columbia, California, Oregon, Newfoundland, and Japan. on moist bare soil along the edges of trails, streams and ponds in the subalpine zone. |
| LI | *Bryoria subcana* | Lichen | CF | Known from coastal western North America between south-central Alaska and central California and from Great Britain. Found on bark and wood of conifers in Sitka spruce, western hemlock, wet Douglas-fir, wet noble fir (*Abies procera*), and mixed hardwood-coniferous forests. |
| LI | *Cladidium bolanderi* | Lichen | RK, OHW, SE | Known from along the immediate coast of Alaska, Oregon, and California. On a variety of rock types on coastal bluffs and coastal grasslands from sea level to 1,000 ft. elevation. |
| LI | *Hypotrachyna riparia* | Lichen | CF, RI | Endemic to Oregon. Currently known from the foothills of the central western Cascade Range. On deciduous shrubs and trees in riparian forests below about 2,000 feet elevation, in foothills of the western Cascade Range, Oregon. |
| LI | *Leioderma sorediatum* | Lichen | CF | Known mainly from the South Pacific, New Zealand, Australia, Sri Lanka, and mainland India, with disjunct populations on the Pacific coasts of North and South America. In Oregon, it is found in semi-open coastal thickets, and deflation plains and ericaceous shrub thickets of shore pine on stabilized dunes and deflation plains. |
| LI | *Leptogium cyanescens* | Lichen | CF, OHW | Found worldwide in both temperate and tropical regions. In the Pacific Northwest, known from Alaska to Oregon, but rare throughout the region. Occurs on shaded twigs of deciduous trees and shrubs in humid habitats, rarely in exposed situations. The two Oregon sites are on the immediate coast at elevations of 15–30 feet. |

| Taxon Group[*] | Scientific Name | Common Name | Habitat Group[†] | Habitat[‡] |
|---|---|---|---|---|
| LI | *Lobaria linita* | Lichen | CF | Occurs sporadically in the European Alps, Norway, Siberia, eastern Asia, and North America. It is strongly associated with old-growth and climax forests, prefers the lower boles of conifers, especially Pacific silver fir, but in drier habitats or at higher elevations it may also grow on moss-covered boulders or rock outcrops in cool, shaded, humid microsites. |
| LI | *Microcalicium arenarium* | Lichen | CF | Found in the Pacific Northwest from Alaska south to California, Scandinavia, Europe, Asia, eastern North America, Australasia, and southern South America. Occurs on free-living green algae or leprose lichens growing in drier microhabitats such as bark, wood, root, and rock faces that are sheltered from precipitation. |
| LI | *Niebla cephalota* | Lichen | CF | Endemic to western North America, ranging from Baja California, north to Washington along the immediate coast. In the Pacific Northwest, it is found on exposed Sitka spruce, Hooker's willow, Monterey cypress and shore pine in open forests, forest edges, and scrublands along windswept coastal headlands, sand dunes, stabilized deflation plains, and marshy swales of the immediate coast. |
| LI | *Pannaria rubiginella* | Lichen | CF | Pacific Northwest from British Columbia to California and Chile. On bark and wood in cool, moist habitats along the Pacific coast. |
| LI | *Pannaria rubiginosa* | Lichen | CF | Known from the Americas and western Europe. Grows on wood and bark of trees and shrubs within a few kilometers of ocean at or near sea-level. |
| LI | *Pilophorus nigricaulis* | Lichen | CF | Occurs in Japan and on the west coast of North America, from Alaska south to Oregon, west of the Cascade crest. Grows on rock substrates primarily in non-forest communities from 130 to 4,700 ft. elevation. |
| LI | *Ramalina pollinaria* | Lichen | CF, MZ, RI | Known in the Pacific Northwest from Alaska south to California and east to the Rocky Mountains, Arizona, New Mexico, Texas, eastern North America, Scandinavia, Europe, and Israel. In the Pacific Northwest, it occurs on bark and wood of various trees and shrubs, shaded rocks at low elevation. |
| LI | *Stereocaulon spathuliferum* | Lichen | CF | Circumboreal. In the Pacific Northwest from Alaska south to Oregon, in and west of the Cascade Range. Grows on basalt blocks of talus slopes, 3,000–5,000 ft. elevation. |
| LI | *Teloschistes flavicans* | Lichen | CF, MZ | Known from mostly tropical and subtropical areas. In the Pacific Northwest it occurs in Oregon and California on exposed headlands and dunes of the immediate coast. |
| LI | *Texosporium sancti-jacobi* | Lichen | SC, MG | Endemic to western North America and known from only a few extremely small, localized and widely scattered populations in south-central Washington, central Oregon, southern Idaho, and central and southern California. It occurs on soil in arid to semi-arid shrub-steppe, grassland or savannah communities up to 3,281 ft. |
| LI | *Tholurna dissimilis* | Lichen | CF | Known from western Canada, Washington and Oregon and Scandinavia. In the Pacific Northwest, grows on krummholz or flag-form subalpine fir and Engelmann spruce on windswept ridges in the upper montane and subalpine zones up to timberline. |
| LI | *Usnea nidulans* | Lichen | CF | Known from the Pacific Northwest and South America. Grows on conifers and deciduous trees exclusively in hypermaritime forests on the immediate coast and in the |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| | | | | Coast Ranges. |
| VA | *Abronia umbellata* ssp. *breviflora* | Pink sandverbena | MZ | On sandy beaches and foredunes within the Coast Range from California to British Columbia |
| VA | *Adiantum jordanii* | California maiden-hair | CF | On seasonally moist, shaded, rocky banks, cliffs, canyons, and ravines in the Coast Range and Klamath Mountains in Oregon and California |
| VA | *Agoseris elata* | Tall agoseris | MG, OHW, CF | Meadows, shrubby slopes and open woodlands, 1,600–3,200 ft. elevation; East Cascade Range and West Cascade Range and Crest |
| VA | *Agrostis howellii* | Howell's bentgrass | RK, CF | Shady woodlands at base of cliffs; West Cascade Range and Crest and Willamette Valley |
| VA | *Allium peninsulare* | Peninsular onion | CH | Dry slopes, flats, < 1,100 m; Klamath Mountains, West Cascade Range and Crest, and California |
| VA | *Arabis koehleri* var. *koehleri* | Koehler's rockcress | RK | Dry, rocky cliffs, 225–280 m; Klamath Mountains |
| VA | *Arabis modesta* | Rogue canyon rockcress | RK, RI | Known from Oregon in Jackson and Josephine Counties and from California. Grows on moist shaded banks, slopes, rocky canyon walls, talus, and basaltic cliffs, 150–500 m. |
| VA | *Arctostaphylos hispidula* | Gasquet manzanita | SE, SC, CF | Rocky serpentine soils or sandstone, open shrub and forests, not fire tolerant; Coast Range, Klamath Mountains, and California |
| VA | *Arnica viscosa* | Shasta arnica | RK | Scree, talus gullies, and slopes w/ seasonal water runoff, 1,750–2,500 m; West Cascade Range and Crest, and California |
| VA | *Artemisia pycnocephala* | Coastal sagewort | MZ, RK | Rocky or sandy soils, coastal strand; Coast Range, and California |
| VA | *Asplenium septentrionale* | Grass-fern | RK | Cliffs of various substrates, 700–2,900 m; West Cascade Range and Crest, and California |
| VA | *Astragalus californicus* | California milk-vetch | MG | Dry, open areas in scrub, woodland, valleys and canyons, 1,000–2,700 ft.; Klamath Mountains, and California |
| VA | *Astragalus gambelianus* | Gambel milk-vetch | MG, SC | Open, grassy areas, scrub, 50–900 m; Klamath Mountains, and California |
| VA | *Astragalus peckii* | Peck's milk-vetch | RK, MG | Very dry sites, on loose sandy soil or pumice, 900–1,100 m; Blue Mountains and East Cascade Range |
| VA | *Bensoniella oregana* | Bensonia | CF, RI, SW | Wet meadows, bogs and streams in deep soils under conifer forests; Coast Range, Klamath Mountains, and California |
| VA | *Botrychium montanum* | Mountain grape-fern | CF, RI | Shady coniferous forest, edges of bogs, cedar swamps, 1,000–2,000 m; Blue Mountains, East Cascade Range, West Cascade Range and Crest; California, Montana, Washington, and British Columbia |
| VA | *Botrychium pumicola* | Pumice grape-fern | RK, CF | Fine pumice gravel on open slopes, dense lodgepole pine stands, 1,900–2,500 m; East Cascade Range, West Cascade Range and Crest; California |
| VA | *Brodiaea terrestris* | Dwarf brodiaea | MZ, MG | Grassland, open woodlands, 0–1,500 m; Coast Range; California |
| VA | *Calamagrostis breweri* | Brewer's reedgrass | RI | Moist subalpine and alpine meadows, lake margins, streambanks, 1,300–3,800 m; West Cascade Range and Crest; California |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Callitriche marginata* | Winged water-starwort | RI | In water or on wet ground; Columbia Basin, Klamath Mountains; British Columbia, and California |
| VA | *Calochortus coxii* | Crinite mariposa-lily | SE, MG | serpentine open grassy slopes or woods, 200–1,000 m; Klamath Mountains |
| VA | *Calochortus greenei* | Greene's mariposa-lily | SC, MG | Shrubby hillsides, open woodlands, dry soils and slopes, 700-1,100 m; East Cascade Range, Klamath Mountains; California |
| VA | *Calochortus howellii* | Howell's mariposa-lily | SE | Dry, rock serpentine soils, 300–500 m; Klamath Mountains |
| VA | *Calochortus monophyllus* | One-leaved mariposa-lily | RK, MG | Wooded slopes, clay-loam soils, 400–1,200 m; East Cascade Range, West Cascade Range and Crest; California |
| VA | *Calochortus persistens* | Siskiyou mariposa-lily | SE, RK | Rocky openings within montane shrub plant community; Klamath Mountains; 1310-1829 m. |
| VA | *Calochortus umpquaensis* | Umpqua mariposa-lily | SE, MG | Grassland-forest ecotones on serpentine soils, 300–500m; Klamath Mountains, West Cascade Range and Crest |
| VA | *Camassia howellii* | Howell's camas | SE, OHW, MG | Serpentine open, seasonally wet slopes; Klamath Mountains |
| VA | *Cardamine pattersonii* | Saddle mountain bittercress | RI, MG | Moss mats over bare rocks, moist cliffs and other rocky slopes, grassy balds, and wet, mossy-gravelly creek banks, 840–960 m; Coast Range |
| VA | *Carex brevicaulis* | Short stemmed sedge | MZ, RI | Dry, open, sandy or rocky slopes, cliffs, and dunes, 0–90 m; Coast Range; Washington, California |
| VA | *Carex capitata* | Capitate sedge | RI, SW | Wet places, meadows, slopes, 1,900–3,900 m; Northern Basin and Range, East Cascade Range, West Cascade Range and Crest; Idaho, Nevada, Washington |
| VA | *Carex comosa* | Bristly sedge | RI, SW | Swamps and wet thickets, stream, pond, and lakeshores, 0–700 m; East Cascade Range, Klamath Mountains, Willamette Valley; California, Idaho, Washington |
| VA | *Carex diandra* | Lesser panicled sedge | RI | Swampy, marshy, or boggy areas, 0–2,800 m; East Cascade Range, West Cascade Range and Crest; California, Nevada, Washington |
| VA | *Carex klamathensis* | A sedge | RI | Boreal fens, calcareous floating mats, 0–1,100m; Klamath Mountains; California |
| VA | *Carex lasiocarpa* var. *americana* | Slender sedge | RI | Bogs, calcareous fens, sedge meadows, and shallow marshes; Blue Mountains, East Cascade Range, West Cascade Range and Crest; California, Idaho, Washington |
| VA | *Carex livida* | Pale sedge | RI | Boreal fens, calcareous floating mats, 0–1,100m; Coast Range, West Cascade Range and Crest; California, Idaho, Washington |
| VA | *Carex macrocephala* | Bighead sedge | CD | coastal sand dunes; Coast Range; Washington, Alaska, British Columbia |
| VA | *Carex macrochaeta* | Large-awn sedge | RI | in spray zone of waterfalls or on seepy, N-facing cliffs; Coast Range, West Cascade Range; Washington |
| VA | *Carex nervina* | Sierra nerved sedge | MG | Subalpine meadows, 1,200–3,000 m; Klamath Mountains; California, Nevada |
| VA | *Carex retrorsa* | Retrorse sedge | SW, RI | Swamps, wet thickets, often along streams, marshes, sedge meadows, 0–1,900 m; Blue Mountains, Columbia Basin, West Cascade Range and Crest, Willamette Valley; Idaho, Washington |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Castilleja chlorotica* | Green-tinged paintbrush | CF | In loose sandy soils, often in ponderosa pine woods, 1,400–2,500 m; Blue Mountains, East Cascade Range |
| VA | *Cheilanthes covillei* | Coville's lip-fern | RK | Rocky slopes, cliffs, and ledges, 100–2,500 m; West Cascade Range and Crest; California, Nevada |
| VA | *Cheilanthes intertexta* | Coastal lipfern | RK | Rocky slopes and ledges, 500–2,800 m; Klamath Mountains; California |
| VA | *Chlorogalum angustifolium* | Narrow-leaved amole | MG, OHW | Heavy soils of grassland or woodland, 0–500 m; Klamath Mountains; California |
| VA | *Chloropyron maritimum* ssp. *palustre* | Point reyes bird's beak | RI | Coastal salt marshes, inland alkaline flats; Oregon and California |
| VA | *Cicendia quadrangularis* | Timwort | RI, OHW, SW, MG, RK | Crevices, bases of rocks, coastal wetlands, vernal pools, moist valley grassland and oak woodland, 0–2,700 m; Coast Range, Klamath Mountains, Willamette Valley; California |
| VA | *Collomia mazama* | Mt. Mazama collomia | CF, RI, MG | Alpine meadows and slopes and dry rocky places in black hemlock, fir, or lodgepole forest, 900–1,850 m; West Cascade Range and Crest |
| VA | *Coptis trifolia* | Three-leaf goldthread | CF, RI | Wet to mesic, coniferous and mixed forests, bogs, willow scrub, and tundra, 0–1,500 m; West Cascade Range and Crest; British Columbia |
| VA | *Corydalis aquae-gelidae* | Cold-water corydalis | RI, CF | Perennial streams, seep, and springs; West Cascade Range; Washington |
| VA | *Cryptantha leiocarpa* | Seaside cryptantha | MZ | Sandy soils, dunes, <200 m; Coast Range; California |
| VA | *Cryptantha milo-bakeri* | Milo baker's cryptantha | RK | Rocky or gravelly soils, generally coniferous forest; Coast Range, Klamath Mountains; California |
| VA | *Cryptogramma stelleri* | Steller's rockbrake | RK | Sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest, 0–3,000 m; Blue Mountains; Nevada, Washington |
| VA | *Cyperus acuminatus* | Short-pointed cyperus | RI, SW | Wet, often sandy shores, and damp, disturbed soils, 0–1,500 m; Klamath Mountains, Willamette Valley; California, Washington |
| VA | *Cypripedium fasciculatum* | Clustered lady's-slipper | CF | Coniferous forest, often late-successional; Blue Mountains, East Cascade Range, West Cascade Range and Crest; California, Colorado, Idaho, Montana, Washington, Wyoming |
| VA | *Delphinium nudicaule* | Red larkspur | RK, OHW | Wooded, rocky slopes, moist talus, cliff faces, 0–2,600 m; Klamath Mountains; California |
| VA | *Delphinium nuttallii* | Nutall's larkspur | RI, MG | Rock outcrops, rocky meadows, 20–300 m; East Cascade Range, West Cascade Range and Crest, Willamette Valley; Washington, British Columbia |
| VA | *Dicentra pauciflora* | Few-flowered bleedingheart | RK, CF | Openings in coniferous forests, in volcanic and granitic soils, 1,200–2,700 m; Klamath Range; California |
| VA | *Diplacus bolanderi* | Bolander's monkeyflower | RK, SC, OHW | Burns, openings in chaparral, foothill woodland, yellow pine forest, <6500 ft.; Klamath Mountains; California |
| VA | *Diplacus congdonii* | Congdon's monkeyflower | RK | Disturbed areas or seepage, gen. granitic soils, 120–1,100 m; Klamath Mountains; California |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Diplacus tricolor* | Three-colored monkey-flower | RI, SW | Vernally wet depressions, streambanks, <600 m; Northern Basin and Range, East Cascade Range, Willamette Valley; California |
| VA | *Dodecatheon austrofrigidum* | Frigid shootingstar | RI | Steep basalt slopes along rivers, 30–915 m; Coast Range; Washington |
| VA | *Draba howellii* | Howell's whitlow-grass | RK | Rock crevices, 2,000–3,000 m; Klamath Mountains; California |
| VA | *Epilobium oreganum* | Oregon willow-herb | SW, RI | Ultramafics, bogs, small streams, ditches, 500–1,600 m; Klamath Mountains; California |
| VA | *Ericameria arborescens* | Golden fleece | CF, OHW, SC | Woodland, open forest, chaparral, esp. after fire, <1,200 m; Coast Range, Klamath Mountains; California, Nevada |
| VA | *Erigeron cervinus* | Siskiyou daisy | SE, MG, RK | Open, rocky slopes, meadows, pine to fir woods, 900–1,900 m; Klamath Mountains; California |
| VA | *Erigeron howellii* | Howell's daisy | RK, MG | Moist, often rocky places w/in mixed coniferous forest with Columbia River Gorge; West Cascade Range; Washington |
| VA | *Eriogonum lobbii* | Lobb's buckwheat | RK, MG, SC | Gravelly to rocky or talus slopes, mixed grassland, shrub, and sagebrush communities, montane, subalpine, or alpine conifer woodlands; Klamath Mountains; California, Nevada |
| VA | *Eriogonum umbellatum* var. *glaberrimum* | Green buckwheat | MG | Sand or gravel, 1,600–2,300 m; East Cascade Range; California |
| VA | *Eriophorum chamissonis* | Russet cotton-grass | RI | Peat, bogs, marshes, muskegs, 0–3,000 m; Coast Range; British Columbia |
| VA | *Erodium macrophyllum* | Large-leaved filaree | MG, SC | Known from southern Oregon and California. Grows in open sites, grassland and scrub, <1200 m. |
| VA | *Erythranthe inflatula* | Disappearing monkeyflower | SW, RI | Moist gravelly, rocky areas, stream edges, in sagebrush-juniper zones; Blue Mountains, Northern Basin and Range, Columbia Basin, East Cascade Range; California, Idaho |
| VA | *Erythronium elegans* | Coast range fawn-lily | MG, CF, SC, RK | Meadows and open coniferous forest, 800–1,000 m; Coast Range |
| VA | *Erythronium howellii* | Howell's adder's-tongue | CF, SE, SC, MG | Serpentine influence, meadows, open woodlands, mixed conifer; Klamath Mountains; California |
| VA | *Eschscholzia caespitosa* | Gold poppy | RK, MG, SC | Open chaparral, rocky slopes, 0–1,500 m; Klamath Mountains; California |
| VA | *Eucephalus gormanii* | Gorman's aster | RK, CF | Open rocky slopes and exposed cliffs, 1,200–1,900 m; West Cascade Range and Crest |
| VA | *Eucephalus vialis* | Wayside aster | CF, MG, OHW | Dry open oak or coniferous woods, gen. harsher clay soils, 200–500 m; Klamath Mountains, West Cascade Range and Crest, Willamette Valley; California |
| VA | *Frasera umpquaensis* | Umpqua swertia | CF | Coniferous forests dominated by true firs; in damp, shaded sites under forest canopy, forest edges, occasionally in the open, 3,000–6,100 (6,500) feet; Klamath Mountains, West Cascade Range and Crest; California |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Fritillaria camschatcensis* | Black lily | MG, RI | Moist areas from near tidal flats to mountain meadows, 0–1,000 m; Coast Range, West Cascade Range; Washington |
| VA | *Gentiana newberryi* var. *newberryi* | Newberry's gentian | SW, MG | sites under forest canopy, forest edges, occasionally in the open; East Cascade Range, West Cascade Range and Crest; California |
| VA | *Gentiana plurisetosa* | Elegant gentian | SW | Coniferous forest, meadows, mesic, 1,230–1,938 m; Klamath Mountains; California |
| VA | *Gentiana setigera* | Waldo gentian | SW, SE, MG | Serpentine bogs and wet meadows; Klamath Mountains; California |
| VA | *Gilia millefoliata* | Seaside gilia | MZ | Stabilized coastal dunes, < 10 m; Coast Range; California |
| VA | *Hackelia bella* | Beautiful stickseed | MG | Streambanks, roadsides, forest opening, 900–2,000 m; Klamath Mountains, West Cascade Range and Crest; California |
| VA | *Hastingsia bracteosa* var. *atropurpurea* | Purple-flowered rush-lily | SW, SE | Ultramafic riverbeds that have year-round water in rooting horizon and wet, open, sunny bogs, 500–700 m; Klamath Mountains |
| VA | *Hastingsia bracteosa* var. *bracteosa* | Large-flowered rush-lily | SW, SE | Bogs, moist open meadows, seeps and wetlands often overlying serpentine or peridotite rock formations, < 240 m; Klamath Mountains |
| VA | *Heliotropium curassavicum* | Salt heliotrope | SW | Moist to dry saline soils, < 2,100 m; Blue Mountains, Northern Basin and Range, Columbia Basin, East Cascades Range, Willamette Valley; California, Nevada |
| VA | *Hesperocyparis bakeri* | Baker's cypress | CF, SE | Mixed evergreen forests, often serpentine; Klamath Mountains, West Cascade Range and Crest; California |
| VA | *Hieracium horridum* | Shaggy hawkweed | RK | Boulders, gravels, meadows, pine forests, 1,500–3,700 m; Klamath Mountains, West Cascade Range and Crest; California |
| VA | *Horkelia congesta* ssp. *congesta* | Shaggy horkelia | MG, OHW | Grassland and oak savannah remnants, grassy balds; Klamath Mountains, Willamette Valley |
| VA | *Horkelia tridentata* ssp. *tridentata* | Three-toothed horkelia | MG, OHW, CF | Dry, open coniferous forest, 300–2,500 m; Klamath Mountains; California |
| VA | *Hydrocotyle verticillata* | Whorled marsh-pennywort | MZ, RI | Along edges of coastal and inland lakes, swampy ground, wetlands, < 100 m; Coast Range, Willamette Valley; California |
| VA | *Iliamna latibracteata* | California globe-mallow | CF, RI | Moist ground and stream sides in conifer forests, 500–2,000 m; Coast Range, Klamath Mountains, West Cascade Range and Crest; California |
| VA | *Iris tenax* var. *gormanii* | Gorman's iris | MG | Dry soils in fields and open woods; Willamette Valley |
| VA | *Kalmiopsis fragrans* | Fragrant kalmiopsis | RK, CF | Mixed coniferous forest, commonly on or closely adjacent to talus slopes, boulder piles, or pillars of silicified tuff, 450–1,350 m; West Cascade Range and Crest |
| VA | *Keckiella lemmonii* | Bush beardtongue | CF, OHW, SC | Rocky slopes, coniferous and mixed forests, chaparral, 200–1,900 m; Klamath Mountains; California, Nevada |
| VA | *Lathyrus holochlorus* | Thin-leaved peavine | OHW, CF, MG | Open forests and thickets, margins of woods, roadsides; Willamette Valley |
| VA | *Lewisia columbiana* var. *columbiana* | Columbia lewisia | RK | Rocky slopes and crevices, 500–2,300 m; West Cascade Range and Crest; Washington |

| Taxon Group[*] | Scientific Name | Common Name | Habitat Group[†] | Habitat[‡] |
|---|---|---|---|---|
| VA | *Lewisia leeana* | Lee's lewisia | RK, CF | Sandy, rocky places, pine forests, 1,300–3,300 m; Klamath Mountains; California |
| VA | *Limnanthes alba* ssp. *gracilis* | Slender meadow-foam | SW | Wet, open, serpentine valley bottomlands, meadows, intermittent creeks; Klamath Mountains, West Cascade Range; Klamath Mountains, West Cascade Range |
| VA | *Limnanthes floccosa* ssp. *bellingeriana* | Bellinger's meadow-foam | SW, SC, OHW | Edges of vernal pools or seasonally wet, rocky, open meadows and grassy openings in oak/pine/buckbrush chaparral; East Cascade Range, Klamath Mountains, West Cascade Range and Crest; East Cascade Range, Klamath Mountains, West Cascade Range and Crest; California |
| VA | *Limnanthes pumila* ssp. *pumila* | Dwarf meadow-foam | SW | Edges of vernal pools and wet meadows; Klamath Mountains |
| VA | *Limonium californicum* | Western marsh-rosemary | SW, RI | Coastal strand, salt marshes, beaches, alkaline flats, 0–50 m; Oregon and California |
| VA | *Lomatium engelmannii* | Englemann's desert-parsley | SE | Gravelly serpentine slopes w/in conifer forests, usu. Jeffrey pine, 1,150–2,300 m; Klamath Mountains; California |
| VA | *Lotus stipularis* | Stipuled trefoil | CF, RI, SC | Open pine forests, streambeds, chaparral, mixed conifer forest, chaparral, 0–4,000 ft.; Klamath Mountains; California |
| VA | *Lupinus tracyi* | Tracy's lupine | CF | Dry, open montane forest, 1,500–2,000 m; Klamath Mountains; California |
| VA | *Lycopodiella inundata* | Bog club-moss | SW, RI | Peat bogs, lakeshores, marshes, 0–2,000 m; Coast Range, East and West Cascade Range; California, Idaho, Montana |
| VA | *Lycopodium complanatum* | Ground cedar | CF | Moist coniferous forest; Blue Mountains, West Cascade Range; Idaho, Washington |
| VA | *Meconella oregana* | White fairypoppy | OHW, MG, SW | Open ground, moist sandy, gravelly areas, 0–300 m; East and West Cascade Range, Klamath Mountains; Washington, British Columbia |
| VA | *Navarretia willamettensis* | Willamette navarretia | SW | Willamette Valley of western Oregon; grows in vernal pools and similar habitat |
| VA | *Nemacladus capillaris* | Slender nemacladus | RK | Dry slopes, burned areas in chaparral, yellow pine forest, 2,000–4,500 ft.; Klamath Mountains, West Cascade Range; California |
| VA | *Ophioglossum pusillum* | Adder's-tongue | MZ, RI, SW | Marsh edges, low pastures, 1,100–2,000 m; Blue Mountains, Coast Range, West Cascade Range; California, Idaho, Washington |
| VA | *Pellaea andromedifolia* | Coffee fern | RK, SE, OHW, SC | Rocky outcrops or dry areas, 30–1,800 m; Coast Range, Klamath Mountains, Willamette Valley; California |
| VA | *Pellaea mucronata* ssp. *californica* | California bird's-foot cliff-brake | RK | California and southern Oregon; grows on cliffs and rocky slopes, 1800–3000 m. |
| VA | *Penstemon glaucinus* | Blue-leaved penstemon | CF, RK | Open understory of lodgepole or white-bark pine, occ. Ponderosa; East Cascade Range |
| VA | *Perideridia erythrorhiza* | Red-rooted yampah | MG, OHW, SW | Moist meadows, poor drained soils, open woodlands and pine forests, < 1,525 m; East Cascade Range, Klamath Mountains, West Cascade Range |
| VA | *Phacelia argentea* | Silvery phacelia | MZ | Coastal sand dunes and sandy bluffs; Coast Range; California |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Phacelia leonis* | Siskiyou phacelia | CF, SE | Moist to wet meadows, gravelly serpentine soils, openings in conifer forests, 1200–1900 m; Klamath Mountains; California |
| VA | *Pilularia americana* | American pillwort | SW | Vernal pools, mud flats, lake margins, 50–600 m; Blue Mountains, Northern Basin and Range, East Cascade Range, Klamath Mountains; California |
| VA | *Plagiobothrys austiniae* | Austin's plagiobothrys | SW | Vernal pools, wet sites, < 500 m; Klamath Mountains; California |
| VA | *Plagiobothrys figuratus* ssp. *corallicarpus* | Coral seeded allocarya | SW, RI | Wet meadows, riparian areas, intermittent streams, valley floor; Klamath Mountains, West Cascade Range |
| VA | *Plagiobothrys greenei* | Greene's popcorn flower | SW, RI | Wet sites, grassland to woodland; Klamath Mountains, West Cascade Range; California |
| VA | *Poa rhizomata* | Timber bluegrass | CF, MG | Shady, moist slopes in forest, rich, loose soils, <100 m; Klamath Mountains, West Cascade Range; California |
| VA | *Pogogyne floribunda* | Profuse-flowereed mesa mint | SW | Vernal pools and edges of seasonal ponds and intermittent flooded drainages, <1,500 m; Northern Basin and Range, East Cascade Range; California, Idaho |
| VA | *Polystichum californicum* | California sword-fern | RI, RK | Woods, streambanks to rocky open slopes w/ moisture, < 800 m; Coast Range, Klamath Mountains, West Cascade Range, Willamette Valley; California, Washington |
| VA | *Potamogeton diversifolius* | Rafinesque's pondweed | RI | Shallow water, ditches, ponds, lakes, < 2,500 m; Northern Basin and Range, East Cascade Range; California, Idaho, Nevada, Washington |
| VA | *Prosartes parvifolia* | Siskiyou fairy bells | CF | Northern California and southern Oregon in the Siskiyou Mountains; grows in shaded forest understories and forest edges as well as on adjacent exposed roadside slopes and at logged and burned sites, 600–1,525 m. |
| VA | *Pyrola dentata* | Toothleaf pyrola | CF, OHW, SE, RK | Northwestern California to southwest British Columbia, Baja California; mixed conifer forest, mixed conifer and oak woodland, pine woodland, forested serpentine and volcanic areas, hillsides of decomposed granite or loose, coarse sand or gravel near rocky outcrops; 55–2,900 m. |
| VA | *Pyrrocoma racemosa* var. *racemosa* | Racemose pyrrocoma | SW, MZ | Coastal valleys and marshes, 0–300 m; Willamette Valley; California |
| VA | *Rafinesquia californica* | California chicory | CH, OHW | open sites in scrub, woodland; often common after fire; 100–1,500 m; Klamath Mountains; California, Nevada |
| VA | *Ranunculus austrooreganus* | Southern Oregon buttercup | OHW, MG | Open oak savannahs and grasslands and along margins of rocky vernal pools; Klamath Mountains, West Cascade Range |
| VA | *Rhamnus ilicifolia* | Redberry | SC | Chaparral, montane forests, < 2,000m; Klamath Mountains; California |
| VA | *Rhynchospora alba* | White beakrush | RI | Acid, sphagnous, boggy, open sites, 0–2,000 m; Coast Range, West Cascade Range; California, Idaho, Washington |
| VA | *Ribes divaricatum* var. *pubiflorum* | Straggly gooseberry | CF | Coastal bluffs, forest edges, < 650 m; Coast Range, Klamath Mountains, West Cascade Range; California |
| VA | *Romanzoffia thompsonii* | Thompson's mistmaiden | MG, SW, RK, RI | Moist rocky areas, wet cliffs, 750–6,000 ft.; Coast Range, Klamath Mountains, West Cascade Range, Willamette Valley |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Rorippa columbiae* | Columbia cress | RI, SW | Meadows, playas, river margins; Blue Mountains, Northern Basin and Range, Columbia Basin, East and West Cascade Range, Willamette Valley; California, Washington |
| VA | *Rotala ramosior* | Lowland toothcup | RI, SW | Wet places, lake and pond margins, streams, < 1900 m; Northern Basin and Range, East Cascade Range, Willamette Valley; California, Washington |
| VA | *Saxifragopsis fragarioides* | Joint-leaved saxifrage | RK | Rock crevices, 1,500–3,000 m; Klamath Mountains; California, Washington |
| VA | *Scheuchzeria palustris* ssp. *americana* | Scheuchzeria | RI, SW | Bogs, lake margins, Cascades, 1,400–2,000m; East Cascade Range, West Cascade Range; California, Idaho, Washington |
| VA | *Schoenoplectus subterminalis* | Water clubrush | RI, SW | Submerged to emergent in water, 10–2,200 m; Coast Range, East Cascade Range, Klamath Mountains, West Cascade Range; California, Idaho, Washington |
| VA | *Scirpus pendulus* | Drooping bulrush | RI, SW | Marshes, wet meadows, 0–600 m; East Cascade Range, Klamath Mountains, West Cascade Range, Willamette Valley; California |
| VA | *Sedum moranii* | Rogue River stonecrop | RK, SE | Open, dry serpentine outcrops and cliffs, 180–830 m; Klamath Mountains |
| VA | *Sericocarpus rigidus* | White-topped aster | MG | Open grassland in lowlands of Willamette Valley-Puget Trough, 100–550 ft.; Willamette Valley; Washington, British Columbia |
| VA | *Sidalcea hendersonii* | Henderson's sidalcea | RI | Tidally influenced areas; Coast Range, Marine; Washington, British Columbia |
| VA | *Sidalcea hickmanii* ssp. *petraea* | Hickman's checkerbloom | MG, RK, SC | Where fresh water from lakes or streams; Klamath Mountains |
| VA | *Sidalcea malviflora* ssp. *patula* | Coast checker bloom | MZ, MG | Open coniferous forest, coastal prairie, and coastal bluff scrub. Below 2,300 ft.; Coast Range, Klamath Mountains; California |
| VA | *Silene hookeri* ssp. *bolanderi* | Bolander's catchfly | SE, OHW | Serpentine, rocky slopes, northern oak woodlands to yellow pine forests, < 5,000 ft.; Klamath Mountains; California |
| VA | *Sisyrinchium hitchcockii* | Hitchcock's blue-eyed grass | MG | Grassy areas, openings in woods, WV and Umpqua V, 200–1,000 m; Klamath Mountains, Willamette Valley; California |
| VA | *Sisyrinchium sarmentosum* | Pale blue-eyed grass | MG, SW | Wet meadows in forest openings, primarily Pacific Silver and Grand Fir zones, 490–1,200 m; West Cascade Range; Washington |
| VA | *Solanum parishii* | Parish's horse-nettle | CF, OHW, SC | Dry chaparral, oak/pine woodland, pine forest, < 2,000 m; Klamath Valley, West Cascade Range; California |
| VA | *Sophora leachiana* | Western sophora | OHW, CF | Open, disturbed sites (often in clearcuts) w/in mixed conifer/oak, often serpentine; Klamath Mountains |
| VA | *Streptanthus glandulosus* | Common jewel flower | SW, CF, OHW, MG, SC | Dry, open grasslands, chaparral, open conifer/oak woodland, sometimes on serpentine, 15–1,300 m; Klamath Mountains; California |
| VA | *Streptanthus howellii* | Howell's streptanthus | SE, OHW | Rocky serpentine in open conifer/hardwood forest, 600–1,500 m; Klamath Mountains; California |
| VA | *Streptopus streptopoides* | Kruhsea | CF | Dense, damp coniferous forests, 0–1,600 m; West Cascade Range; British Columbia |

| Taxon Group* | Scientific Name | Common Name | Habitat Group† | Habitat‡ |
|---|---|---|---|---|
| VA | *Sullivantia oregana* | Oregon sullivantia | RK | Moist cliffs, esp. near waterfalls, 250–1,600 ft.; West Cascade Range, Willamette Valley; Washington |
| VA | *Tetrapteron graciliflorum* | Slender-flowered evening-primrose | MG, SC, OHW | Open or shrubby slopes, grassland, oak; Klamath Mountains; California |
| VA | *Trillium kurabayashii* | Siskiyou trillium | CF, RI, SC, OHW | Moist conifer/hardwood forest, predominantly deciduous flat woods along streams, 20–500 m; Coast Range, Klamath Mountains; California |
| VA | *Utricularia gibba* | Humped bladderwort | SW, RI | Shallow water, mud, 10–2,300 m; Coast Range, West Cascade Range, Willamette Valley; California, Idaho, Washington |
| VA | *Utricularia minor* | Lesser bladderwort | SW, RI | Shallow acidic waters, 800–2,900 m; Blue Mountains, North Basin and Range, Coast Range, East Cascade Range, Klamath Mountains, West Cascade Range; California, Idaho, Nevada, Washington |
| VA | *Utricularia ochroleuca* | Northern bladderwort | RI | Shallow acidic waters, 1,300–2,400 m; West Cascade Range; California, Washington, British Columbia |
| VA | *Viola primulifolia* ssp. *occidentalis* | Western bog violet | SE, SW | Serpentine bogs, fens, swamps, or marshes, below 800 m; Klamath Mountains; California |
| VA | *Wolffia borealis* | Dotted water-meal | RI, SW | Freshwater wetlands, ponds, sloughs, < 1,000m; West Cascade Range, Willamette Valley; Washington |
| VA | *Wolffia columbiana* | Columbia water-meal | RI, SW | Freshwater wetlands, ponds, sloughs, < 200 m; Klamath Mountains, West Cascade Range, Willamette Valley; California |
| VA | *Zigadenus fontanus* | Small-flowered death camas | MG, SW, SE | Vernally moist or marshy areas, often on serpentine, < 500 m; Klamath Mountains; California |

* Taxon Groups:
- BR = Bryophyte
- FU = Fungi
- LI = Lichen
- VA = Vascular Plant

† Habitat Groups:
- CF = Conifer/Mixed Evergreen Forest
- MG = Meadows/Grassland
- MZ = Maritime Zone
- OHW = Oak/Hardwood Woodlands
- RI = Riparian and Aquatic
- RK = Rocky Areas Outcrops/Scree
- SC = Shrub Community
- SE = Serpentine Areas
- SW = Seasonal Wetland Fens/Vernal Pools

‡ Habitat Descriptions from: Interagency Special Status/Sensitive Species Program Species Fact Sheets and Conservation Planning Documents http://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/species-guides.shtml.

**Table N-3.** Survey and Manage species in the No Action alternative

| Taxon* | December 2003 Category[†] | Species with Uncertain Outcomes from 2004 FEIS to Remove S&M[‡] Alt. 2 | 2015 ISSSSP Status[§] | Occurrence Within Decision Area[‖] | **Name and Geographic Area on December 2003 List[#]** | **Common Name** (common names provided for vascular plants only) | **Current Name** (if different from name on 2003 list) |
|---|---|---|---|---|---|---|---|
| FU | B | | STR | S | *Acanthophysium farlowii* | Fungus | |
| FU | B | | SEN | S | *Albatrellus avellaneus* | Fungus | |
| FU | B | | STR | D | *Albatrellus caeruleoporus* | Fungus | |
| FU | B | X | | D | *Albatrellus ellisii* | Fungus | |
| FU | B | | SEN | S | *Alpova alexsmithii* | Fungus | *Rhizopogon alexsmithii* |
| FU | B | | | D | *Alpova olivaceotinctus* | Fungus | |
| FU | B | | | D | *Arcangeliella camphorata* | Fungus | |
| FU | B | | | S | *Arcangeliella crassa* | Fungus | |
| FU | B | | | S | *Arcangeliella lactarioides* | Fungus | |
| FU | B | | | D | *Asterophora lycoperdoides* | Fungus | |
| FU | B | | | S | *Asterophora parasitica* | Fungus | |
| FU | B | | | S | *Baeospora myriadophylla* | Fungus | |
| FU | B | | STR | D | *Balsamia nigrens* | Fungus | *Balsamia nigrans* |
| FU | B | | | D | *Boletus haematinus* | Fungus | |
| FU | B | | | D | *Boletus pulcherrimus* | Fungus | |
| FU | A | | SEN | D | *Bridgeoporus nobilissimus* | Fungus | |
| FU | B | | | S | *Catathelasma ventricosa* | Fungus | *Catathelasma ventricosum* |
| FU | D | | | D | *Chalciporus piperatus* | Fungus | |
| FU | B | | SEN | D | *Chamonixia caespitosa* | Fungus | |
| FU | B | | STR | D | *Choiromyces alveolatus* | Fungus | |
| FU | B | | SEN | D | *Choiromyces venosus* | Fungus | |
| FU | B | | | S | *Chroogomphus loculatus* | Fungus | |
| FU | B | | | S | *Chrysomphalina grossula* | Fungus | |
| FU | B | X | | D | *Clavariadelphus ligula* | Fungus | |
| FU | B | | | D | *Clavariadelphus occidentalis* | Fungus | |
| FU | B | X | | D | *Clavariadelphus sachalinensis* | Fungus | |
| FU | B | | STR | D | *Clavariadelphus subfastigiatus* | Fungus | |
| FU | B | | | D | *Clavariadelphus truncatus* | Fungus | |
| FU | B | | STR | S | *Clavulina castanopes* var. *lignicola* | Fungus | |
| FU | B | | | D | *Clitocybe senilis* | Fungus | |
| FU | B | | STR | S | *Clitocybe subditopoda* | Fungus | |
| FU | F | | | S | *Collybia bakerensis* | Fungus | |
| FU | B | | | D | *Collybia racemosa* | Fungus | |
| FU | B | | | S | *Cordyceps ophioglossoides* | Fungus | |
| FU | B | | SEN | S | *Cortinarius barlowensis* | Fungus | |
| FU | B | | | S | *Cortinarius boulderensis* | Fungus | |
| FU | B | | STR | D | *Cortinarius cyanites* | Fungus | |
| FU | B | | STR | D | *Cortinarius depauperatus* | Fungus | |
| FU | B | | STR | D | *Cortinarius magnivelatus* | Fungus | |
| FU | B | | | D | *Cortinarius olympianus* | Fungus | |
| FU | B | | | S | *Cortinarius speciosissimus* | Fungus | |
| FU | B | X | | S | *Cortinarius tabularis* | Fungus | |
| FU | B | | | S | *Cortinarius umidicola* | Fungus | |
| FU | B | | | S | *Cortinarius valgus* | Fungus | |

| Taxon* | December 2003 Category[†] | Species with Uncertain Outcomes from 2004 FEIS to Remove S&M[‡] Alt. 2 | 2015 ISSSSP Status[§] | Occurrence Within Decision Area[‖] | Name and Geographic Area on December 2003 List[#] | Common Name (common names provided for vascular plants only) | Current Name (if different from name on 2003 list) |
|---|---|---|---|---|---|---|---|
| FU | B | | | S | *Cortinarius variipes* | Fungus | |
| FU | B | | | D | *Cortinarius verrucisporus* | Fungus | |
| FU | B | | | S | *Cortinarius wiebeae* | Fungus | |
| FU | B | X | | D | *Cudonia monticola* | Fungus | |
| FU | B | | | D | *Cyphellostereum laeve* | Fungus | |
| FU | B | | SEN | D | *Dermocybe humboldtensis* | Fungus | |
| FU | B | | STR | S | *Destuntzia fusca* | Fungus | |
| FU | B | | STR | S | *Destuntzia rubra* | Fungus | |
| FU | B | | | S | *Dichostereum boreale* | Fungus | |
| FU | B | | | S | *Elaphomyces anthracinus* | Fungus | |
| FU | B | | STR | D | *Elaphomyces subviscidus* | Fungus | |
| FU | B | | | S | *Endogone acrogena* | Fungus | |
| FU | B | | STR | D | *Endogone oregonensis* | Fungus | |
| FU | B | | | S | *Entoloma nitidum* | Fungus | |
| FU | B | | | S | *Fayodia bisphaerigera* | Fungus | |
| FU | B | | STR | S | *Fevansia aurantiaca* | Fungus | |
| FU | B | | | D | *Galerina cerina* | Fungus | |
| FU | E | | | D | *Galerina heterocystis* | Fungus | |
| FU | E | | | S | *Galerina sphagnicola* | Fungus | |
| FU | B | | STR | S | *Gastroboletus imbellus* | Fungus | |
| FU | B | | STR | S | *Gastroboletus ruber* | Fungus | |
| FU | B | | | D | *Gastroboletus subalpinus* | Fungus | |
| FU | B | | | D | *Gastroboletus turbinatus* | Fungus | |
| FU | B | | SEN | S | *Gastroboletus vividus* | Fungus | |
| FU | E | X | | N | *Gastrosuillus amaranthii* | Fungus | |
| FU | B | | | S | *Gastrosuillus umbrinus* | Fungus | |
| FU | B | | STR | S | *Gautieria magnicellaris* | Fungus | |
| FU | B | | STR | S | *Gautieria otthii* | Fungus | |
| FU | B | | | D | *Gelatinodiscus flavidus* | Fungus | |
| FU | B | | | S | *Glomus radiatum* | Fungus | |
| FU | B | | | D | *Gomphus bonarii* | Fungus | |
| FU | F | | | D | *Gomphus clavatus* | Fungus | |
| FU | E | X | | D | *Gomphus kauffmanii* | Fungus | |
| FU | B | | | S | *Gymnomyces abietis* | Fungus | |
| FU | B | | STR | D | *Gymnomyces nondistincta* | Fungus | |
| FU | B | X | SEN | D | *Gyromitra californica* | Fungus | *Pseudorhizina californica* |
| FU | B | | | S | *Hebeloma olympianum* | Fungus | |
| FU | B | | SEN | S | *Helvella crassitunicata* | Fungus | |
| FU | B | | | S | *Helvella elastica* | Fungus | |
| FU | B | | STR | S | *Hydnotrya inordinata* | Fungus | |
| FU | B | | | S | *Hydnotrya subnix* | Fungus | |
| FU | B | | STR | D | *Hydropus marginellus* | Fungus | |
| FU | B | | | D | *Hygrophorus caeruleus* | Fungus | |
| FU | B | | | S | *Hygrophorus karstenii* | Fungus | |
| FU | B | | | S | *Hygrophorus vernalis* | Fungus | |

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|---|---|---|---|---|---|---|---|
| FU | B | | | D | *Hypomyces luteovirens* | Fungus | |
| FU | B | | | D | *Leucogaster citrinus* | Fungus | |
| FU | B | | | S | *Leucogaster microsporus* | Fungus | |
| FU | B | | STR | S | *Macowanites chlorinosmus* | Fungus | |
| FU | B | | | S | *Macowanites lymanensis* | Fungus | |
| FU | B | | | S | *Macowanites mollis* | Fungus | |
| FU | B | | | S | *Marasmius applanatipes* | Fungus | |
| FU | B | | | S | *Martellia fragrans* | Fungus | |
| FU | B | | SEN | S | *Martellia idahoensis* | Fungus | *Cystangium idahoensis* |
| FU | B | | STR | S | *Mycena hudsoniana* | Fungus | |
| FU | D | | | D | *Mycena overholtsii* | Fungus | |
| FU | B | | STR | S | *Mycena quinaultensis* | Fungus | *Mycena quiniaultensis* |
| FU | B | | STR | D | *Mycena tenax* | Fungus | |
| FU | B | | SEN | S | *Mythicomyces corneipes* | Fungus | |
| FU | B | | | S | *Neolentinus adhaerens* | Fungus | |
| FU | B | | | S | *Neolentinus kauffmanii* | Fungus | |
| FU | B | | | D | *Nivatogastrium nubigenum*, In entire range except Oregon Eastern Cascades and California Cascades Physiographic Provinces | Fungus | |
| FU | B | | | S | *Octaviania cyanescens* | Fungus | |
| FU | B | | STR | S | *Octaviania macrospora* | Fungus | |
| FU | B | | | S | *Octavianina papyracea* | Fungus | *Zelleromyces papyracea* |
| FU | D | | | D | *Otidea leporina* | Fungus | |
| FU | B | | STR | D | *Otidea smithii* | Fungus | |
| FU | D | | | D | *Phaeocollybia attenuata* | Fungus | |
| FU | B | X | SEN | D | *Phaeocollybia californica* | Fungus | |
| FU | B | X | STR | D | *Phaeocollybia dissiliens* | Fungus | |
| FU | D | X | | D | *Phaeocollybia fallax* | Fungus | |
| FU | B | | SEN | D | *Phaeocollybia gregaria* | Fungus | |
| FU | D | | | D | *Phaeocollybia kauffmanii* | Fungus | |
| FU | F | | | D | *Phaeocollybia olivacea*, in Oregon | Fungus | |
| FU | B | | SEN | D | *Phaeocollybia oregonensis* | Fungus | |
| FU | B | X | | D | *Phaeocollybia piceae* | Fungus | |
| FU | B | X | STR | D | *Phaeocollybia pseudofestiva* | Fungus | |
| FU | B | X | | D | *Phaeocollybia scatesiae* | Fungus | |
| FU | B | X | | D | *Phaeocollybia sipei* | Fungus | |
| FU | B | X | | D | *Phaeocollybia spadicea* | Fungus | |
| FU | B | | | D | *Phellodon atratus* | Fungus | |
| FU | B | | STR | D | *Pholiota albivelata* | Fungus | *Stropharia albivelata* |
| FU | B | | STR | S | *Podostroma alutaceum* | Fungus | |
| FU | B | X | | D | *Polyozellus multiplex* | Fungus | |
| FU | B | | STR | S | *Pseudaleuria quinaultiana* | Fungus | |
| FU | B | | STR | D | *Ramaria abietina* | Fungus | |
| FU | B | X | SEN | D | *Ramaria amyloidea* | Fungus | |
| FU | B | X | | D | *Ramaria araiospora* | Fungus | |

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|---|---|---|---|---|---|---|---|
| FU | B | X | | D | *Ramaria aurantiisiccescens* | Fungus | |
| FU | B | | STR | S | *Ramaria botrytis* var. *aurantiiramosa* | Fungus | |
| FU | B | | | D | *Ramaria celerivirescens* | Fungus | |
| FU | B | | | S | *Ramaria claviramulata* | Fungus | |
| FU | B | X | | N | *Ramaria concolor* f. *marrii* | Fungus | |
| FU | B | | | S | *Ramaria concolor* f. *tsugina* | Fungus | |
| FU | B | | STR | D | *Ramaria conjunctipes var. sparsiramosa* | Fungus | |
| FU | B | | STR | D | *Ramaria coulterae* | Fungus | |
| FU | B | X | | D | *Ramaria cyaneigranosa* | Fungus | |
| FU | B | | STR | D | *Ramaria gelatiniaurantia* | Fungus | |
| FU | B | | STR | S | *Ramaria gracilis* | Fungus | |
| FU | B | | | D | *Ramaria hilaris* var. *olympiana* | Fungus | |
| FU | B | X | STR | D | *Ramaria largentii* | Fungus | |
| FU | B | | | S | *Ramaria lorithamnus* | Fungus | |
| FU | B | | STR | D | *Ramaria maculatipes* | Fungus | |
| FU | B | | STR | D | *Ramaria rainierensis* | Fungus | |
| FU | B | | SEN | D | *Ramaria rubella* var. *blanda* | Fungus | |
| FU | B | | STR | D | *Ramaria rubribrunnescens* | Fungus | |
| FU | B | X | | D | *Ramaria rubrievanescens* | Fungus | |
| FU | D | | | D | *Ramaria rubripermanens*, in Oregon | Fungus | |
| FU | B | | | S | *Ramaria spinulosa* var. *diminutiva* | Fungus | |
| FU | B | X | | D | *Ramaria stuntzii* | Fungus | |
| FU | B | | STR | D | *Ramaria suecica* | Fungus | |
| FU | B | | STR | D | *Ramaria thiersii* | Fungus | |
| FU | B | | | S | *Ramaria verlotensis* | Fungus | |
| FU | B | | STR | D | *Rhizopogon abietis* | Fungus | |
| FU | B | | STR | S | *Rhizopogon atroviolaceus* | Fungus | |
| FU | B | | STR | S | *Rhizopogon brunneiniger* | Fungus | |
| FU | B | | SEN | S | *Rhizopogon chamaleontinus* | Fungus | |
| FU | B | | SEN | D | *Rhizopogon ellipsosporus* | Fungus | |
| FU | B | | | D | *Rhizopogon evadens* var. *subalpinus* | Fungus | |
| FU | B | | SEN | D | *Rhizopogon exiguus* | Fungus | |
| FU | B | | STR | D | *Rhizopogon flavofibrillosus* | Fungus | |
| FU | B | | SEN | S | *Rhizopogon inquinatus* | Fungus | |
| FU | D | | | D | *Rhizopogon truncatus* | Fungus | |
| FU | B | | | S | *Rhodocybe speciosa* | Fungus | |
| FU | B | | STR | D | *Rickenella swartzii* | Fungus | |
| FU | B | | | S | *Russula mustelina* | Fungus | |
| FU | B | X | STR | D | *Sarcodon fuscoindicus* | Fungus | |
| FU | B | | | S | *Sedecula pulvinata* | Fungus | |
| FU | B | X | | D | *Sowerbyella rhenana* | Fungus | |
| FU | D | X | | D | *Sparassis crispa* | Fungus | |
| FU | B | | | D | *Spathularia flavida* | Fungus | |
| FU | B | | SEN | S | *Stagnicola perplexa* | Fungus | |
| FU | B | | | S | *Thaxterogaster pavelekii* | Fungus | |

| Taxon* | December 2003 Category[†] | Species with Uncertain Outcomes from 2004 FEIS to Remove S&M[‡] Alt. 2 | 2015 ISSSSP Status[§] | Occurrence Within Decision Area[‖] | **Name and Geographic Area on December 2003 List[#]** | **Common Name** (common names provided for vascular plants only) | **Current Name** (if different from name on 2003 list) |
|---|---|---|---|---|---|---|---|
| FU | D | | | D | *Tremiscus helvelloides* | Fungus | |
| FU | B | | | S | *Tricholoma venenatum* | Fungus | |
| FU | B | | STR | S | *Tricholomopsis fulvescens* | Fungus | |
| FU | B | | STR | D | *Tuber asa* | Fungus | |
| FU | B | | STR | S | *Tuber pacificum* | Fungus | |
| LI | D | | | D | *Tylopilus porphyrosporus* | Fungus | |
| LI | A | | | D | *Bryoria pseudocapillaris* | Lichen | |
| LI | A | | | S | *Bryoria spiralifera* | Lichen | |
| LI | B | | SEN | D | *Bryoria subcana* | Lichen | |
| LI | E | | STR | S | *Buellia oidalea* | Lichen | |
| LI | B | X | | D | *Calicium abietinum* | Lichen | |
| LI | E | X | STR | S | *Calicium adspersum* | Lichen | |
| LI | E | | | D | *Cetrelia cetrarioides* | Lichen | |
| LI | B | | | D | *Chaenotheca chrysocephala* | Lichen | |
| LI | B | | | D | *Chaenotheca ferruginea* | Lichen | |
| LI | E | | | D | *Chaenotheca subroscida* | Lichen | |
| LI | E | | | D | *Chaenothecopsis pusilla* | Lichen | |
| LI | F | X | | D | *Collema nigrescens*, In Washington and Oregon, except in Oregon Klamath Physiographic Province | Lichen | |
| LI | A | | | D | *Dendriscocaulon intricatulum*, In Oregon outside of Coos, Curry, Douglas, Josephine, & Jackson Counties; Washington | Lichen | |
| LI | E | | | D | *Dermatocarpon luridum* | Lichen | *Dermatocarpon meiophyllizum* |
| LI | E | | | D | *Fuscopannaria saubinetii* | Lichen | |
| LI | E | X | STR | S | *Heterodermia sitchensis* | Lichen | |
| LI | C | | | D | *Hypogymnia duplicata* | Lichen | |
| LI | E | X | | S | *Hypogymnia vittata* | Lichen | |
| LI | E | | | D | *Hypotrachyna revoluta* | Lichen | |
| LI | E | X | STR | S | *Leptogium burnetiae* var. *hirsutum* | Lichen | Leptogium burnetiae |
| LI | A | | SEN | S | *Leptogium cyanescens* | Lichen | |
| LI | E | | | D | *Leptogium rivale* | Lichen | |
| LI | E | | | D | *Leptogium teretiusculum* | Lichen | |
| LI | A | | SEN | D | *Lobaria linita* var. *tenuoir*, In Washington Western Cascades (south of Snoqualmie Pass), Western Lowlands, and Eastern Cascades Physiographic Provinces; Oregon | Lichen | |
| LI | B | X | SEN | D | *Microcalicium arenarium* | Lichen | |

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|---|---|---|---|---|---|---|---|
| LI | E | | | D | *Nephroma bellum*, In Oregon Klamath, Willamette Valley, and Eastern Cascades Physiographic Provinces; Washington Western Cascades (outside Gifford Pinchot NF), Eastern Cascades, and Olympic Peninsula Physiographic Provinces | Lichen | |
| LI | E | X | | S | *Nephroma isidiosum* | Lichen | |
| LI | C | X | | D | *Nephroma occultum* | Lichen | |
| LI | A | | SEN | D | *Niebla cephalota* | Lichen | |
| LI | E | | SEN | D | *Pannaria rubiginosa* | Lichen | |
| LI | E | | | D | *Peltigera pacifica* | Lichen | |
| LI | E | | | D | *Platismatia lacunosa*, all except Oregon Coast Range Physiographic Province | Lichen | |
| LI | A | | | D | *Pseudocyphellaria perpetua* | Lichen | |
| LI | A | X | | D | *Pseudocyphellaria rainierensis* | Lichen | |
| LI | E | X | | D | *Stenocybe clavata* | Lichen | |
| LI | A | | SEN | D | *Teloschistes flavicans* | Lichen | |
| LI | B | X | SEN | S | *Tholurna dissimilis*, south of the Columbia River | Lichen | |
| LI | E | | | D | *Usnea hesperina* | Lichen | |
| LI | A | | | D | *Usnea longissima*, In Curry, Josephine, and Jackson Counties, Oregon; In California | Lichen | |
| BR | F | | | D | *Usnea longissima*, In Oregon, except in Curry, Josephine, and Jackson Counties; In Washington | Lichen | |
| BR | E | X | | D | *Brotherella roellii* | Moss | |
| BR | B | | | D | *Diplophyllum plicatum* | Liverwort | |
| BR | E | X | SEN | S | *Herbertus aduncus* | Liverwort | |
| BR | B | | STR | S | *Iwatsukiella leucotricha* | Moss | |
| BR | B | X | SEN | D | *Kurzia makinoana* | Liverwort | |
| BR | B | X | SEN | S | *Marsupella emarginata* var. *aquatica* | Liverwort | |
| BR | B | | | S | *Orthodontium gracile* | Moss | |
| BR | E | | | D | *Racomitrium aquaticum* | Moss | *Codriophorus ryszardii* |
| BR | B | | | S | *Rhizomnium nudum*, In Oregon | Moss | |
| BR | A | | | D | *Schistostega pennata* | Moss | |
| BR | A | | SEN | S | *Tetraphis geniculata* | Moss | |
| BR | B | X | | D | *Tritomaria exsectiformis* | Liverwort | |
| VA | B | X | | D | *Tritomaria quinquedentata* | Liverwort | |
| VA | A | | | D | *Botrychium minganense*, In Oregon and California | Gray moonwort | |
| VA | A | | SEN | S | *Botrychium montanum* | Mountain grape-fern | |
| VA | A | | | S | *Coptis asplenifolia* | Spleenwort-leaved goldthread | *Coptis aspleniifolia* |

| Taxon* | December 2003 Category† | Species with Uncertain Outcomes from 2004 FEIS to Remove S&M‡ Alt. 2 | 2015 ISSSSP Status§ | Occurrence Within Decision Area‖ | **Name and Geographic Area on December 2003 List#** | **Common Name** (common names provided for vascular plants only) | **Current Name** (if different from name on 2003 list) |
|---|---|---|---|---|---|---|---|
| VA | A | | SEN | S | *Coptis trifolia* | Three-leaf goldthread | |
| VA | A | | SEN | D | *Corydalis aquae-gelidae* | Cold-water corydalis | |
| VA | C | | SEN | D | *Cypripedium fasciculatum*, In Washington outside Eastern Cascades Physiographic Province; Oregon; California | Clustered lady's slipper | |
| VA | C | | | D | *Cypripedium montanum*, Entire range except Washington Eastern Cascades Physiographic Province | Mountain lady's slipper | |
| VA | A | | SEN | D | *Eucephalus vialis* | Wayside aster | |
| VA | A | | | S | *Galium kamtschaticum*, In Washington Western Cascades (south of Snoqualmie Pass), Olympic Peninsula, and Eastern Cascades Physiographic Provinces; Oregon Western Cascades Physiographic Provinces | Boreal bedstraw | |
| VA | C | | | S | *Platanthera orbiculata* var. *orbiculata* | Large roundleaf orchid | |

* Taxon: FU = Fungus; LI = Lichen; BR = Bryophyte; VA = Vascular Plant
† Survey and Manage Categories:
Category A = Manage all known sites; pre-disturbance surveys practical, strategic surveys
Category B = Manage all known sites; pre-disturbance surveys not practical and not applicable; strategic surveys
Category C = Manage high-priority sites; pre-disturbance surveys practical; strategic surveys
Category D = Manage high-priority sites; pre-disturbance surveys not practical or not necessary; strategic surveys
Category E = Manage all known sites; pre-disturbance survey not applicable; strategic surveys
Category F = known site management and pre-disturbance surveys not applicable; strategic surveys
‡ Species found to have uncertain outcomes in the Final Supplement to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guideline, June 2007. See Table 3&4-17 Species Outcomes.
§ Interagency Special Status and Sensitive Program Lists: SEN = Sensitive; STR = Strategic
‖ Occurrence: D = Documented to occur on BLM land; S = Suspected to occur on BLM land; N = No habitat available on BLM land
\# Species name as shown on the 2003 Survey and Manage species list

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