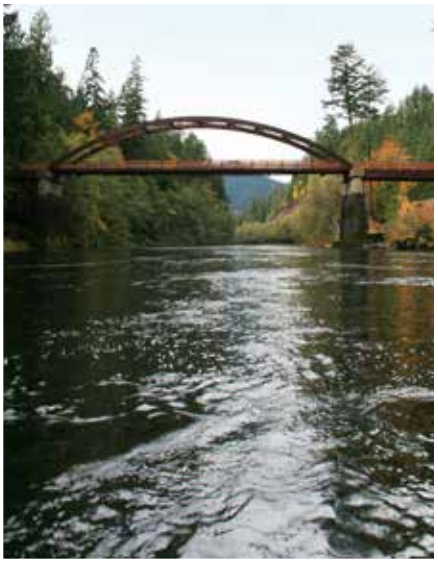
Resource Management Plans for Western Oregon

Bureau of Land Management

BLM

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

Analysis of the Management Situation



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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Introduction to the Analysis of the Management Situation

The 2.5 million acres of Bureau of Land Management (BLM) lands in western Oregon play an important role in the region's social, ecological, and economic well-being. The BLM is in the process of revising the Resource Management Plans (RMP) for western Oregon. As stewards of these lands, we at the BLM have a responsibility to ensure our management is effectively meeting our legal mandates, objectives set through the public land use planning process, and the needs of the communities in western Oregon.

The Analysis of the Management Situation (AMS) document is primarily an internal tool for the BLM decision-makers involved in the planning process. The AMS provides a snapshot of the area's resources, discusses our current management approach, and highlights what we need to be aware of for the planning effort. It is a condensed, yet thorough, look at the current situation in western Oregon and the status of the lands, species, and ecosystems on BLM-administered lands.

The AMS will help those involved to consider management options and identify opportunities that may influence the development of alternatives. It is especially important for decision-makers to consider the key findings and points described in the introduction and within each section. A few highlights of these items are:

- The northern spotted owl populations are declining throughout the range. The BLM-administered lands play a key role in their conservation.
- Watershed conditions are improving across the region. Large wood, stream temperature, sediment and water flow have the greatest influence on aquatic habitat and its ability to support fish.
- Rare plant and fungi species are not evenly distributed across the landscape; active management is necessary to maintain the special status species and rare plant areas.
- Implementation of the timber program has departed substantially from the management direction in the 1995 RMPs. The current approach to forest management is not sustainable at the declared allowable sale quantity (ASQ) level.
- The BLM is committed to the counties and the communities within our planning area; this responsibility includes working to address economic needs, as well as land use needs such as special places, visitor services, and recreation.

The people of western Oregon are in need of a lasting solution that will provide predictability and sustainable management of the BLM-administered lands. The AMS represents one step in the planning process that will provide a lasting solution for the public lands we are privileged to manage.

Jerome E. Perez
State Director
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Oregon/Washington

Chapter 1: Introduction

The Salem, Eugene, Roseburg, Medford, and Coos Bay Districts and the Lakeview District's Klamath Falls Field Office of the Bureau of Land Management (BLM) have begun the process of revising their current Resource Management Plans (RMP; BLM 1995a, b, c, d, e, f). In 2012, the BLM conducted RMP evaluations in accordance with its planning regulations, which require that RMPs "shall be revised as necessary based on monitoring and evaluation findings, new data, new or revised policy and changes in circumstances affecting the entire plan or major portions of the plan" (43 CFR §1610.5-6). These evaluations contained the conclusion that "[a] plan revision is needed to address the changed circumstances and new information that has led to a substantial, long-term departure from the timber management outcomes predicted under the 1995 RMPs" (BLM 2012). These evaluations also identified a need to modify or update management direction for most of the other resource management programs due to changed circumstances and new information. This Analysis of the Management Situation is an early step in the process of revising these RMPs.

Purpose of the Analysis of the Management Situation

The purpose of the Analysis of the Management Situation is the following:

- Describe the current conditions and trends of the resources and the uses/activities in the planning area.
- Provide the basis for the no action alternative.
- Create a framework from which to resolve the planning issues through the development of alternatives.

Although the Analysis of the Management Situation will be available to the public, it is primarily intended to provide BLM managers with condensed information for use in developing alternatives for the RMP. Managers will also use information received during the public scoping period in the alternative development process. Because it is only intended to provide a snapshot of resources and management opportunities, the Analysis of the Management Situation does not provide the level of detail, background information, references, or definitions that will be included in the RMP environmental impact statement. The data included in this document should be considered preliminary and may be updated or revised in future RMP's for Western Oregon planning documents.

While the Analysis of the Management Situation is not a National Environmental Policy Act document, the RMP process of which it is a part is subject to the National Environmental Policy Act. The BLM will draw upon the Analysis of the Management Situation as it develops the introduction, affected environment chapter, and no action and action alternatives for the RMPs' environmental impact statement.

The BLM resource management planning process consists of nine steps, which, in some instances, may overlap each other:

1. Identification of issues
2. Development of planning criteria and State Director Guidance
3. Collection of inventory data and information
4. Analysis of the management situation
5. Formulation of alternatives
6. Estimation of effects of alternatives
7. Selection of preferred alternative
8. Selection of RMP
9. Monitoring and evaluation

General Description of Planning Area

Planning Area

The planning area includes approximately 2.5 million acres of public land managed by the Salem, Eugene, Roseburg, Medford, and Coos Bay Districts and the Lakeview District's Klamath Falls Field Office (Map 1).

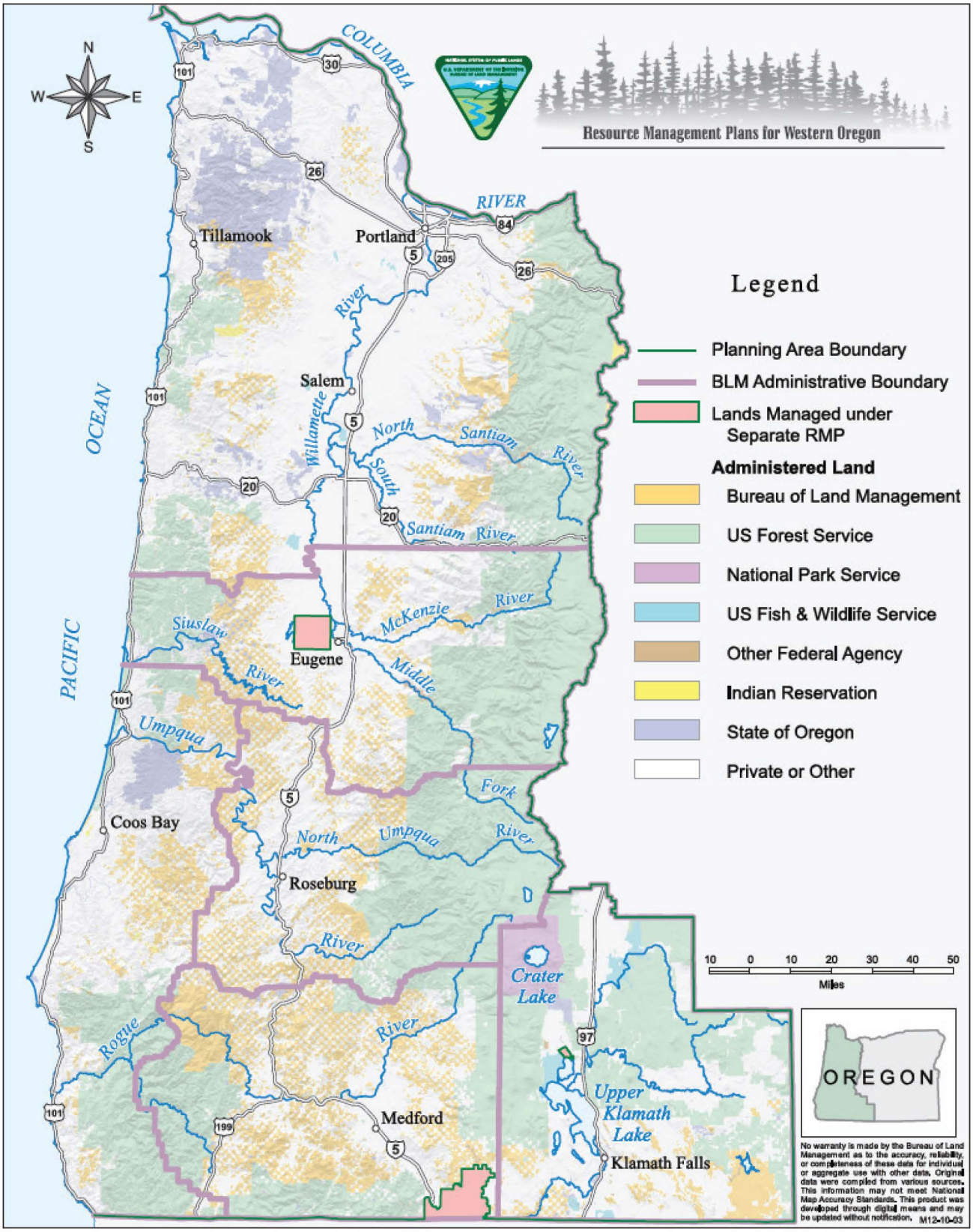
Throughout this document, the term "planning area" will be used to refer to all lands within the geographic boundary of this planning effort regardless of jurisdiction. However, the BLM will only make decisions on lands that fall under BLM jurisdiction (including subsurface minerals). The term "decision area" will be used to refer to the lands within the planning area for which the BLM has authority to make land use and management decisions. In general, the BLM has jurisdiction over all BLM-administered lands (surface and subsurface) and over subsurface minerals in areas of split estate (i.e. areas where the BLM administers federal subsurface minerals, but the surface is not owned by the BLM).

Within the western Oregon districts, three BLM-administered areas are not included in the decision area: the Cascade Siskiyou National Monument (Medford District), the Upper Klamath Basin and Wood River Wetland (Klamath Falls Field Office), and the West Eugene Wetlands (Eugene District). The first two areas have independent RMPs, while the BLM is currently developing an RMP for the West Eugene Wetlands. This revision process will not be alter or affect these independent RMPs.

Land Status

BLM-administered lands in the planning area include Oregon and California Railroad (O&C) lands, Coos Bay Wagon Road lands, Public Domain lands, and acquired lands (Map 2). Table 1 shows the amount of BLM surface ownership by source of administrative authority for the decision area.

The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) (43 U.S.C. §1181a) provides the legal authority for the management of O&C lands and Coos Bay Wagon Road lands. The O&C Act requires that these lands be managed "… for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities …".



Map 1: Administered Land in the Planning Area

The Federal Land Policy and Management Act of 1976 (43 U.S.C. §1701) provides the legal authority for the management of Public Domain lands and acquired lands. These lands and resources are to be managed under the principles of multiple use and sustained yield.

Land Ownership Patterns

The land ownership patterns in western Oregon create unique management challenges. Generally, O&C land is located in odd-numbered sections and private land is located in even-numbered sections, creating a "checkerboard" ownership pattern, as seen in Map 2. Activities on adjacent private lands have implications for management of the BLM-administered lands. The BLM also typically manages only a small percentage of the land in any particular watershed, and in many cases, the cumulative actions across all ownerships determine resource outcomes. In the Coast Range mountains, checkerboard ownership (private and BLM) is spread across the entire watershed. In the western Cascades, checkerboard ownership is mostly in the lower part of watersheds with blocked Forest Service ownership in the headwater areas.

Table 1. Land status of BLM-administered lands.

Land Status	Acres	Percent of Decision Area
O&C lands	2,025,826	81.2
Coos Bay Wagon Road lands	74,598	3.0
Public Domain	384,273	15.4
Acquired lands	8,958	0.4

Current Management Direction

Relevant Plans and Amendments

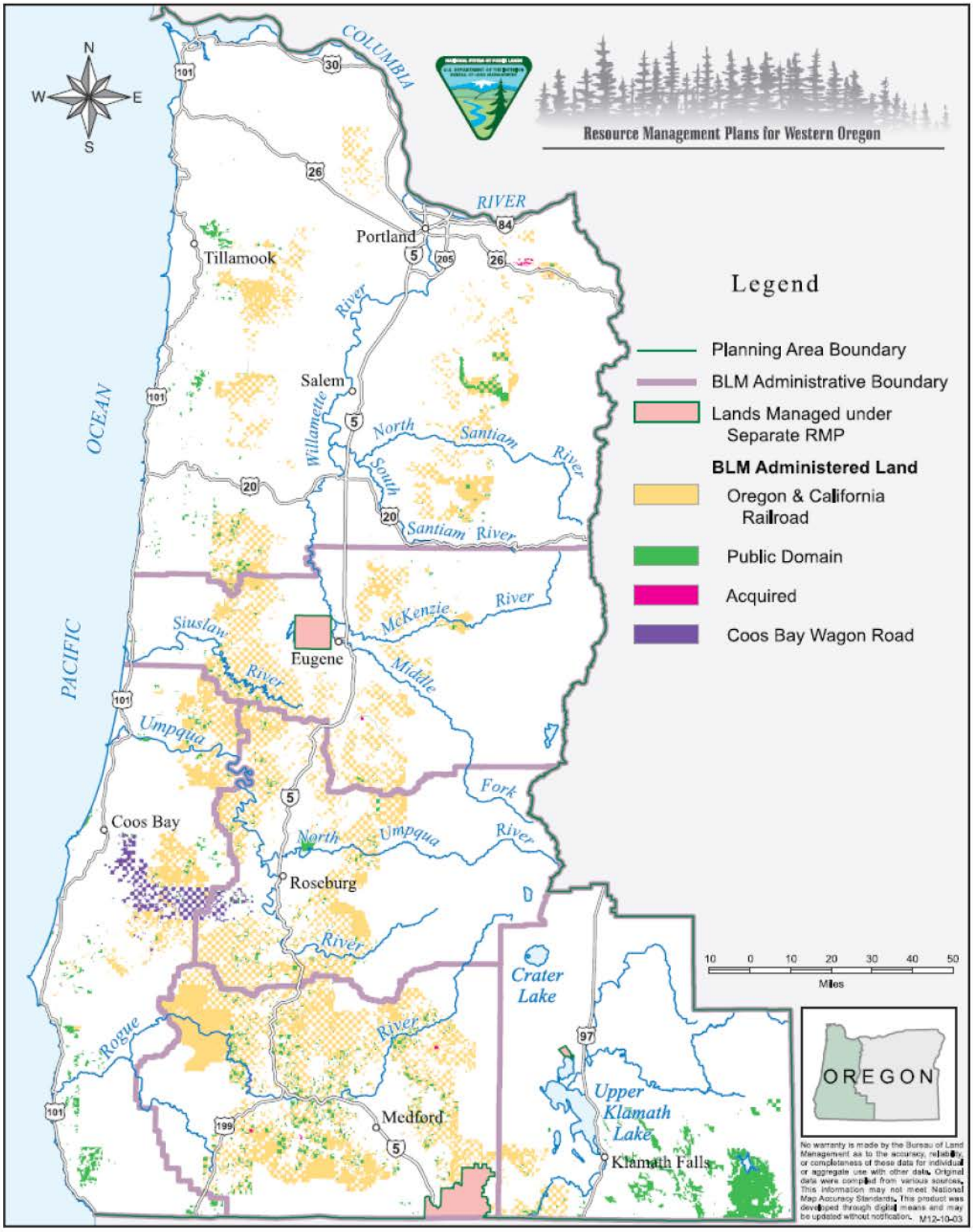
The RMPs for the following six western Oregon BLM offices provide the current management direction:

- Coos Bay District
- Eugene District
- Klamath Falls Field Office –Lakeview District
- Medford District
- Roseburg District
- Salem District

These six RMPs were completed concurrently and had Records of Decision signed in 1995.

The 1994 Final SEIS and Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl are commonly referred to as the Northwest Forest Plan. Land management plans for individual National Forests and BLM Districts (including the six Districts in the planning area) west of the Cascade Range Mountains in Washington, Oregon, and Northern California have incorporated the Northwest Forest Plan's management direction. With the exception of the eastern portion of the Klamath Falls Field Office, the planning area is entirely within the area addressed by the Northwest Forest Plan.

The Northwest Forest Plan includes seven land use allocations along with standards and guidelines that provide specific management direction for each allocation. The Northwest Forest Plan created a landscape of large Late-Successional Reserves to maintain a functional, interactive, late-successional, and old-growth forest ecosystem.



Map 2: Land Status of BLM Lands in the Planning Area

These reserves were designed to serve as habitat for late-successional and old-growth related species, which include the northern spotted owl. At the landscape-scale, the BLM manages a small percentage of these large reserves (Map 3).

The BLM and the Forest Service have twice amended the Northwest Forest Plan's approach to the management of little-known species closely associated with late-successional and old-growth forest, known as Survey and Manage. In 2001, the agencies issued a decision modifying the Survey and Manage requirements; a subsequent 2004 decision by the agencies removed the Survey and Manage requirements entirely. In 2006, the U.S. District Court for the Western District of Washington set aside the 2004 decision. The BLM issued a 2007 decision to correct the defects identified by the District Court. In 2009, this decision was also set aside. The District Court approved a settlement agreement addressing Survey and Manage in 2011, which was overturned by the Ninth Circuit Court of Appeals in April of 2013.

In 2004, the BLM issued a decision amending the Coos Bay, Medford, and Roseburg Districts' RMPs with management direction for managing Port-Orford-cedar. All six western Oregon RMPs have also been refined and clarified through plan maintenance.

Management Decisions

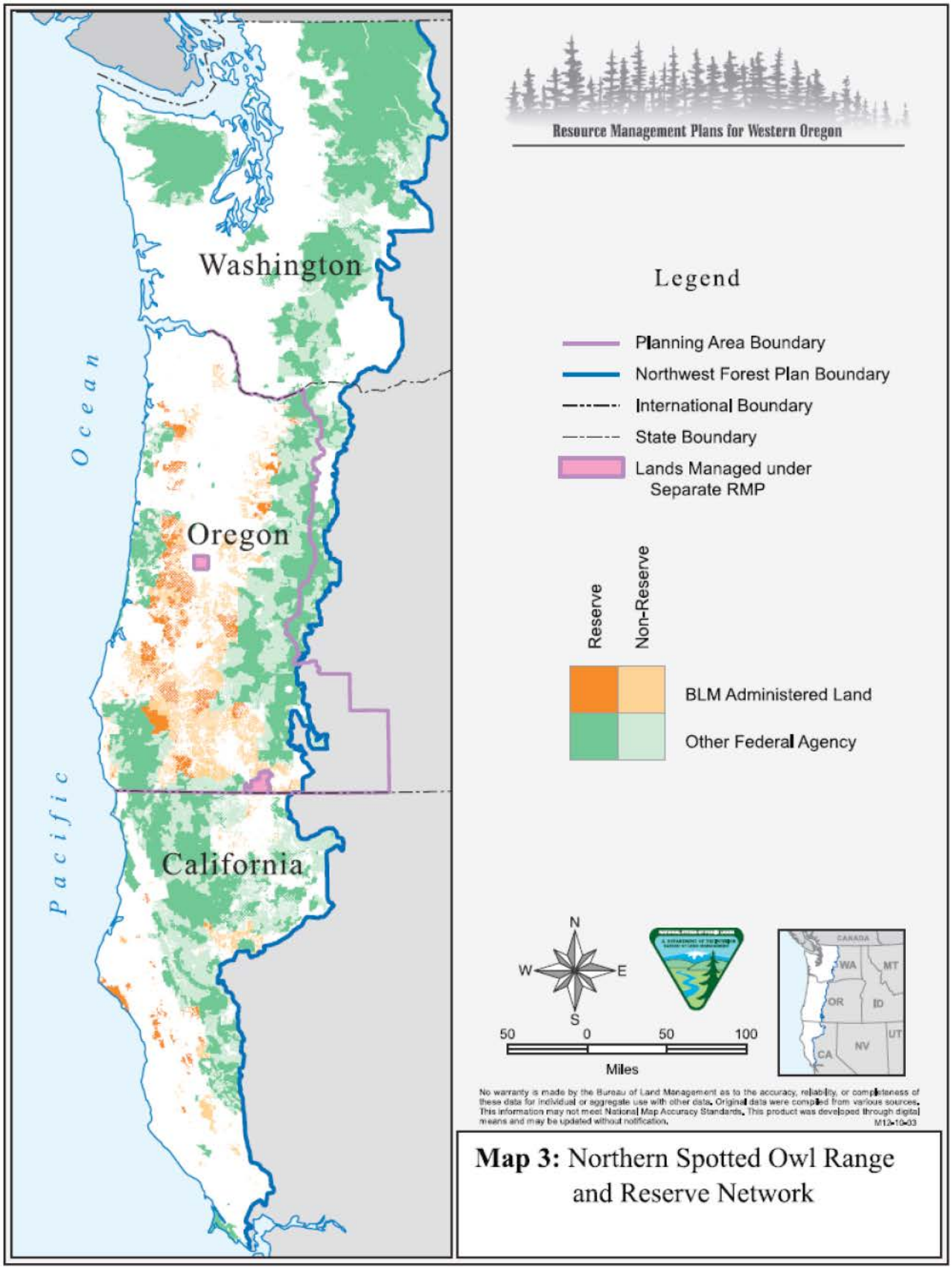
Management objectives for various resources and programs, land use allocations, and management direction in the six plans are very consistent, because the BLM completed the six western Oregon RMPs concurrently and with a high degree of coordination. Land use allocations in the six RMPs consist of:

- Congressionally Reserved Areas – Included in this category are Wilderness Areas and Wild and Scenic Rivers.
- Late-Successional Reserves – These reserves are intended to maintain a functional, interactive, late successional and old-growth forest ecosystem.
- Adaptive Management Areas – These areas are designed to develop and test new management approaches to integrate and achieve ecological, economic, and other social and community objectives. A portion of the timber harvest comes from this land.
- Managed Late-Successional Areas – These lands are either mapped managed pair areas or unmapped protection buffers. Managed pair areas are delineated for northern spotted owl activity centers known as of January 1994.
- Administratively Withdrawn Areas[1] – These areas are identified in current district plans and include recreational and visual areas, back country areas, and other areas not scheduled for timber harvest.
- Riparian Reserves – The main purpose of these reserves is to protect the health of the aquatic system and its dependent species; the reserves also provide incidental benefits to upland species.
- Matrix – The matrix is the federal land outside the other six categories of designated areas. It is also the area in which most timber harvest and other silvicultural activities are conducted. Lands in the matrix contain all seral stages. Approximately 14 percent of existing late-successional forest in the Northwest Forest Plan area is located with the matrix. Matrix is subdivided into:
    - General forest management area
    - Connectivity/diversity blocks

  Matrix in the Medford District is further subdivided into:
    - Northern general forest management area
    - Southern general forest management area

  Matrix in the Klamath Falls Field Office consists only of the southern general forest management land use allocation.

[1]The 1995 RMPs define this allocation as "areas withdrawn from scheduled timber harvest"; the allocation does not refer to withdrawal from mineral laws.



Map 3: Northern Spotted Owl Range and Reserve Network

The six western Oregon RMPs address twenty-four different resources and programs. For each of these resources and programs the RMPs provide:

- Land use allocations.
- Management objectives.
- Management direction.

Management objectives are expected to be achieved through the establishment of land use allocations and the implementation of management direction. Management direction is generally consistent among the six RMPs. Notable variations apply to the timber resources programs of the Medford District and Klamath Falls Field Office. These variations are intended to address the different physiographic conditions in southwestern Oregon.

Key Findings

The following are key findings of the Analysis of the Management Situation, drawn from the key points found in Chapter Two. These findings are highlighted because they are likely to be important considerations in the development of alternatives for the RMP revision.

- Northern spotted owl populations are declining throughout the range at an annual rate of three percent. While other threats to the species are ongoing, a principal cause of this spotted owl population decline is competition from barred owls, which have expanded their range into the Pacific Northwest during the past forty years.
- BLM-administered lands play a key role in spotted owl conservation in major portions of the planning area; however, recent research provides no evidence that the BLM can manage individual forest stands in a manner that provides spotted owls with a competitive advantage over barred owls. Instead, research reaffirms the importance of managing for large blocks of contiguous old-forest habitat that are properly spaced.
- Marbled murrelet populations showed no statistically significant population trend in the planning area from 2000 to 2012.
- Watershed conditions are improving throughout the range of the Northwest Forest Plan and the objectives of the Aquatic Conservation Strategy are being or are trending toward being met.
- Riparian Reserve boundaries extend out beyond the water influence zone and are wider than necessary for water quality protection. Current Riparian Reserves were allocated for multiple objectives including terrestrial species habitat.
- Large wood, stream temperature, sediment, and water flow have the greatest influence on aquatic habitat and the ability of aquatic habitat to support fish populations.
- Rare plant and fungi species are not evenly distributed across the landscape. Active management is necessary to maintain or improve habitat conditions for many special status species and rare plant communities.
- Fire exclusion in the frequent fire regimes has resulted in ecosystem alteration, loss of habitat, species shifts, and increased likelihood of high intensity wildfire and associated consequences.
- Management activities can be designed to serve as a partial surrogate for natural disturbance and change in the absence of natural fire. Forest management can create desired structural and compositional changes while also producing commercial forest products.
- Timber program implementation has departed substantially from assumed harvest levels in the 1995 RMPs. In particular, regeneration harvest volume offered has been substantially below assumed levels, while thinning volume offered has been substantially above assumed levels. The current approach to forest management is not sustainable at the declared ASQ level.
- O&C payments averaged $134 million from 1960-2011. The total payment declined from $136 million in 2001 to $40 million in 2011. Without the Secure Rural Schools extension, the O&C Counties would have received a total of $9 million in 2011 based on 50 percent of timber receipts (Tuchmann and Davis 2013).

- Federal payments account for more than 20 percent of discretionary spending in ten of the planning area counties. In Coos, Curry, Josephine, and Douglas counties, this percentage ranges from 56 to 81 percent.
- Jobs in wood products manufacturing in western Oregon – some of the highest-paying jobs in the planning area – have declined by over 40 percent since 2001. Visitor services and government have fared well compared with other industry groups, but visitor services pay the lowest wages of industry groups primarily affected by management of BLM-administered lands.
- The BLM will continue to produce diverse, high-quality recreational opportunities that support outdoor-oriented lifestyles and add to participants' quality of life, enhance the quality of local communities, and foster stewardship of natural and cultural resources. This planning effort will achieve this by integrating new management direction related to recreation and visitor services, while taking a community level approach to public engagement.

Chapter 2: Area Profile

Introduction

This chapter provides a concise overview of the current condition of resources, resource uses, and programs related to BLM management in western Oregon. To the extent possible, it also offers an overview of trends in resource condition and includes a forecast of future resource condition. Finally, it provides BLM managers with management opportunities to consider as they formulate alternatives for analysis in the RMP revision.

The Analysis of the Management Situation focuses on the issues that are likely to be of the greatest management concern; the 2012 RMP Evaluation (BLM 2012a) contained the identification of programs and resources that the evaluation identified as functioning as anticipated or that were not initially identified as key issues in the preparation plan are addressed in less detail. Although this Analysis of the Management Situation addresses topics concisely, the environmental impact statement will rigorously explore and objectively evaluate any issues that are carried forward in the RMP revision.

An underlying assumption in the Analysis of the Management Situation is that the BLM will comply with the legal requirements of all applicable laws in its management of BLM-administered lands. In order to keep the document concise, the need for compliance with various laws is not repeatedly addressed in each section.

Air Quality

Key Points

- The primary influence on air quality from BLM-administered lands is smoke from wildfires. Prescribed fires can result in smoke intrusions into smoke sensitive areas, although it is less clear if they have caused the exceedances of the daily $PM_{2.5}$ standard.
- Air quality has generally improved over time, although climate change may reverse some improvements due to increased wildfires and increasing relative humidity.
- Opportunities to reduce emissions from BLM management actions are limited, unless new markets develop for the waste material generated by vegetation management.

Current Conditions And Context

The U.S. Environmental Protection Agency (EPA) regulates air quality under the Clean Air Act, as amended (42 *U.S.C.* §7401). The EPA has established national ambient air quality standards (NAAQS)[2]

[2]More information about these standards is at the EPA website: http://www.epa.gov/air/criteria.html

for seven pollutants; the main ones of concern for BLM management activities are ozone (O_3) and particulate matter. Particulate matter has two standards; "inhalable coarse particles" sized 2.5 to 10 microns are called PM_{10} and "fine particles" sized ≤2.5 microns are called $PM_{2.5}$ (ODEQ 2012). Most burning activities associated with BLM land management emit particles in the $PM_{2.5}$ standard. Wildland fire produces two additional pollutants – nitrogen oxides (NO_x) and volatile organic compounds (VOCs) – and they are precursors for ground-level ozone. The EPA intends for air quality standards to protect human health and welfare, with visibility in mandatory Class 1 areas serving as the indicator for human welfare.

The Oregon Department of Environmental Quality's (ODEQ) Air Quality Division implements the EPA's air quality regulations and it has delegated smoke management responsibilities to the Oregon Department of Forestry (ODF). Under the Oregon Smoke Management Plan, ODF issues burning permits for all forest lands within designated forest protection districts.

Within the air quality analysis area there are nine mandatory Class 1 areas (Crater Lake National Park and the Kalmiopsis, Mt. Hood, Three Sisters, Mt. Jefferson, Mt. Washington, Diamond Peak, Gearhart Mountain, and Mountain Lakes wildernesses), two non-attainment areas for PM_{10} (Eugene-Springfield, Oakridge), two non-attainment areas for $PM_{2.5}$ (Oakridge, Klamath Falls), and two air quality maintenance areas for ozone (Portland-Vancouver, Salem). In addition, the Oregon Smoke Management Plan contains the identification of 35 smoke sensitive areas along the I-5 corridor, the coast, and just east of the Cascades within the air quality analysis area, including the Columbia River Gorge National Scenic Area.

Poor air quality is most commonly associated with major polluting activities, temperature inversions, and strong high pressure systems that create stagnant air. The worst air quality in winter typically occurs due to the combination of a strong and persistent inversion, high vehicle use, and biomass consumption associated with heat or power generation (particulates) (ODEQ 2012). The worst air quality in summer typically occurs due to the combination of strong persistent high pressure and high vehicle use (ozone) or wildfires (particulates, ozone).

Large wildfires contribute to air quality issues over large areas and for prolonged periods. During 2002, wildfires resulted in 14 daily $PM_{2.5}$ exceedances in Klamath Falls and one in Medford (ODEQ 2003); at that time, the daily $PM_{2.5}$ standard was 65 $\mu g/m^3$. Elevated particulate levels were reported between late July and the end of August at Bend, Brookings, Cave Junction, Grants Pass, Klamath Falls, and Medford (ODEQ 2003). Similar issues developed in 2008 from extensive wildfires burning in northern California, although smoke from those fires reached as far north as Portland (ODEQ 2009).

The primary source of pollutants from activities on BLM-administered lands is wildland fire. Emissions from wildfires are not subject to regulatory control. Emissions from prescribed burns on BLM-administered lands in western Oregon are greater than those produced by burns on state forests, slightly less than those produced by burns on National Forest System lands, and considerably less than those produced by privately owned lands (BLM 2008). Under the 1995 resource management plans, the BLM anticipated prescribed burning to produce 5,447 tons of PM10 and 3,812 tons of PM2.5 per year, primarily resulting from slash disposal following regeneration harvesting. Actual emissions have averaged 1,854 tons of PM10 and 1,155 tons of PM2.5 per year, primarily from hazardous fuels reduction treatments in southwest Oregon and slash disposal following thinning operations (BLM 2008).

Trends And Forecasts

According to Interagency Monitoring of Protected Visual Environments (IMPROVE) data (available at http://vista.cira.colostate.edu/improve/), visibility has improved within the air quality analysis area since monitoring began (varies by monitoring station). ODEQ reports that trends have been downward for most pollutants in most areas except for the daily $PM_{2.5}$ in Klamath Falls and Oakridge (ODEQ 2012). Both Klamath Falls and Oakridge have exceeded the daily $PM_{2.5}$ standard of 35 $\mu g/m^3$ nearly every year since 2006, when the standard was lowered to that level. Residential home heating in winter is associated with most exceedances of the $PM_{2.5}$ standard with summer wildfires a secondary factor.

On 15 January 2013, the EPA published final rules in the Federal Register lowering the annual $PM_{2.5}$ standard to 12 µg/m³ from 15 µg/m³, effective 18 March 2013. Whether this change will result in any areas designated as non-attainment for the annual $PM_{2.5}$ standard is not known yet. The daily $PM_{2.5}$ standard remains unchanged.

Climate change may result in a reversal of the trend in visibility and a worsening of air quality in summer and fall. Many climate projections foresee longer fire seasons and more severe burning conditions, which would lead to more acres burned, increased fire severity (e.g. Mote *et al.* 2013 and references therein) and greater particulate production over the life of such wildfires. One result would be an increase in the number of unhealthy days and reduced visibility in mandatory Class 1 areas. In addition, as the atmosphere warms, it holds more moisture; an increasing trend in relative humidity has already been documented in the United States (Walsh *et al.* 2013 and references therein). Certain pollutants are very responsive to even small increases in relative humidity, potentially degrading visibility with no change in pollutant level (Hand *et al.* 2011).

Management Opportunities

Management opportunities to further reduce particulate emissions, NO_x, and VOCs from BLM management activities are very limited. The BLM in western Oregon currently complies with the Oregon Smoke Management Plan to reduce potential impacts of particulate emissions on mandatory Class I areas, air quality non-attainment and maintenance areas, and smoke sensitive areas. Given current technologies, smoke management techniques, and markets, there is little BLM can do to further reduce particulate emissions. Increased fuel treatments in dry forests may reduce potential particulate emissions, NO_X and VOCs from wildfires by reducing the probability that canopy fuels will burn.

The only practical ways to reduce emissions from prescribed burning are to reduce the amount of biomass burned through utilization or to conduct burns when smoldering combustion is limited, because smoldering combustion produces significantly more particulates than flaming combustion (Hardy *et al.* 2001). Increasing utilization of biomass has remained elusive due to market limitations. For broadcast and jackpot burning, smoldering combustion can be limited by reducing the amount of coarse fuels and duff burned. These reductions are largely achieved by conducting burns when these fuels are moist, which generally means burning in spring. For pile burning, smoldering combustion can be limited by burning piles that are "clean", which are relatively tightly constructed, and very dry to promote greater incidence of complete combustion (Hardy *et al.* 2001). By greatly limiting or avoiding incorporation of soil into machine piles, covering piles to limit wetting, and burning in fall or winter can accomplish this. The daily smoke management instructions are designed to manage particulate dispersion through distance between prescribed burns and the expected atmospheric conditions that would maximize dispersion and limit smoke concentrations resulting from nighttime or seasonal inversions. The BLM Districts in western Oregon currently apply these recommended smoke management techniques and comply with the provisions of the Oregon Smoke Management Plan.

The primary way to reduce emissions further is to burn less biomass in connection with land management activities. However, simply leaving the resulting debris to decay is also strongly associated with increased wildfire severity, particularly in drier forests where decay rates are slow. In addition, numerous assessments of western wildfire concerns indicates a need to increase forest thinning and other vegetation management activities in drier forests to reduce wildfire risks to wildland-urban interface, infrastructure, forest resources, and ecosystem services. The only alternative to leaving material to decay or burning it is to utilize it. As wood processing technology changes, utilization may increase. Alternatively, if strong biomass markets or market subsidies develop, removal may increase and the material is burned in more efficient furnaces to produce heat or power. At present, the BLM in western Oregon has very limited opportunities to burn less biomass due to the lack of biomass markets, the high costs of transporting this very low value material, and the current inability of energy generated from biomass burning to economically compete with other energy sources, such as natural gas.

Reducing hazardous fuels through a combination of mechanical treatments and prescribed burning is widely identified as a means of reducing potential air quality impacts from large wildfires, particularly in dry forests with historically short fire return intervals. Consumption estimates, and the resulting particulate emissions, vary widely in the various studies that have estimated carbon or particulate emissions from actual large wildfires, depending on

the estimated prefire fuel loading and the assumptions concerning the amount of material consumed. Most studies clearly indicate a reduction in wildfire emissions when comparing a single treatment to a wildfire; however, studies that have compared long-term emissions from both initial and maintenance treatments to a single large wildfire have produced conflicting results. Results seem to depend on what assumptions are made about the frequency of maintenance treatments. Evaluations of fire behavior on wildfires that affect areas that have not received a fuels treatment and areas that have, clearly show a reduction in fire behavior and particularly for canopy fuels consumed, which should have resulted in a reduction in particulate emissions. However, these evaluations have also highlighted that most fuel treatments have occurred at too small a scale to affect final fire size, thus it is unclear if the probable reductions in emissions were significant. Yet these evaluations also clearly indicate that fuel treatments at large enough scales are highly likely to reduce the particulate emissions from a large wildfire. At present, it is not clear if fuel treatments in BLM-managed dry forests in western Oregon are at a sufficient scale to affect probable emissions from a large, high intensity wildfire.

Areas of Critical Environmental Concern (ACECs)

Key Points

- Existing, potential, and new ACEC nominations will be evaluated to determine if they meet the relevance and importance criteria and if designation is necessary for special management to protect those values.
- In the past decade, the BLM has evaluated newly nominated ACECs to determine if they meet the criteria for relevance and importance. These potential ACECs are receiving interim management until a planning decision is made about their designation.

Current Conditions And Context

The BLM uses Areas of Critical Environmental Concern (ACECs) to designate special management that is required to protect important natural, cultural, and scenic resources, and to identify natural hazards. ACEC designations include Research Natural Areas, Outstanding Natural Areas, and Natural Hazard Areas:

- Research Natural Areas (RNAs) – Areas which contain natural resource values of scientific interest and are managed primarily for research and educational purposes:
    - Preserve natural ecosystems for comparison with areas influenced by human activities
    - Areas for ecological and environmental studies
    - Preserve gene pools of typical and endangered plants and animals.
- Outstanding Natural Areas (ONAs) – Areas that contain unusual natural characteristics and are managed primarily for educational and recreational purposes.
- Natural Hazard Areas (NHAs) – Areas that contain natural hazards that significantly endanger human life, health, or property and are managed to protect life and property.

Four categories describe the relevant and important values:

- Historic, cultural, or scenic values
- Fish and wildlife resources
- Natural processes or systems
- Natural hazards

There are 107 ACECs currently designated in the western Oregon districts' RMPs (Map 4). This designation includes 32 Research Natural Areas, seven Outstanding Natural Areas, and one Natural Hazard Area (Table 2).

Special management actions to preserve, protect, or restore relevant and important values and resources are being implemented. RMP allocations, constraints, and mitigation measures appear to be effective in achieving the desired outcomes for the designations. Table 2 shows the number of existing Areas of Critical Environmental Concern by district. Many areas within the planning area meet these criteria for several relevant and important values (Table 3).

The public nominated certain areas for designation as Areas of Critical Environmental Concern late in the 1995 RMP process. Many of these areas were found to meet the important and relevant criteria. However, the BLM could not designate these areas in the 1995 RMP because the BLM received these nominations too late in the RMP process. They have since been protected under interim management (Table 4; Map 4).

As part of the 2008 RMPs, the BLM evaluated newly nominated Areas of Critical Environmental Concern to determine if they met the criteria for relevance and importance so they could be carried forward into the plan revision as potential Areas of Critical Environmental Concern. The 2008 Records of Decision/RMPs designated these potential Areas of Critical Environmental Concern except where they conflicted with timber management on

Table 2. Existing Areas of Critical Environmental Concern by District

District/Field Office	ACECs	RNAs	ONAs	NHAs	Total Number	Total Acres
Coos Bay	10	1	0	0	11	10,197
Eugene	7	5	0	1	15	2,769
Klamath Falls	4	1	0	0	7	8,200
Medford	13	10	1	0	32	13,340
Roseburg	3	7	0	0	15	11,858
Salem	13	8	6	0	27	8,595
Total	50	32	7	1	107	54,959

Table 3. Value categories for existing and potential Areas of Critical Environmental Concern

District/Field Office	Historic, Cultural, or Scenic Values	Fish and Wildlife Resources	Natural Processes or Systems	Natural Hazards
Coos Bay	6	7	16	0
Eugene	4	15	19	0
Klamath Falls	5	5	8	0
Medford	9	11	34	0
Roseburg	2	3	12	0
Salem	8	18	35	3
Total	34	59	124	3

Table 4. Previously nominated Areas of Critical Environmental Concern under interim management since late in the 1995 RMP planning process

District/Field Office	ACECs	RNAs	ONAs	NHAs
Coos Bay	0	0	0	0
Eugene	3	1	0	0
Klamath Falls	2	0	0	0
Medford	2	2	1	0
Roseburg	0	0	0	0
Salem	2	0	0	0

O&C lands (Table 5). Since the Court vacated and remanded the2008 RMPs and Records of Decision, BLM policy requires temporary management for potential Areas of Critical Environmental Concern until they can be further evaluated during a plan amendment or revision. The BLM is managing as potential Areas of Critical Environmental Concern those nominated areas that had relevant and important values but conflicted with timber management on O&C lands (Map 4). Temporary management includes reasonable measures necessary to protect human life and safety or significant resource values from degradation.

There has been opportunity for public nominations during this revision. The BLM will evaluate ACEC nominations to determine if they meet the criteria of relevance and importance. Areas meeting the criteria for relevance and importance would be carried forward in the planning process as potential Areas of Environmental Concern, and a Record of Decision for the RMP would include decisions about designation.

During the evaluations, the BLM identifies special management needs, specifically concerning off-highway vehicle designation, leasable mineral entry, locatable/salable mineral entry proposals, and timber harvest special management prescriptions. The BLM will further determine the need for special management during alternative development. It is conceivable that for some areas and under some alternatives, the land use allocations may provide for the relevant and important values, negating the need for designation to protect the relevant and important values.

Management Opportunities

The BLM will evaluate all existing and potential ACECs to do the following:

- Determine if they still meet the criteria of relevance and importance
- Determine if a designation is still necessary for special management to protect the features for which areas have been designated or put under interim management
- Determine if modifications such as boundary changes, additions, and deletions of acreage, and types of designation are needed

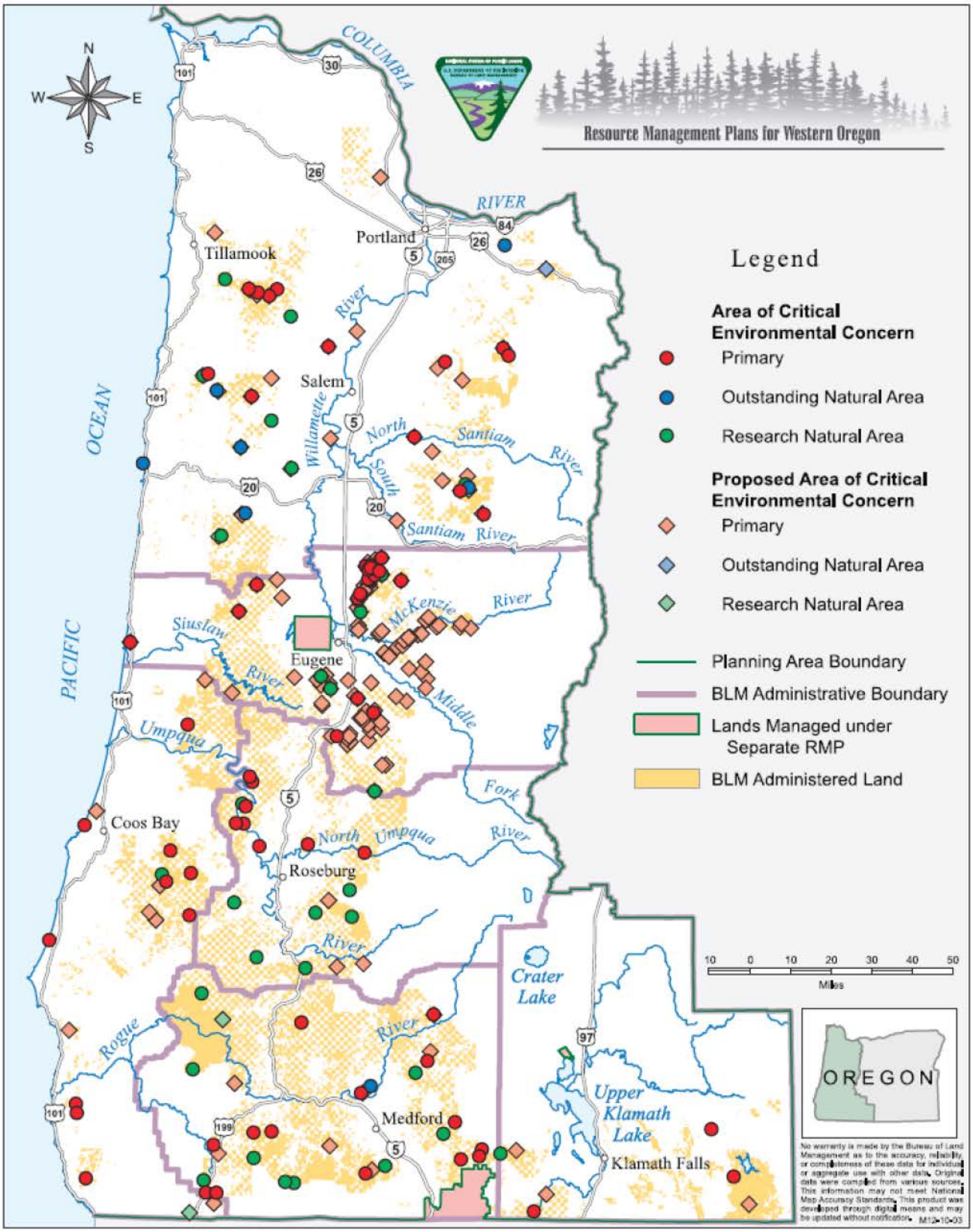
The BLM will also evaluate nominated ACECs to determine if they meet the criteria and if designation is necessary for special management to protect those relevant and important values.

The State of Oregon established its Natural Areas Program in 1979. It evolved out of a federal program led by the U.S. Forest Service's Pacific Northwest Research Station with the first Research Natural Area Needs in the Pacific Northwest published in 1975. Federal agencies and the state of Oregon have used updated versions of this reference to guide identification and selection of lands to identify Research Natural Areas to represent the state's range of ecological and geologic diversity. In 2009, the Interagency Strategy for the Pacific Northwest Natural Areas Network was published (Wilson *et al.* 2009). In large part, the Oregon Natural Areas Plan 2010 incorporated this document. Within this plan are elements that describe the basic units of Oregon's ecological and geologic heritage.

Table 5. Potential Areas of Critical Environmental Concern currently under interim management that were evaluated and determined to meet the criteria while preparing the 2008 RMPs

District/Field Office	Designated in 2008 RMPs	Not Designated in 2008 RMPs*
Coos Bay	5	0
Eugene	6	2
Klamath Falls	3	0
Medford	5	2
Roseburg	1	2
Salem	6	3

*Conflicted with timber management on O&C lands.



Map 4: Areas of Critical Environmental Concern

Many western Oregon BLM designated ACECs and Research Natural Area ACECs represent ecological elements listed in the 2010 Oregon Natural Areas Plan. The BLM could appropriately designate these areas as Research Natural Areas if they are not already. In addition, the BLM could evaluate additional BLM-administered lands to see if they represent some of the ecological and geological elements and could ultimately nominate them as Research Natural Area Areas.

Climate Change

Key Points

- Greenhouse gas emission rates in the atmosphere are tracking with the more intensive carbon emissions scenarios in climate projections with no evidence that these trends will change significantly in the near future.
- Climate change is leading to changes in disturbance regimes and severities (i.e., drought, fire, flood, insects, and disease) and these changes are expected to continue.
- BLM infrastructure along the coast is becoming increasingly vulnerable to storm surges and sea level rise and may be more vulnerable to flooding risks along streams in snow-dominated systems.
- Management opportunities for climate change adaptation include emphasizing species or ecotypes, stand structures, stand densities, and species compositions that are more resistant to drought, fire, insect outbreaks, and disease, particularly at lower elevations and on drier sites.

Current Conditions And Context

Three different climate types characterize the planning area. The Salem, Eugene, and Coos Bay Districts have maritime climates typified by relatively cool, moist conditions year-round. The Medford District and the western portion of the Klamath Falls Field Office have a Mediterranean climate typified by cool to warm, moist conditions in winter and hot dry conditions in summer. The eastern portion of Klamath Falls has a continental climate typified by relatively dry conditions year-round. The Roseburg District lays in the transition zone between the Mediterranean and maritime climates, with characteristics of both and no clear demarcation between the two climate types.

The maritime climate zone supports some of the most productive forests in the western United States, with large, long-lived trees that can sequester and store considerable carbon above- and belowground. The Mediterranean climate zone supports a wide diversity of forest types and woody species (trees and shrubs) and while the trees may not reach the sizes or density seen in the maritime climate zone, they can still sequester and store considerable carbon above- and belowground. The continental climate zone supports western juniper woodland and sagebrush-steppe with considerably less carbon sequestration and aboveground carbon storage capability as compared to the other two climate zones. A much higher proportion of the carbon storage in the continental climate zone is belowground as compared to the Mediterranean and maritime climate zones (Table 4.5 in IPCC 2006).

Globally, atmospheric CO_2 concentrations have increased from an estimated 275-285 ppm (part per million) before the year 1750 to 395 ppm in the year 2012 (IPCCa 2007; Blasing 2013). Carbon dioxide is the primary greenhouse gas, comprising over 80 percent of total emissions globally and in both the U.S. and Oregon with fossil fuel combustion the primary source of CO_2 (IPCC 2007b; ODOE 2011; EPA 2012). United States emissions of CO_2 are 16 percent of global emissions and Oregon's emissions are about one percent of the US emissions (ODOE 2011; EPA 2012; GCP 2013). Ocean and land greenhouse gas sinks remove about 54 percent of that emitted (GCP 2013). Land sinks in the U.S. effectively reduced total greenhouse gas emissions by 16 percent nationally in 2010, with the proportion in Oregon likely somewhat larger due to the productivity of western Oregon forests (EPA 2012; Joyce *et al.* 2013).

An estimate of greenhouse gas emissions from BLM activities will be included in the draft EIS. The main sources of greenhouse gas emissions are forest management activities and prescribed burning. Sonne (2006) estimated that forestry operations in coastal Douglas-fir would emit between 0.032 and 0.039 tonnes (Mg) of carbon dioxide equivalent (CO_2e) per 100 ft^3 harvested on a 60-year even-aged rotation. Operations assessed included combinations

of site preparation, tree planting at three densities (including seedling transport), herbicide use, fertilization, pre-commercial thinning, commercial thinning, and final harvest. Longer rotations and less intensive management could reduce expected greenhouse gas emissions while shorter rotations and more intensive management could increase emissions. A quick assessment using the First Order Fire Effects Model (FOFEM) and a draft version of a greenhouse gas calculator under development by the National Operations Center suggests that prescribed burning emits an estimated 130-150 Mg CO_2e per acre in wetter forests and 70-85 Mg CO_2e per acre in drier forests. Natural sources of greenhouse gas emissions include decay of dead vegetation, respiration from living plants, and wildfires.

Forests globally, nationally, and within the planning area are a well-documented sink for carbon dioxide, absorbing more than they emit (McKinley *et al.* 2011). Forest management can increase or decrease the forest carbon sink directly through management practices and indirectly by affecting forest susceptibility and resistance to other disturbances such as drought, fire, and insects. Nationally, forests and derived forest products are estimated to store 216-313 million tonnes of carbon (Tg C) per year, the equivalent of 10-20 percent of U.S. carbon emissions, with the forests in western Oregon providing one of the larger forest sinks (McKinley *et al.* 2011).

Estimates of total carbon stored on BLM-administered lands in the planning area will be included in the draft EIS. It is difficult to estimate the carbon stored in harvested forest products (solid wood, paper, and paperboard) originating from BLM-administered lands, but it is necessary since this category is a significant sink (Pan *et al.* 2011; McKinley *et al.* 2011; Krankina *et al.* 2012). In 2008, the BLM estimated 427 Tg C stored on BLM-administered lands and in forest products based on standardized carbon amounts in different key species, stand ages, and life expectancies of different forest products. Based on National Forest averages of carbon density for 2005, BLM-administered lands within the planning area stored an estimated 354 Tg C (120-779 Tg C), not including carbon stored in forest products. These differences highlight how different estimation methodologies produce different results. At the state and local scale, it is not clear whether these differences are substantial or meaningful. Using either approach, however, the amount of carbon stored on BLM-administered lands and forest products is approximately one percent of the conterminous U.S. total and 0.04 percent of the global total stored in forests (Heath *et al.* 2011; McKinley *et al.* 2011; Pan *et al.* 2011), indicating these differences are very small at the national and global scale. Approximately 44 percent of the carbon stored in the land base is located in the top 3.3 ft. of soil, 42 percent in live biomass both above- and belowground, eight percent in dead wood, and five percent in litter and duff on the forest floor (Pan *et al.* 2011; Krankina *et al.* 2012). Determining the amount of carbon stored in forest products either in use or in landfills changes over time, complicating these calculations. In 2008, the BLM estimated two percent of the carbon from wood previously harvested remained stored in wood products. In 2012, the EPA estimated the amount of carbon stored in wood products was 5.4 percent of the total forestry-based carbon stored in the conterminous United States. In western Oregon, the proportion of wood stored in harvested forest products is lower than the national average due to the higher productivity of western Oregon forests relative to the national average and the substantially lower harvests relative to the national average because of the Northwest Forest Plan (Krankina *et al.* 2012). The carbon stored in western Oregon federal forests is approximately 16.6 percent of the statewide emissions from fossil fuels, which is similar to the national average.

Scientific consensus is that forests are inherently "leaky" with respect to carbon (gaining carbon in wetter years and losing it in drier years) and subject to a variety of natural disturbances that result in changes in carbon storage and that the BLM cannot control. Globally, the most significant vegetation-based carbon stores occur in tropical forests and in boreal ecosystems with thick organic soil layers. The amount of carbon stored in temperate forests (like in the planning area) is small relative to total global carbon storage in vegetation.

Trends And Forecast

Climate data specific to the planning area will be analyzed in the draft EIS. This section uses downscaled observations for the Pacific Northwest, defined as Oregon, Washington, Idaho, western Montana, and small portions of surrounding states and Canadian provinces. Many of the trends specific to the planning area are likely very similar to the Pacific Northwest as a whole. In the Pacific Northwest, average annual temperature has increased by 1.5°F, the frost-free period averages 18 days longer, and precipitation has increased with most of the increase in spring (Mote *et al*. 2013; Walsh *et al.* 2013). More winter precipitation occurs as rain and less as snow. Spring snowpack has decreased and spring snowmelt is occurring up to one month earlier. Late winter and early spring

streamflow has increased and summer streamflow has decreased with the greatest changes in the snow-dominated systems and the fewest changes in rain-dominated systems (Mote *et al.* 2013). The amount of precipitation falling in heavy downpours has increased by seven percent, although the trends in flood magnitude are mixed in western Oregon (Walsh *et al.* 2013). This mixed trend may be due to a decreased frequency of rain-on-snow events, which typically produce the largest floods in western Oregon. Tectonic uplift along the Oregon coast has limited increases in relative sea level, but El Niño conditions can temporarily raise sea level by 4-12 inches (NRC 2012; Mote *et al.* 2013). Weaker upwelling has reduced summertime fog (Mote *et al.* 2013); summer fog is a significant source of unmeasured moisture along the coast.

Projections are for observed trends to continue through the 21st century with temperature increases of 3-10°F by the end of the century. Since current emissions exceed that expected under the highest estimate used in the IPCC's (Intergovernmental Panel on Climate Change) 4th assessment, the current trend is towards the higher estimate of temperature increase. Projections related to temperature have high confidence values assigned to them whereas projections related to precipitation have lower confidence. For the Pacific Northwest, Mote and Salathé (2010) indicated a two to four percent increase in average annual precipitation, relative to the 1970-1999 mean; although this mean is associated with wide variation, nearly all models predict drier summers. All types of extreme events, except cold-related events, are expected to increase in frequency and strength (Karl *et al.* 2009; Walsh *et al.* 2013) with the probable exception of rain-on-snow events. Importantly for the Northwest, Mote *et al.* (2013) expect snowpack to continue to decline, affecting soil moisture content, streamflow timing, and growing season length in snow-dominated areas. Sea level along the Oregon coast is projected to rise by an average of two feet, but potentially ranging from only six inches to nearly five feet (Mote *et al.* 2013).

The combination of increased temperature, increased frequency of drought, and drier summers are likely to overcome benefits of any modest increases in precipitation in the remaining seasons and to exacerbate the effects of any decreases. As a result, the impacts of drought and drought-related stressors can occur under wetter conditions than in the past due to higher temperatures. For example, background rates of tree mortality are rising across North America and the western United States largely due to elevated temperature and its effects on soil water deficits (Van Mantgem *et al.* 2009; Allen *et al.* 2010). Several studies in the Pacific Northwest and western US found that on moist sites low soil moisture during the growing season limits tree growth at lower elevations while growing season length limits growth at higher elevations; on dry sites, low soil moisture limits growth at all elevations (Holman and Peterson 2006; Nakawatase and Peterson 2006; Chen *et al.* 2010; Latta *et al.* 2010; Weiskettel *et al.* 2011). Projected changes in climate are expected to increase background rates of tree mortality at all elevations, reduce stand densities and drive shifts in species composition in lower elevations (<3300 ft.) and increase stand densities or tree size in higher elevations (>3300 ft.).

Changes in fire severity and bark beetle outbreaks consistent with that expected under climate change have already been observed in the Pacific Northwest (Mote *et al.* 2013). Due to projected increases in temperature nearly all projections of climate change effects anticipate increased frequency and severity of wildfires, insect outbreaks, disease rates, and drought, leading to slower regeneration, altered species compositions and less dense forests, particularly in lower elevation forests (Chmura *et al.* 2011; Vose *et al.* 2012; Mote *et al.* 2013). Tree and stand growth and reproductive success are likely to be adversely affected on sites with moisture or nutrient limitations and for individual species or local ecotypes that require specific periods of cooler temperatures to set buds or begin growth in spring (Chmura *et al.* 2011). Most forest scientists believe phenotypic plasticity alone will not provide sufficient adaptive capability. Interactions among disturbance types and stressors are expected to have a greater effect on ecosystems than any single disturbance type or stressor (Vose *et al.* 2012). The potentially suitable range for Douglas-fir, most pine species, and nearly all subalpine species is predicted to decline substantially, with western Oregon projected to lose 6 to 20 tree species by the end of the century (McKenney *et al.* 2011; Vose *et al.* 2012).

As atmospheric greenhouse gas concentrations continue to increase, the upper ends of the various climate change projections become more likely. Carbon dioxide emissions, particularly those associated with energy production and use, are the dominant factor in global, U.S., and Oregon trends (ODOE 2011; EPA 2012; GCP 2013). Globally, the current trajectory of fossil fuel emissions is tracking with the more carbon intensive emission scenarios used by IPCC (GCP 2013). Between 1990 and 2010, total U.S. greenhouse gas emissions and total emissions in Oregon

increased (ODOE 2011; EPA 2012), although the rate of increase slowed considerably with the recent economic downturn. The U.S. State Department (2010) projected U.S. greenhouse gas emissions to continue to increase, although the projected increase in carbon is considerably lower than the observed trend.

Greenhouse gas emissions from BLM forest management activities fluctuate from year to year but with no clear trend at present. Since the construction industry uses much of the wood harvested in western Oregon, emissions associated with harvesting tend to fluctuate with demand from that economic sector. Increasing construction demand tends to result in higher lumber and log prices that, in turn, increase harvest rates. The recent economic downturn, since it involved the housing sector, is believed to have reduced harvest-related greenhouse gas emissions. If the Northwest Forest Plan had been implemented as planned, harvest-related greenhouse gas emissions likely would have been higher than what has occurred under the actual levels of harvesting. The Northwest Forest Plan envisioned more harvesting as regeneration cuts and less harvesting as thinning than has actually occurred (BLM 2012a). Therefore, emissions associated with establishing the next stand (site preparation, tree planting, and competing vegetation control) have not occurred at the level expected under the Northwest Forest Plan. Emissions associated with prescribed burning have been more stable but are slowly declining as funding for hazardous fuels treatment declines.

The amount of carbon stored on BLM-administered lands in the planning area continues to increase. Estimates of the annual rate of increase in different studies vary, depending on the time frame used, how forest ownerships were combined or broken out, and the land base used. Krankina *et al.* (2012) estimated reduced harvests under the Northwest Forest Plan as implemented increased carbon stocks in western Oregon by approximately 62 percent over what would have been stored under the Northwest Forest Plan as written, accounting for both total site carbon and harvested wood products. If current practices continued unchanged, the annual rate of increase would reach its maximum between 2005 and 2020, and then gradually decline through the remainder of the century. This decline in the annual rate of increase would arise from expected declines for old growth due to wildfire and continuing declines in the carbon stored in forest products generated during the peak years of harvesting. These results were based on an assumption of no harvesting in late successional reserves, whereas there has been thinning harvest in those reserves, especially in the past decade (BLM 2012a). Because Krankina *et al.* (2012) assumed no harvest in those reserves, their calculations likely slightly over estimated the increase in carbon stocks that has occurred in the planning area. Despite that detail, carbon stocks are likely higher under the Northwest Forest Plan as implemented due to the significantly higher proportion of thinning and significantly lower proportion of regeneration harvesting as compared to the planned levels (BLM 2012a). Im *et al.* (2010) estimated the non-soil carbon stocks on federal forests in western Oregon would increase approximately 90 percent by 2065 and the amount of carbon in dead biomass would double under current management practices. The BLM (2008) estimated total carbon storage in western Oregon would increase by 40 percent by 2100 on BLM-administered lands under the current RMPs as written.

However, these estimates of future carbon storage do not account for potential decreases in carbon storage capability arising from changing climate. Millar *et al.* (2006) projected live vegetation carbon in western Oregon would decline by the end of the century even under more optimistic emissions scenarios, "wetter" climate models, and full fire suppression. Increasing temperatures will lengthen the growing season and increase evapotranspiration demand, thus reducing soil water availability. If the forests in western Oregon are near their water-limited carrying capacity, these changes will lead to a lower leaf area, implying a reduction in forest density and aboveground live biomass (Millar *et al.* 2006).

Management Opportunities

Many ecologists recommend pursuing "no regrets" courses of action in forest management by taking actions that are robust responses to the expected range of potential climate change. Climate scientists have high confidence that temperatures will increase but the rate and degree of increase are less certain. All vegetation projections to date anticipate that the areas currently forested in western Oregon will remain forested, although species composition and stand densities are expected to change because of increased soil moisture deficits and increased frequency and severity of various disturbances such as fire and insect outbreaks. The greatest uncertainties concerning the degree of vegetation change occur on the Klamath Falls Field Office, the driest portion of the planning area. Vegetation response to changing climate is not expected to be gradual or linear as mature trees can tolerate a wider range of

climate conditions than germinants or seedlings. Species shifts are more likely to occur following a disturbance, such as a regeneration harvest, wildfire, disease, or insect outbreak. Habitats that are already relatively dry, small in size, or isolated are more vulnerable to climate change. The general categories of a "no regrets" strategy in forest management include 1) thinning to reduce ladder fuels and canopy and stand densities and favoring species that are more drought and fire tolerant, 2) including ecotypes from warmer and drier seed zones in planting mixes, 3) including species from warmer and drier climates that currently are not present in the general area or present in only small numbers, and 4) planting a diversity of species instead of a single species.

Thinning stands with a preference for drought and fire resistance and species diversity to increase insect and disease resistance can increase overall resistance to climate change and preserve carbon sequestration and storage capability to the extent possible. Sites where soil moisture is already limited or expected to become limited in the near future would most likely benefit from this strategy.

Several of the key species important to western Oregon forests have relatively large ranges and much ecotypic variation across those ranges. As the climate warms and dries, facilitated migration of selected ecotypes of existing species can help maintain desired species compositions, although growth rates, tree form, and tree size may differ from the current ecotypes. Some work investigating the facilitated migration of Douglas-fir ecotypes is already in progress. Including ecotypes from warmer or drier seed zones when replanting may be appropriate, particularly where soil moisture is already a limiting factor or expected to become so in the near future. Including species from warmer and drier climates that are either currently absent or present only in low numbers and planting a diversity of species should reduce the risks of losing entire stands to drought, insects, and disease.

Another part of a "no regrets" strategy is to review placement and design of infrastructure and consider alterations or relocations to reduce the risks of loss from changing flood regimes, sea level rise and increasing storm surges, and wildfires. The BLM can begin planning infrastructure changes, such as culvert and bridge size, road locations or maintenance levels, and recreation site location or design, particularly along the coast. Since a major earthquake and tsunami along the Cascadia subduction zone would further exacerbate sea level rise, infrastructure changes along and near the coast could consider the possibility of an abrupt and large change in sea level.

As stands age, carbon sequestration rates fall but overall carbon storage increases. Practices that promote adaptation to climate change are more likely to preserve existing carbon storage. However, a wildcard remains the extent to which prescribed burning will be needed to dispose of vegetation treatment residue. Increased utilization of what is now waste material would reduce potential greenhouse gas emissions from prescribed burning.

Managing forests primarily for carbon storage is scientifically controversial, although most scientists recommend against that strategy. Several papers have attempted to examine the carbon storage implications of various forest practices, primarily thinning to reduce fire risks. These studies disagree on whether reducing forest densities while also reducing the risks of stand-replacing fire ultimately increase, decrease, or are neutral towards carbon storage. The main weaknesses in all these studies are 1) the lack of validation of estimated carbon releases in stand-replacing fires largely due to poor estimates of the amount of fuel consumed, 2) failure to include estimates of changing carbon storage capability as the climate continues to warm, and 3) failure to conduct such analyses at the landscape scale instead of just the stand scale.

The BLM is currently establishing a climate change-vegetation monitoring network in cooperation with the Forest Service to detect shifts in species compositions and populations. Monitoring protocols are in development and plots will be established in Research Natural Areas, Areas of Critical Environmental Concern, and similar land allocations where vegetation management is not planned. Some plots have already been established in Areas of Critical Environmental Concern, primarily within the Medford District, which will be included in the network.

Cultural Resources

Key Points

- Cultural resources are fragile, non-renewable, and unevenly distributed across the planning area.
- The number of recorded cultural resources increases every year because of compliance and non-compliance driven surveys.
- Looting, natural processes, wildland fire, public land use and some land management activities continue to affect cultural sites.
- The BLM is required to treat all cultural resource sites as eligible for the National Register of Historic Places until formally evaluated for eligibility.
- Existing Class I Cultural Resource Overviews for the planning area are all over 20 years old and need to be updated to reflect current scientific research and summarize new data.

Current Conditions And Context

The BLM defines cultural resources "as definite locations of past and present human activity, occupation or use in the physical environment, identifiable through field inventories, historical documentation or oral evidence" (BLM 8100 Manual). They include prehistoric and historic archaeological sites, buildings, structures, objects, districts, landscapes and viewsheds. They can also include locations on the landscape that have plants, animals, or topographic features that are considered important by a Native culture or community. Cultural resources are a critical link to our shared past, and connect modern communities to those who came before, helping us to understand and identify with people of different cultures and times.

Cultural resources are typically divided into two categories: historic and prehistoric. Prehistoric resources are considered any material remains, locations, structures, or items used or modified by people before Euro-Americans established a presence in western Oregon. Examples of these types of resources include lithic quarrying and tool manufacturing locales, temporary or permanent residential sites, hunting blinds, fishing weirs, rock shelters, rock art, trails, and isolated finds. Historic resources refer to the material remains, locations, structures, or landscape alterations that have occurred since the arrival of Euro-Americans. Examples of these types of resources include mining features, areas or districts, historic homesteads or their remains, roads and trails, irrigation ditches for mining and farming, railroads, phone and power lines, trash scatters or dumps, corrals, cabins and machinery.

Cultural resources are currently managed under a variety of laws, regulations, directives, and executive orders as listed below:

- National Historic Preservation Act (1966)
- Archaeological Resources Protection Act (1979)
- Historic Sites Act (1935)
- Antiquities Act (1906)
- Archaeological Data Preservation Act (1974)
- Native American Graves Protection and Repatriation Act (1990)
- American Indian Religious Freedom Act (1978)
- Executive Order 13007 – Indian Sacred Sites (1996)
- BLM-SHPO Protocol Agreement (1998)
- DOI IB 2002-101 – Cultural Resource Conditions in Resource Management Plans (2002)

Overall, cultural resource compliance is managed through the National Programmatic Agreement between the BLM, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers. In Oregon, cultural resources are further managed through an agreement with the State Historic Preservation Office (SHPO) known as the "Protocol." The Protocol allows BLM offices to streamline the compliance (Section 106) process in order to reduce time and labor costs. Section 106 of the National Historic Preservation Act (NHPA) requires agencies to make a good faith effort to consider the potential effects of agency actions on historic properties (e.g., Columbia Plateau cultures cultural resources deemed eligible for or listed on the National Register of Historic Places (NRHP)) in consultation with appropriate parties as defined in 36 CFR §800. Such consideration normally takes place through the following process: 1) field survey or inventory to locate and document cultural resources; 2), evaluation of located sites for their NRHP significance, and, 3) if the effects will be adverse, seeking ways to avoid, reduce, or mitigate these effects.

The significance of cultural resources is assessed through a process of evaluation against a set of criteria developed for the NRHP. Sites that are listed or are eligible for listing on the NRHP must meet at least one of the criteria, and must possess some level of integrity of location, design, setting, materials, workmanship, feeling, and association. In general, the BLM manages specific sites according to the eligibility of sites to be listed on the NRHP and by assigning specific resources to BLM Cultural Resource Use Categories (Traditional Use, Conservation for Future Use, Scientific Use, Public Use, Experimental Use, Discharged from Management). Sites are assigned to these Use Categories regardless of their NRHP eligibility.

All cultural resources listed on or eligible for listing on the NRHP are managed as directed by 36 CFR §800 – Protection of Historic and Cultural Properties. In addition, those sites that remain unevaluated for NRHP eligibility are treated as eligible until determined otherwise. Of the known sites within the planning area, 231 have been formally determined eligible for the NRHP, while 30 sites are listed on the NRHP (Table 6).

There are over 4200 cultural resource sites recorded on BLM-administered lands in the planning area; these includes sites that are pre-historic, historic or, multi-component (i.e., possessing both historic and pre-historic components) in nature (Table 7). Sites range from as little as a few square yards to over 200 acres in size. Recorded sites are widely distributed across the districts, and each district manages both prehistoric and historic resources. In general, the

Table 6. National Register of Historic Places (NRHP) sites by district

District/Field Office	Number of Sites Determined Eligible for the NRHP	Number of Sites Listed on NRHP
Coos Bay	2	1
Eugene	3	0
Klamath Falls	7	0
Medford	167	27
Roseburg	49	1
Salem	3	1

Table 7. Cultural resource sites by district or field office

District/Field Office	Number of Historic Sites	Number of Pre-historic Sites	Percent in good condition	Percent noticeably deteriorating	Percent Condition Unknown
Coos Bay	unknown	31	10	unknown	90
Eugene	1	185	11	<1	88
Klamath Falls	329	1,051	98	2	0
Medford	1,039	1,149	30	20	50
Roseburg	28	253	41	16	43
Salem	1	185	8	4	88

southwestern districts have a higher percentage of historic sites due to the mining and timber harvesting history of the region.

Natural processes as well as land management practices, looting, wildland fires, and mining activities can all affect cultural resource sites. An assessment of site condition is usually completed when a site is initially recorded or when it is monitored later. Due to the large number of recorded sites and a change in recordation standards through the years, many of the 4200 recorded sites in the planning area are in an unknown condition. Archaeological surveys have been conducted since the 1960s, but most districts have intensively surveyed less than 25 percent of BLM administered lands for cultural resources. Typically, cultural resource surveys are undertaken in response to project planning and therefore are not being driven by a systematic and scientific approach that could predict where sites are most likely to be encountered. This compliance-driven survey (i.e., a Section 106 survey) approach means that a variety of ecological or environmental areas is not being examined for cultural resources. As a result, the number of previously recorded sites is not a good indicator of how many undiscovered sites there may be on most of the districts in the planning area. However, the Coos Bay District may be an exception to this as the Protocol specifically identifies the Coast Range as being extremely low in sensitivity for the presence of cultural resources and it is unlikely that "important historic properties" would be found by further survey prior to project implementation.

Each district had Class I Cultural Resource Overviews completed in the early 1980s. These documents provide the framework and foundation for district cultural resource programs. These overviews are now outdated, as archaeological investigations and research conducted in the intervening years has produced a large body of new information. A summary and synthesis of current archaeological information is necessary to assist BLM archaeologists in making determinations of eligibility for historic and prehistoric resources, as well as for making appropriate management recommendations.

Prehistoric

The BLM-administered lands in the planning area are located within the Northwest Coast, Northern Great Basin/ Columbia Plateau and California culture areas and five physiographic and geological provinces including the Klamath Mountains, Coast Range, Northern Cascades, Willamette Valley, and Basin and Range provinces. Although evidence for early human occupations in the region date to approximately 10,000 years ago most archaeological sites in the planning area post-date 8,500 years before present. Evidence from excavated sites within the region suggests that early people followed a highly mobile way of life that incorporated movement across a wide territory driven by the availability of resources. Relatively few early sites have been identified within the planning area.

The highly diverse nature of the natural environment fostered an equally diverse and complex range of cultural adaptations. The following section provides a brief discussion of the ethnographical and environmental contexts of each district.

The Eugene and Salem Districts are located in the Coast Range, Willamette Valley, and Cascade Range physiographic provinces and encompass portions of the Northwest Coast and Columbia Plateau culture areas. The Roseburg District is located within the Coast Range, Northern Cascades, and Klamath Mountain physiographic provinces and encompasses portions of the Northwest Coast, Columbia Plateau, and California culture areas. The Coos Bay District is located in the Coast Range physiographic province and primarily encompasses the Northwest Coast culture area. The Medford District is located in the Coast Range, Northern Cascades, and Klamath Mountain physiographic provinces and encompasses portions of the Northwest Coast, California, and Northern Great Basin culture areas. Finally, the Klamath Falls Field Office is located in the Northern Cascades, Klamath Mountain physiographic provinces and encompasses portions of the Northern Great Basin/Columbia Plateau and California culture areas.

Northwest Coast cultures typically occupied year-round permanent villages, following a specialized maritime subsistence strategy. This way of life incorporated an extremely elaborate and complex social system that focused on the acquisition of material goods. A wide range of resources and habitats were utilized, with salmon being a mainstay of subsistence. A number of specialized technologies were developed to obtain resources and to sustain the acquisition of material goods that made a person wealthy and powerful within their society. Trade and exchange

with interior groups to obtain wealth related goods were very important and ties were maintained through marriage arrangements and visits to the interior along well-traveled routes.

Great Basin cultures were typically highly mobile hunter-gatherers that essentially moved from one area to another throughout the year as resources became available. Although winter villages were often located near permanent lakes or streams where water and ample supplies of wood were available year round, they also occupied tribally owned seasonal "field offices" that were returned to year after year. Each major resource had its own season, and individual family or village groups would coalesce in traditional gathering areas to assist each other in collecting large quantities of certain resources for storage. Of particular importance were annual fish runs, deer hunts, and root or seed harvests. These types of resources typically possess a "window" of opportunity for harvesting, and require a substantial amount of effort to take full advantage of them.

In general, Columbia Plateau cultures lived near large river systems and relied on a diverse subsistence base of fish, game, and root resources. Research conducted in the Plateau area suggests that movements across a large territory to procure resources from widely dispersed "patches" was particularly important to gather food to provision people through the winter. This process incorporated a settlement pattern of semi-permanent low elevation winter villages, with temporary camps in the uplands at traditional fishing, hunting, and plant gathering grounds.

California or western valley cultures also lived near large river systems. Economies were largely focused on salmon and acorns, which were collected in huge quantities, processed and stored for winter use. Permanent winter villages were typically located on terraces above large rivers, or near the confluences of major creeks and rivers. In the warmer months, people lived in upland camps to hunt or gather plants and other resources as they became available. Typically, food was transported back down to major village sites to be stored for winter consumption.

Common prehistoric archaeological site types in the planning area are lithic tool-stone scatters and procurement areas, and village or temporary camp sites. Less common site types are rock art (petroglyphs and pictographs), rock features (i.e., storage pits or cairns), and rock shelters.

Historic

Exploration and trade by Europeans began as early as the 1500s along the west coast of North America. By the late 1700s, numerous expeditions from a number of countries had traversed the west coast, bringing guns, beads, textiles and other goods to trade Native Americans for pelts. By the early 1800s, European explorers had reached the interior of Oregon, including the fur traders of the Hudson Bay Company, the Pacific Fur Company, and the North West Company Missionaries. Emigrants and military expeditions soon followed with the construction of several important trail systems, including the Oregon and California Trails. Between 1843 and 1855, approximately 60,000 emigrants traveled along the Oregon Trail into northeast Oregon. Many of the people who came to the west coast were attracted by the opportunity to homestead. Once homesteaders claimed their land, they set about building towns, establishing businesses and erecting churches. The discovery of gold in 1851 soon drew prospectors and miners to the region. Lands were opened up for mining and settlement as quickly as treaties with Native Americans could be signed. As mining communities and population in the region increased, gold reserves played out, miners expanded their search for riches by focusing on other precious metals.

Mining and the subsequent development of agriculture, along with a growing interest in timber harvesting and fishing operations brought in more settlers and an increased need in good transportation systems. Trails originally used by Native Americans became wagon roads and stagecoach routes that lead from the coast inland. Eventually ranches and farmsteads were established, and livestock operations including hay and grain farming began to expand to meet the needs of a rapidly developing region.

Common historic sites within the planning area include properties associated with the mining and ranching history. Numerous mining, ditches, trash scatters, access roads, adits, tunnels, shafts, and pieces of machinery are found throughout the southern part of the planning area. Old farms or ranches and the remnants of structures, roads, fences and other aspects of the built environment can be found on every district. Less common sites include historic cemeteries, mining cabins, and water developments.

Trends And Forecasts

Most cultural resources are identified because of the surveys the BLM conducts to comply with Section 106 of the NHPA. Cultural resource management direction focuses on preserving sites, and the avoidance of impacts to them because of project implementation. However, BLM is directed to manage sites as eligible for the National Register of Historic Places (NRHP) until they are formally evaluated. Due to time and budget constraints, most sites are not evaluated, and must continually be protected through subsequent projects. This protection is usually in the form of avoidance ("flag and avoid") practices. Because of avoidance, the trend is an increase in sites that will need to be protected or mitigated with a concurrent increase in time needed to complete cultural resource work.

Both BLM cultural program and law enforcement staff periodically monitor sites. However, these are often sites that have been impacted by looting or project implementation; therefore, they are more likely to be a focus of such activity. Surveys aimed at complying with Section 110 of the NHPA (proactive surveys) are not typically performed due to time or budget constraints. Therefore, many sites on public lands in the planning area are not recorded, and their condition is unknown. It is likely that the trend for these sites will be deterioration over time to a point where they may no longer be eligible for the National Register.

Cultural resources are generally considered fragile and non-renewable, and can be affected by a number of natural and human-caused factors. Weathering, erosional processes, and animal activity, in addition to various types of human activity can cause deterioration of sites. Natural processes (weathering and erosion) are ongoing and often have cumulative effects that can take a relatively long time to affect sites, or in the event of severe weather can affect sites suddenly. Cultural resource management practices such as "flag and avoid" can leave accumulations of heavy fuels on sites, making them susceptible to burning hotter in the event of forest fires. Off-highway road vehicles can adversely affect sites by mixing soils, destroying cultural features and providing access for looting. Common factors that influence site conditions in the planning area include motorized vehicle impacts, wildfire suppression efforts, vandalism or looting, animal burrowing, stream or shoreline erosion, and wildlife or livestock trampling.

As use of public lands for recreation and commerce increase, there will likely be an increase in risk of effects to cultural resources. Although the total amount of site monitoring varies by district across the planning area, recent data from four out of the six districts indicates that the main sources of adverse impacts to cultural resource sites are looting, off-highway vehicle traffic, and inadvertent effects due to land management projects. These effects may be a result of direct damage from project implementation, or, in the case of looting, increased access to previously non-accessible areas from new road construction. Natural processes will continue to have effects on sites, structures, and features.

Management Opportunities

Tribes have indicated a desire to have an increased level of protection for ethnographic village sites, rock art and rock feature sites, and traditional gathering areas. The identification of Traditional Cultural Properties or tribal areas of use is also important to Native Americans, and can be accomplished through partnerships with Tribes. These areas can then be designated ACECs or nominated to the NRHP as appropriate, giving them a higher level of protection.

Conducting additional surveys beyond those required for project-compliance could assist in identifying and protecting cultural resources and partnerships with Tribes or volunteer organizations could help accomplish this. Identifying, documenting, and evaluating sites would ensure adequate protection and management of cultural resources before their values diminish or are lost. Updating existing Class I Cultural Resource Overviews would assist the BLM in assessing the significance of cultural resources and improve management of them.

The BLM could develop activity management plans for cultural resources to provide better protection of areas with concentrations of cultural resources and to assist in acquiring funding for studies.

Fire and Fuels

Key Points

- Fire regimes vary from high intensity, long return interval regimes in the north and coastal districts to low intensity, short return interval regimes in the interior south. Ecological effects of fire exclusion are far more pronounced in the southern districts: Roseburg, Medford, and Klamath Falls.
- Fire exclusion in the frequent fire regimes has resulted in ecosystem alteration, loss of habitat, species shifts, and an increase in the likelihood of high intensity wildfire and the associated consequences.
- In the absence of natural fire as a disturbance agent, the BLM can design management activities to serve as a partial surrogate for natural disturbance and change. Forest management can create desired structural and compositional changes while also producing commercial forest products.
- The Wildland Urban Interface receives the highest emphasis for fuels treatment planning, partnerships and funding.
- Coordination with partners and integration of fuels treatments with other forest practices is needed to stretch limited implementation dollars and provide for a more consistent and effective strategy across the larger landscape. Funding for treating hazardous fuels is in severe decline. Suppression costs and fire complexities are increasing.

Current Conditions And Context

Historically, fire has played a major role in shaping forests across the planning area. From large scale stand replacement fires in the north and coast, to low and mixed severity fires in the interior south, fire has been a major disturbance agent in western Oregon forests for millennia. The northern districts such as Eugene and Salem are in a high severity, infrequent fire regime with return intervals measured in hundreds of years. The southern interior districts, particularly the Medford District and the Klamath Falls Field Office are in a low to mixed severity, frequent fire regime with return intervals of ten to thirty years. Historically, natural fires in the north and coast were infrequent and typically resulted in mid to large patches (100s to 1,000s of acres) burning with high mortality. Fires in the interior south tended towards small patch size and under-burning, resulting in limited mortality of large mature trees but a periodic reduction in lower limbs, young trees and understory shrubs.

The effects of fire exclusion are less pronounced in the northern and coastal districts. In the interior south, where fire return intervals were in the 20-30 year range, effective fire suppression over the last 60 to 100 years has resulted in numerous missed fire return cycles. Because of fire exclusion, tree densities and understory fuels have increased with a corresponding increase in wildfire intensity. Fire exclusion has also resulted in a change to the development of forest structure and species composition. With the absence of fire, ponderosa pine, incense-cedar, and hardwoods that historically developed in open conditions are unable to compete with more shade-tolerant Douglas-fir. The proportion of Douglas-fir to pine, cedar and hardwoods has increased. The proportion of small trees to large trees has also increased. In addition, with increasing canopy closures, there is a shift from sun loving species to species tolerant of shade.

Western Oregon BLM-administered lands are typically found in the foothills and mountains surrounding inhabited valley bottom land. Historic development and land use policies have resulted in much of the planning area in a checkerboard pattern of ownership with alternating square mile sections controlled by private interests and by BLM. The lower elevation private lands often consist of small towns and low-density rural residential lands. Landowners often manage the mid to higher elevation private lands for timber production.

The threat of loss to wildfire is a combination of risk and hazard. Risk is the likelihood of ignition together with suppression capability. Hazard is the measure of conditions conducive to spreading and sustaining fire. The current landscape patterns of forest cover, the long dry summers, and the remoteness of the lands all contribute to Oregon Department of Forestry's ranking of the majority of western Oregon in the moderate to high hazard and risk category (Table 8).

Table 8. Oregon Department of Forestry composite fire hazard and risk rating

Fire Hazard and Risk	Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem
Low	8%	14%	4%	1%	1%	22%
Moderate	91%	83%	61%	60%	86%	77%
High	1%	3%	34%	39%	12%	1%

The BLM manages fire suppression in western Oregon under a contract with the Oregon Department of Forestry. Wildfires are currently managed with a full suppression response to minimize both acres burned and risk to adjacent private landowners. While some members of the public have advocated restoring fire's historic role by letting natural wildfires burn, the "checkerboard" ownership pattern limits the options for managing wildfires for resource benefits because the risk of impacting neighboring adjacent private lands is very high. Managing wildfires for resource benefits may also affect timber production.

Recent patterns of wildfire tend towards larger and more complex fires particularly in the southern portion of the state where warmer temperatures, drier conditions, and more frequent historic fire regimes exist. The majority of wildfires are suppressed quickly and kept relatively small. With the continued expansion of rural residential development, the complexities of wildfire suppression and the values at risk have also increased.

Vegetation patterns created by short-rotation forest management have resulted in large contiguous, even-aged, young stands of Douglas-fir. High stocking levels with continuous dense canopies increase susceptibility to adverse fire effects. While this condition does exist on BLM-administered lands, it is more widespread on privately-managed timber production land adjacent to BLM-administered lands. Across the BLM-administered lands in the planning area, there currently is little to no regeneration harvest. Over time, younger conifer-dominant stands will become less susceptible to fire over time as canopy base height increases and stands mature.

Trends And Forecasts

Climate change is an emerging issue and has the potential to alter fire regimes substantially. The National Oceanic and Atmospheric Administration's National Climate Data Center reported that the year 2012 was the warmest year in the 1895-2012 period of record keeping for the nation. In addition, the Climate Data Center also reported that in 2012 over nine million acres of forest burned in the U.S.; this is one and a half times the ten-year average.

In the last decade, numerous national and regional efforts have developed to address the costs and consequences of large fires. Program such as the National Fire Plan, the Western Governors' Association Wildland Fire Leadership Council, the National Cohesive Wildland Fire Management Strategy, and locally developed community wildfire protection plans have brought heightened awareness to the general public and local governments concerning wildfire effects and fire ecology.

The BLM is a key participant in many partnerships focused on developing strategies to mitigate wildfire effects through strategic fuel management. Some of these programs have provided avenues for partnerships and funding for fuels management projects. The Oregon Department of Forestry has developed statewide maps of Communities at Risk and worked with local county government to define Wildland Urban Interface boundaries. Programs providing financial assistance are generally focused on reducing loss to homes and private property in the Wildland Urban Interface.

The effects of fire exclusion will continue and intensify under a full suppression strategy as fire seasons lengthen and fuel loads continue to increase. Fuel management treatments are occurring, but they are limited in scale and cannot keep up with the increase in fuel development. In the western states, fires continue to burn more intensely, and fire seasons are becoming longer. Loss or degradation of desired habitat conditions for special status species and threat to human life and property are likely to continue or increase.

Much effort and funds have been directed to fuel reduction projects in the last 10-15 years. While many of these projects have resulted in less acres burned or lower fire intensity when wildfire occurs, the scope and scale of the fire

threat continues to outpace the funding and implementation schedule. There is also an increasing maintenance need as areas treated in the last 10-15 years regrow. Many of these areas could be retreated with prescribed fire at much lower costs than the initial cut, pile and burn treatment.

Western Oregon BLM's hazardous fuels reduction program has focused on reducing threats to homes and private property using strategic placement of fuel breaks and reducing surface and ladder fuels. The majority of the hazardous fuel reduction dollars have gone to the Medford District and the Klamath Falls Field Office, where the highest threat and risk for wildfire exists. In the last few years, there has been a shift of national hazardous fuels reduction money from Oregon to other western states. From 2010 to 2013, the western Oregon BLM budget for fuels reduction declined at a rate of 10 to 15 percent per year. It is expected that by 2019, hazardous fuel reduction funding will no longer be sufficient to employ a permanent work force dedicated to fuel reduction. Funds are being shifted from hazardous fuels towards the increased suppression costs. Annual costs for the Oregon Department of Forestry's westside fire suppression contract continue to rise over time (Figure 1).

While fire sizes are generally increasing for all lands in western Oregon (Figure 2), the Oregon Department of Forestry suppression contract has been largely successful at reacting quickly to new starts and keeping fires small on BLM-administered lands. Over the last three decades, the rapid deployment of aircraft and strategic staffing of ground crews have led to a decline in overall acres burned on BLM-administered lands (Figure 3). Initial attack forces are usually adequate to address most fire seasons' workloads. Exceptions occurred in 1987 and 2002 when dozens of lightning-generated fires occurred in a single day and completely overloaded all available firefighting resources.

Management Opportunities

In the dry forests of the interior south, emulating the historic patterns of fire through management practices could help increase ecological function and decrease threat to loss from fire. The use of strategic forest management practices can increase the resistance and resilience of both landscapes and forest stands to wildfire, drought, insects, and climatic fluctuations.

In the drier, more frequent fire regime areas, creating stand structures that avoid the continuous fuel beds created by even-aged plantations and emphasize more variation in size, structure, and species, would aid in reducing losses through wildfire. Uneven-age management can provide for these conditions over time and provide cutting cycles sufficient to provide for saw log production. Uneven-age management generally includes harvest of trees across all age classes. This type of forest management can mimic the historic disturbance patterns with which these forests developed. Uneven-age management over time would result in mature and structurally complex stands with a mosaic of age classes and a relatively open stand structure in both the understory and the overstory, which would more closely resemble historic stand conditions and thus more resilience to fire.

Figure 1. Annual cost of Oregon Department of Forestry west side fire suppression contract

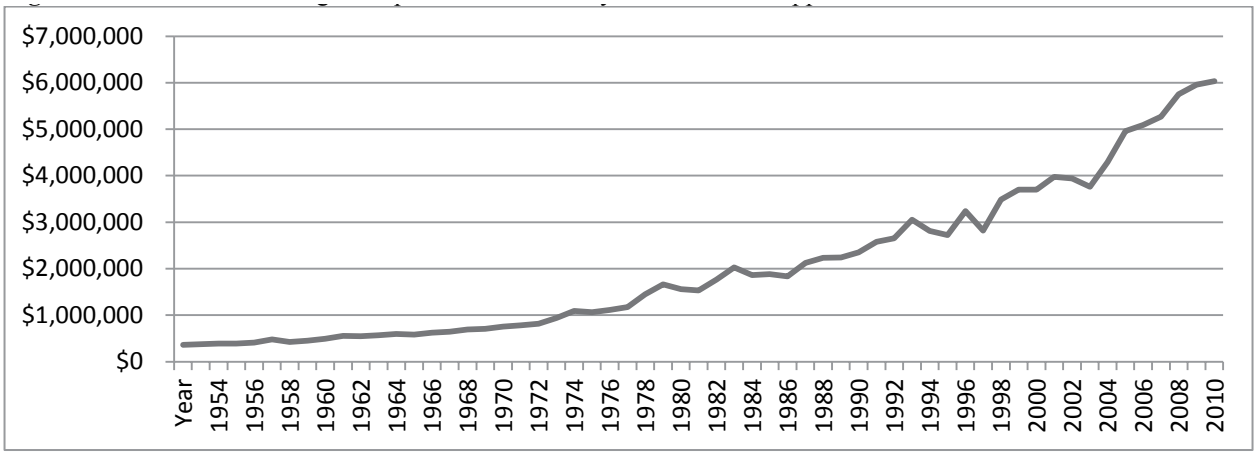


FIGURE 2. ACRES BURNED WEST OF THE CASCADES, INCLUDES ALL OWNERSHIPS

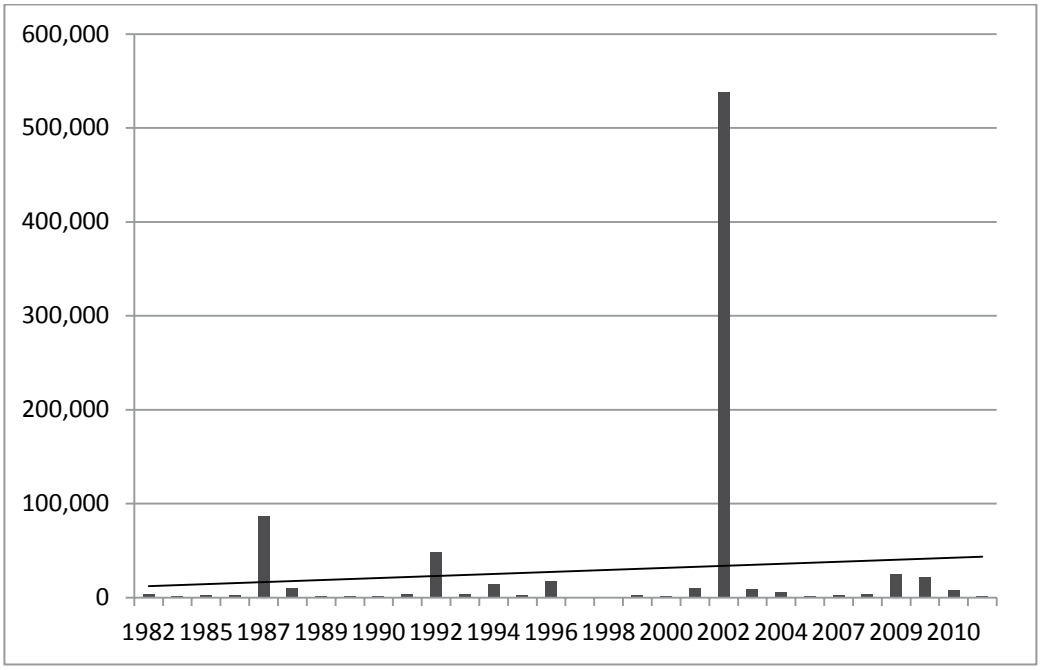
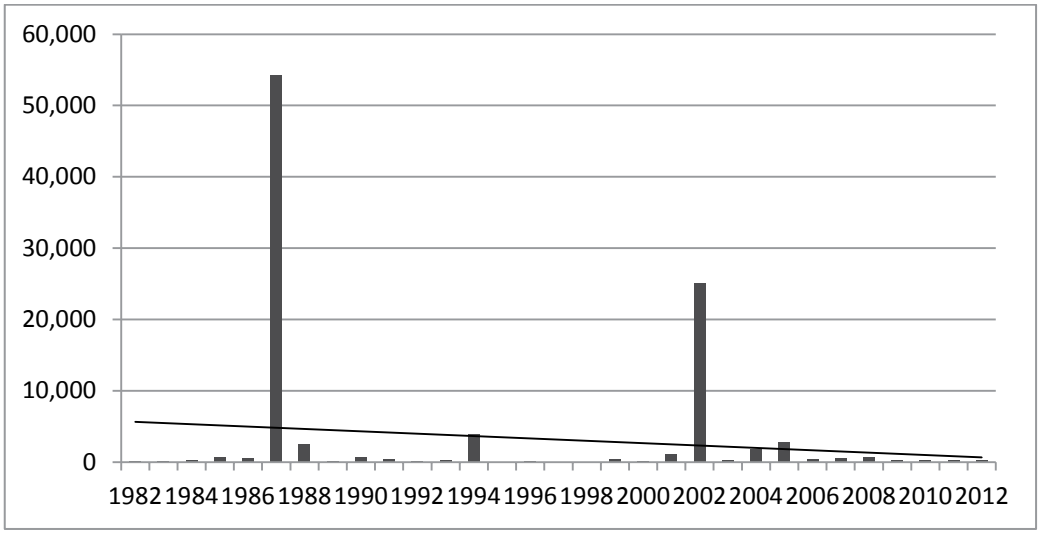


FIGURE 3. ACRES BURNED WEST OF THE CASCADES, BLM-ADMINISTERED LANDS ONLY



Forest management practices could adjust structure and densities, shift species composition, and allow more rapid growth rates to achieve forest structure more resilient to fire.

In the northern district forests, many plantations are growing out of young stages into mature stands with less risk to loss from fire. Harvest practices that result in large blocks of dense young forest would increase risk of loss. Harvest patterns that retain large legacy trees and retain mature blocks interspersed with younger forests could help to moderate fire loss due to the spatial separation of fuel types. Harvest practices that result in more of a patchy distribution of size classes could help to moderate loss to wildfire and better emulate historic landscape patterns.

Landscape analysis in the southern interior districts could provide a basis for strategic fuel reduction around high value forest stands where it may be desirable to have dense forest with multiple layers to provide habitat conditions for species such as the northern spotted owl, pacific fisher, and other late-seral species.

Prescribed fire could achieve many of the desired resource benefits at a lower cost than targeted cutting and thinning efforts. However, prescribed fire is not precise and more variation in treatment outcomes should be expected. The risk of "escape" and possible impacts to neighboring private land is an important consideration. There are limited opportunities to achieve multiple resource benefits using prescribed fire alone. Combining mechanical forest management with prescribed fire to reduce accumulating fuel loading and ladder fuels offers the best opportunity to maintain healthy, resilient forest ecosystems in light of the full suppression policy. Research demonstrates that mechanical thinning alone does not adequately reduce fuels to prevent significant wildfires, but, when combined with prescribed burning, the mechanical treatments are very effective (Finney *et al.* 2005; Ritchie *et al.* 2007; Safford *et al.* 2009). Prescribed fire could be an integral part of the overall strategy for managing these forests as healthy, resilient ecosystems into the future.

Fisheries

Key Points

- There are several anadromous salmon and steelhead populations that are listed as threatened or endangered under the Endangered Species Act or are Oregon sensitive species within the planning area. Habitat degradation is a factor of decline for most of these populations and is a major risk factor that continues to threaten all of the population segments.
- The BLM has limited opportunity to reduce road density. Addressing road location, condition, and chronic problem areas rather than reducing miles would better focus restoration efforts.
- Large wood, stream temperature, sediment, and water flow have the greatest influence on aquatic habitat and the ability of aquatic habitat to support fish populations.
- The abundance and survival of salmonids are often closely linked to the abundance of large woody debris in stream channel. The current levels of large woody debris in stream are a limiting factor and hinder recovery of salmonid populations.
- Eighty-one percent of sampled stream channels on BLM-administered lands in the planning area had less than 22 percent fine sediment and 19 percent of stream channels had more than 22 percent.
- Throughout the range of the Northwest Forest Plan, watershed conditions are improving and the objectives of the Aquatic Conservation Strategy are being or are trending toward being met except in watersheds that have experienced catastrophic wildfire.
- In portions of the planning area that are predominantly private land, the BLM manages some of the last remaining late successional riparian forest.

Current Conditions And Context

Within the planning area, eleven populations (Evolutionarily Significant Units (ESUs) or Distinct Population Segments (DPSs)) of salmon and steelhead that are listed as threatened under the Endangered Species Act or are Oregon sensitive species (Table 9). There are several ESUs/DPSs of coho salmon, steelhead trout, and chinook salmon that are threatened, endangered, or sensitive as well as one ESU of chum salmon and cutthroat trout.

The Southern DPS of the Pacific Eulachon Evolutionarily Significant Unit was listed as threatened in 2011. The Southern DPS of the North American Green Sturgeon is a threatened species found only on the Coos Bay District.

Six resident fish populations are listed under the Endangered Species Act or are Oregon sensitive species. The federal-threatened bull trout is a resident species that occurs within the McKenzie River basin and east of the Cascade mountain range. The Umpqua chub is an Oregon sensitive species found only in the Umpqua River on the

Table 9. Current federal and State of Oregon listing status for fish species within the planning area.

Common Name	Scientific Name	Evolutionarily Significant Unit or Distinct Population Segment	Federal or State listing status
Bull trout	Salvelinus confluentus	All	Federal Threatened
Chinook salmon	Oncorhynchus tshawytscha	Lower Columbia River	Federal Threatened
Chinook salmon	Oncorhynchus tshawytscha	S. Oregon Coast/N. California Coast	Oregon Sensitive
Chinook salmon	Oncorhynchus tshawytscha	Upper Willamette River	Federal Threatened
Chum salmon	Oncorhynchus keta	Pacific Coast	Oregon Sensitive
Coastal cutthroat trout	Oncorhynchus clarkii clarkii	Columbia River/SW. Washington	Oregon Sensitive
Coho salmon	Oncorhynchus kisutch	Lower Columbia River	Federal Threatened
Coho salmon	Oncorhynchus kisutch	N. California/S. Oregon Coast	Federal Threatened
Coho salmon	Oncorhynchus kisutch	Oregon Coast	Federal Threatened
Lost River sucker	Deltistes luxatus	All	Federal Endangered
Miller Lake lamprey	Lampetra minima	All	Oregon Sensitive
Millicoma dace	Rhinichthys cataractae ssp. (Millicoma)	All	Oregon Sensitive
North American green sturgeon	Acipenser medirostris	Southern DPS	Federal Threatened
Pacific eulachon	Thaleichthys pacificus	Southern DPS	Federal Threatened
Shortnose sucker	Chasmistes brevirostris	All	Federal Endangered
Steelhead trout	Oncorhynchus mykiss	Klamath Mountains Province	Oregon Sensitive
Steelhead trout	Oncorhynchus mykiss	Lower Columbia River	Federal Threatened
Steelhead trout	Oncorhynchus mykiss	Oregon Coast	Oregon Sensitive
Steelhead trout	Oncorhynchus mykiss	Upper Willamette River	Federal Threatened
Umpqua chub	Oregonichthys kalawatseti	All	Oregon Sensitive

Medford and Roseburg Districts. The Lost River and shortnose suckers are resident species unique to the Klamath Basin and are listed as endangered.

Draft recovery plans are in place and critical habitat has been designated for bull trout, Lost River sucker, and shortnose sucker. Recovery plans for the listed anadromous fish populations are in progress and should be available for use in later stages of the RMP revision process.

BLM Ownership Pattern and the Fisheries Resource

The ability of the BLM to influence aquatic and riparian habitat varies with the percentage of BLM ownership in each watershed. The BLM's ability to affect stream conditions for fish can vary significantly in watersheds where BLM ownership is limited.

The Pacific Northwest Research Station has developed Intrinsic Habitat Potential models for streams containing coho, Chinook, and steelhead on BLM-administered lands in the planning area. The model uses species-specific relationships between channel gradient, mean annual discharge, and valley constraint developed from scientific literature and field observations to predict the ability of a given stream segment to provide high quality habitat. Streams rated as High Intrinsic Potential (HIP) are those that have a predicted ability to provide high quality habitat

for each species. The current condition of these areas varies greatly, but, in general, the majority is considered to be in fair or poor condition. This situation may be outside the historic range of aquatic habitat conditions seen in the planning area prior to the 1950s.

For the Oregon Coast coho evolutionarily significant unit (ESU), habitat that is considered HIP is generally located in low gradient, mid-order streams that are in wide valley bottoms. Much of this land base is in private ownership with limited BLM management. There are 6,575 miles of coho-bearing streams in the Oregon Coast coho ESU, of which 673 miles (10 percent) flow through BLM-administered lands and 309 miles (4 percent) flow through BLM-administered lands and are considered HIP.

Key Watersheds identified in the Northwest Forest Plan do not always coincide with areas that are important for listed fish. For example, within the Upper Willamette River Basin, dams block access to approximately 400 miles of salmon and steelhead spawning reaches. Although Key Watersheds have been designated in historic salmon and steelhead spawning areas, many of these areas are located above dams. Furthermore, existing Key Watersheds overlap with numerous areas important for steelhead, but generally include fewer areas preferred by coho salmon. Restoration efforts may be more effective if they focused on high intrinsic potential streams and areas within recovery plans, rather than Key Watersheds emphasized in the Northwest Forest Plan. Identification of these areas could be coordinated with the National Marine Fisheries Service and U.S. Fish and Wildlife Service Technical Recovery Teams.

Fish populations are cyclic by nature and trends can be driven by a variety of factors. Since the BLM manages habitat and not fish populations, identifying the primary risk factors for each fish population is important to determine which factors BLM can influence. For example, the Oregon Coast Coho Salmon Assessment identifies declining factors, current and future risk factors and opportunities to strengthen current coho population viability. Stream complexity presents a medium level of risk to population viability and generally remains the best opportunity to improve productivity of the ESU as a whole.

Reeves *et al.* (2013) summarize the effects of disturbance in the aquatic system, note the growing body of science that suggests that aquatic systems are highly variable, and they experience a wide range of disturbance over space and time.

In general, survival traits of anadromous fish include:

- Straying of adults
- Multiple life histories
- High fecundity
- Mobility of juveniles

In many watersheds containing streams with listed fish, BLM manages a small portion of the landscape. However, depending on the location of aquatic habitat near streams, the BLM could contribute to habitat conditions that in turn could contribute to survival rates. For example:

- Increasing fish distribution through culvert replacements (mobility)
- Improving and maintaining good water quality, including cold water, substrate, and large woody debris (high fecundity, multiple life histories)
- Providing stream complexity for various life history stages (high fecundity, multiple life histories)

Key Ecological Processes and Restoration

Woody debris is an important channel-forming component in forested streams in the Pacific Northwest. Wood traps and stores gravel, generates scour that creates pool habitat, provides overhead cover, and protects banks by reducing stream energy. In headwater streams, small functional wood can temporarily retain fine sediment and slow its downstream transport to fish-bearing reaches. Stream channels retain conifer species the longest. However,

hardwoods like alder and maple provide functional wood and leaf litter that serves as an important nutrient base for macroinvertebrates. The size of wood that can function in a stream varies by stream size. Generally, wider streams require larger pieces of wood in order to be stable and induce habitat change. Smaller pieces of wood can also be functional if the stream channel is narrow, or if they interact with larger, stable debris jams.

Adjacent stands deliver wood to streams through tree fall, bank erosion, or upstream sources in the form of debris flows. Although most wood is delivered from within one site-potential tree height, not all riparian areas have a high probability of delivering wood to fish-bearing streams. Steep, shallow soil areas with existing large trees that are closely connected to larger channels have the highest potential to deliver wood to fish-bearing streams.

Historically, many streams were "cleaned" of large wood to make the downstream transport of harvested logs more efficient and to reduce the perceived risks of flood-mobilized wood damaging human infrastructure downstream (e.g. roads, bridges, houses). Without large wood to retain gravel and other woody material, many streams are scoured to bedrock and have correspondingly poor habitat for fish.

The current RMPs contain direction to reduce road miles in watersheds where sediment delivery affects streams; however, the BLM's ownership pattern, along with non-discretionary rights-of-way, has impeded this effort. Implementation of the current RMPs has instead focused on instream restoration to improve aquatic habitat.

Active restoration of anadromous streams has involved the placement of logs and whole trees in addition to boulders. These restorative efforts are thought to persist for several decades until riparian stands are capable of supplying long-term sources of wood to streams.

Passive restoration has typically relied on the growth of large conifers within Riparian Reserves and natural wood delivery to stream channels. Since tree fall rates are variable in nature, there may be long periods between inputs to stream channels. Adding large wood to channels where it is needed can increase stream complexity between episodic events. A combination of both passive restoration efforts in the long-term and more active restoration efforts in the short-term can yield the greatest long-term improvement to aquatic habitat.

Instream habitat projects have occurred on about 230 miles of anadromous or listed fish streams in the planning area (Figure 4). For most BLM districts in the planning area, there is still a great need for additional instream

FIGURE 4. MILES OF STREAM RESTORATION COMPLETED WITHIN THE PLANNING AREA

Data Source: IRDA Database, 2012

projects on fish-bearing streams. However, much of the remaining habitat restoration needs are on adjacent private lands. The checkerboard ownership pattern of the BLM makes large restoration projects difficult as long sections of fish-bearing streams may have multiple owners in addition to the BLM.

Fine sediment occurs naturally in stream systems and can affect fish directly when suspended in the water column (i.e., turbidity). High turbidity can influence fish directly by inhibiting foraging and breathing function or indirectly by becoming embedded in stream substrates thereby reducing macroinvertebrate productivity or smothering eggs and fry. Increased sediment from both natural and human causes can result in high levels above tolerable limits. Poorly drained road systems can contribute fine sediment at stream crossings, and concentrated runoff from harvested units can carry sediment to adjacent streams. Where roads are connected to the stream channel, effective use of cross drains and maintaining a good road surface can minimize road-derived sediment. Employing effective vegetated buffers along harvested units and avoiding ground disturbance that would lead to concentrated runoff can also minimize or eliminate sediment delivery from harvested stands.

Decommissioning roads adjacent to stream channels can reduce sediment input to stream channels and lower the risk of culvert and road failure. However, many decommissioned roads are not located near stream channels and do not result in a decrease in road-related effects to streams and aquatic organisms.

Road crossings often prevent large wood from being delivered to downstream fish-bearing streams. Wood that is deposited at road crossings is often subsequently salvaged to open the road for traffic, rather than retained in the stream system. The checkerboard nature of BLM-administered lands has resulted in road-related legal obligations to our adjacent landowners and reciprocal rights-of-way that limit road closure options to remedy this condition.

The Oregon Department of Fish and Wildlife identified about 3,350 culverts in the planning area that are either partial or complete fish barriers. While many occur on BLM-administered lands, many more are unmapped and occur on small private lands. Removing passage barriers at road crossings restores access for adults to reach spawning habitat and increases ability for juveniles to move within the stream channel during winter high flows and access cooler stream reaches during summer months. The majority of fish passage barriers occur on private land and roads used for forest management. Relying on watershed partnerships is important in these watersheds to improve fish passage.

Aquatic organisms have a range of stream temperatures where feeding, growth and survival are optimized. Temperatures above or below this range can lead to a reduction in growth, disease resistance and metabolic efficiency. In extreme cases, high water temperatures can eventually lead to death and cold water temperatures can lead to very low stream productivity. Stream temperature is controlled predominantly by shading and the reduction of solar heating. Topography, aspect, or canopy from adjacent stands can provide shade to streams. In general, the further from the stream channel the less any particular tree contributes to stream shade.

The Northwest Forest Plan Aquatic Conservation Strategy strives to maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands. In particular, it emphasizes the development of large, older riparian trees. These trees will eventually provide large wood to streams, which is an important component of habitat complexity. Mid-seral or younger conifers as well as hardwoods are also important and can contribute to stream function. Improving the growth trajectory and species diversity of young, dense conifer stands through thinning may more rapidly increase the attainment of large conifers and hardwoods in these areas. Large wood is needed to retain coarse sediments (e.g. gravel and cobbles) in the aquatic system.

About 1.8 percent (approximately 17,000 acres) of Riparian Reserves in the planning area have been treated with density management since 1995. The rationale for most riparian treatments was to improve individual tree growth and produce large conifers adjacent to the stream that would eventually recruit to the stream. Most riparian stands, however, were forested in the past with a mix of conifers and hardwoods. Both are important to diversity of aquatic habitat. Hardwoods provide critical biological function (food derived from leaf litter) to streams, whereas conifer species can provide a more long-term instream habitat function.

Trends And Forecasts

The Aquatic Conservation Strategy was designed to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. Its focus is habitat rather than species populations because, for anadromous species such as salmon, ocean currents, weather patterns, recreational and commercial harvest, and other factors outside the control of forest management can affect population numbers.

Scientific studies completed after the Northwest Forest Plan was implemented support the framework and assumptions of the Aquatic Conservation Strategy, particularly the ecological importance of smaller, headwater streams and the retention of streamside forests protected in buffers. A growing body of science about the dynamics of aquatic and riparian ecosystems, however, could provide a foundation for developing new management approaches and policies.

The Aquatic and Riparian Effectiveness Monitoring Program was developed to measure and detect trends in watershed condition because of the implementation of the Aquatic Conservation Strategy of the Northwest Forest Plan. The program uses a combination of direct sampling and remote sensing in subwatersheds across U.S. Forest Service, BLM, and National Park Service lands from Northern California to Washington. By comparing scores, it is possible to rate the overall success of the Aquatic Conservation Strategy in achieving its intended goals and objectives.

Overall, after 15 years of the Aquatic Conservation Strategy, there were more watersheds with a higher watershed condition than a lower one (Lanigan *et al.* 2012). Out of 1,379 watersheds modeled, 69 percent showed an improvement in watershed condition compared to 23 percent that showed a decline and eight percent that showed no detectable change (Figure 4). Improvements in watershed condition were primarily due to road decommissioning, vegetation, and landslide risk (Lanigan *et al.* 2012). The five watersheds that showed the greatest decline were all a result of the 2002 Biscuit Fire.

Throughout the range of the Northwest Forest Plan, watershed conditions are improving and the objectives of the Aquatic Conservation Strategy are being or are trending toward being met. While not all watersheds showed positive changes, much of the negative changes can be attributed to natural patterns of disturbance (e.g., fire and landslides) that ultimately stimulate recovery and improved habitat for aquatic and riparian species.

Management Opportunities

Forest stands adjacent to streams have the greatest potential to affect instream habitat for fish by providing sources of large wood, shade, and contribution of leaf litter and influencing primary production. Previously harvested riparian stands could be actively managed to create forests similar to those that existed prior to the original harvest. These stands could be managed to develop a variety of species and sizes of trees to provide both short and long-term recruitment of functional wood as well as nutrient, shade and primary production levels similar to those of the original stands. This management could include creating gaps in the canopy to stimulate growth of riparian pioneer species and planting to restore lacking or underrepresented species. The absence of treatment could hinder recovery of riparian stands by creating persistent overstocked stands.

Most wood that enters streams from adjacent stands comes from within one site-potential tree-height (FEMAT 1993). In support of this, a recent summary of scientific literature on down wood found that 95 percent of near-stream wood inputs come from within 82 to 148 feet of the stream (Spies *et al.* 2013). Thinning within that zone has the most potential to increase the availability of large trees in the future; however, it could reduce the short-term availability of smaller wood. Several thinning approaches could alleviate this risk of short-term wood availability, while still achieving the desired stand benefits related to species diversity, nutrients, and primary production. A recent science team found that the benefits in terms of increasing large instream wood are greatest when treating dense, young stands where trees are not already large enough to create stable instream habitat (Spies *et al.* 2013).

The 1995 RMPs focused restoration priorities on reducing road miles in addition to instream restoration. The BLM has limited opportunity to reduce road density; however, there are opportunities to use road location and condition to

target restoration of chronic problem areas. The BLM could prioritize roads that block downstream routing of large wood or are chronic sources of sediment to fish-bearing streams.

Streams can be prioritized using recently developed GIS applications like NetMap (Benda *et al.* 2007) or LiDAR to identify streams for restoration based on user-defined attributes. These attributes could include HIP, sensitivity to canopy removal and stream temperature increase or large wood delivery potential. Designating Riparian Management Areas adjacent to streams based on specific attributes could allow for more focused riparian treatments.

Opportunities continue to exist to enhance habitat and improve fish access to streams on Federal lands for salmon, steelhead and other species; however, the majority of HIP exists on private and industrial managed lands. Working through partnerships with local watershed councils and the Oregon Department of Fish and Wildlife will be essential to continuing this work. This will include coordinating with Oregon Department of Fish and Wildlife on the implementation of the Oregon Coast Coho Conservation Plan. The checkerboard ownership creates difficulties for implementing large-scale projects, but this also creates opportunities to form partnerships and leverage funding.

Many watershed restoration projects are funded through sources outside of the BLM (Title II/Secure Rural Schools, Oregon Watershed Enhancement Board, Western Native Trout Initiative, Ecotrust/Whole Watershed Restoration Initiative) that are becoming more competitive. The BLM could better utilize alternative funding mechanisms like stewardship contracts for commercial sales to accomplish instream work on adjacent stream reaches.

The Northwest Forest Plan intended that Key Watersheds would "…serve as refugia…crucial to maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species" (1994 RMP). However, they were not designated in areas with high intrinsic potential or where there is a great deal of overlap with listed anadromous species. To make the designation more meaningful, Key Watersheds could be identified based on the percent of streams with high intrinsic potential habitat, or unique areas worthy of protection and further restoration. Other considerations could include the percent of BLM-administered land or the presence of existing restoration partnerships with a proven record of accomplishment of restoration project accomplishment and success.

Grazing

Key Points

- Only the Medford and Coos Bay Districts and the Klamath Falls Field Office administer livestock grazing in the planning area.
- The level, duration, and timing of livestock grazing within the decision area are permitted or leased below levels anticipated in the 1995 RMPs.

Current Conditions And Context

The Medford and Coos Bay Districts and the Klamath Falls Field Office administer livestock grazing on 510,969 acres, representing 22 percent of the decision area (Table 10). This level of grazing represents 16 percent of grazing acres that occurs on land covered by the Northwest Forest Plan. All or portions of nine grazing allotments in the Medford District are located within the Cascade-Siskiyou National Monument, which is not within the decision area. The Klamath Falls Field Office administers two of these allotments.

Table 10. Livestock grazing statistics by district or field office

	Medford	Coos Bay	Klamath Falls	Total
Number of Allotments*	90	4	95	189
Total Public Land Acres	303,271	16	207,682	510,969
Number of Active AUMs	9,036	23	13,354	22,413
Number of Permittees/Lessees	50	4	92	146

*total allotments, including vacant without current permit/lease

Existing grazing leases/permits authorize 22,413 active Animal Unit Months (AUMs) during the grazing season. The level, duration, and timing of livestock grazing use within the planning area are permitted or leased at or below Plan levels. The reasons for this level vary by individual grazing allotments or leases and include annual fluctuations of individual livestock operations, relinquishment by operators, cancellation of grazing leases or permits due to nonuse or noncompliance, and lack of interest.

The 1997 Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington were developed in consultation with Resource Advisory Councils, Provincial Advisory Committees, tribes, and others. Current management direction is to complete rangeland health assessments on all active and vacant allotments. Eighty percent of the allotments and leases within the decision area have been assessed. Table 11 shows that 60 percent of the total acres assessed are meeting rangeland health standards or making significant progress towards meeting the standards.

Management opportunities to achieve desired conditions may be limited in those areas where rangelands may not have the capability to meet rangeland health standards or make significant progress towards meeting the standards due to causes other than livestock. Because of past management activities, an area that has been converted from a perennial grass and forb understory to an invasive plant understory (e.g., medusahead, dogtail, or bulbous bluegrass) is an example of where management opportunities may be limited.

Range improvement projects are being planned and implemented as described in the Medford and Klamath Falls Resource Management Plans. Range improvements are used for the following:

- Improve livestock distribution.
- Provide livestock forage.
- Restore degraded areas.
- Protect sensitive sites.
- Improve wildlife habitat.
- Facilitate intensive management of livestock through implementation of grazing systems.

Table 12 shows the types of range improvements and the amount completed from 1996 through 2012.

Table 11. Rangeland health standards assessment rules

	Medford		Coos Bay		Klamath Falls	
	Allotments	**Acres**	**Allotments**	**Acres**	**Allotments**	**Acres**
Rangelands Meeting All Standards or Making Significant Progress Toward Meeting the Standards	37	57,472	4	16	62	113,345
Rangelands Not Meeting All Standards or Making Significant Progress but Appropriate Action Has Been Taken to Ensure Significant Progress (Livestock is a factor)	11	109,494	0	0	10	35,804
Rangelands Not Meeting All Standards or Making Significant Progress Toward Meeting the Standard Due to Causes Other Than Livestock Grazing	9	53,016	0	0	8	43,887
Total Assessed	42	93,248	4	16	80	193,036
Total Not Assessed	13	71,114	0	0	16	14,646

Table 12. Range improvement projects 1996-2012 (note: the numbers in this table are being updated for use in future RMP's for Western Oregon planning documents)

	Medford	Coos Bay	Klamath Falls	Total
Livestock Fences Constructed or Maintained (units/miles)	75/39	0	30/60	105/99
Reservoirs Constructed or Springs Developed (units)	7	0	3	10
Juniper control-Mechanical and Hand Treatments (acres)	0	0	14,386	14,386

Trends And Forecasts

Table 13 displays the change in the number of active allotments from the 1995 RMP Levels to current levels. The number of vacant allotments and leases has increased from 17 (all in the Medford District) in 1996 to 56 (42 in the Medford District and 14 in the Klamath Falls Field Office). A vacant allotment is an allotment that does not currently have an active permit or lease. Some allotments have been vacant since the 1970s. The reasons for the increase in vacant allotments include:

- Relinquishment by operators
- Cancellation due to nonuse or non-compliance
- Lack of interest
- Intermingled private land making it difficult to graze within an allotment
- Conflicts with other users of public land
- Lack of fencing to contain livestock on public land

Management Opportunities

Current management direction is to complete rangeland health assessments on all active and vacant allotments. The RMP revision can be used as an opportunity to provide a strategy that improves the efficiency of administration for active and vacant allotments/leases.

A strategy could include identifying lands available or not available for livestock grazing that considers the following factors:

- A threshold value of acreage or animal unit months for lease administration
- If a grazing lease or permit has been voluntarily relinquished or if there are outstanding requests to voluntarily relinquish the grazing lease or permit
- Length of time since an allotment has been vacant

Table 13. Current grazing levels compared to 1995 RMP levels

	1995 RMP Levels			Current Levels		
	Active AUMs	Active Allotments	Vacant Allotments	Active AUMs	Active Allotments	Vacant Allotments
Coos Bay	23	6	0	23	4	0
Medford	9,420	49	17	9,036	4	42
Klamath Falls	13,662	95	0	13,354	81	14

Hydrology

Key Points

- Watershed condition on BLM-administered lands in watersheds in which BLM has at least 25 percent ownership has steadily improved under the 1995 RMPs for both the riparian areas and the uplands.
- The checkerboard nature of O&C lands, low BLM ownership in many watersheds, and private landowners' management strategies make it challenging to assess the cumulative effects of BLM actions on watershed condition.
- Riparian Reserve boundaries extend out beyond the water influence zone and are wider than necessary for water quality protection.
- Best Management Practices are the primary mechanism, with monitoring and adaptive management, to achieve Clean Water Act compliance and water quality goals.
- Water Quality Restoration Plans have been completed for most watersheds with 303(d) listed stream segments, where Total Maximum Daily Load (TMDL) allocations emphasize anti-degradation on stream segments on BLM-administered lands, which has normally been achieved by "let-it-grow" vegetative management in the stream adjacent zone, and variable tree retention further out.

Current Conditions And Context

BLM-administered lands in the planning area can be arranged within a system of dominant landforms involving five of nine defined provinces for Oregon: the Coast Range, Willamette Valley, Cascades, Klamath Mountains, Basin and Range provinces. Each province differs greatly in landforms, elevations, degree of stream density and moist to dry climates. The coastal region is characterized by a temperate maritime climate with rain-dominated wet winters, narrow differences in daily air temperatures, and drier, cool summers with some fog near the coast. The interior has a mix of climates from maritime in the north to Mediterranean the south, characterized by cool, wet winters and moderate to hot dry summers. Snow accumulation, increasing by elevation, is common in the Cascades and Klamath Mountains provinces during the winter months. Seasonal precipitation patterns combined with differences in geology, soils, vegetation, landforms, and watershed size define a range of stream types, sizes, patterns, and periodicity of streamflow.

Streams and rivers in the planning area occur in a variety of landscapes from coastal-rain influenced streams to snowmelt-influenced streams in the Cascades and Mountains. There are approximately 20,407 miles of streams and rivers (33 percent perennial, 67 percent intermittent or ephemeral) and 218,199 acres of lakes, ponds, and wetlands on BLM-administered lands.

Average annual watershed runoff varies widely in the planning area. Analysis of more than 100 years of streamflow records at long-term U.S. Geological Survey stream gages show a pattern of average annual yield varying from 10 to more than 100 inches of runoff from the watershed basins. These differences correspond to climate, watershed basin characteristics, streamflow regulation, and out of stream uses including irrigation, industrial, domestic, and public water supplies.

The dispersed nature of BLM-administered lands in the planning area results in low BLM ownership in many watersheds (Table 14).

TABLE 14. BLM OWNERSHIP BY WATERSHED

Watershed Size	>25% BLM Ownership (#)	5-25% BLM Ownership (#)	<5% BLM Ownership (#)
Watershed level (HUC* 10) (Generally 50-300 mi2)	48	57	162
Subwatershed level (HUC 12) (Generally 15-60 mi2)	226	224	763

* HYDROLOGIC UNIT CODE

Water Quantity

Timber harvest can influence peak streamflow susceptibility. As described by Grant *et al.* (2008), increasing percent harvest or areas in non-forest can result in changes in peak flows. Currently, approximately seven percent of BLM-administered lands are in the stand establishment stage, the youngest stage of forest stand development (BLM 2008). Within the planning area, 634 subwatersheds are rain-dominated, 471 subwatersheds are inside rain-on-snow elevations, and 86 subwatersheds are snow-dominated. Under the current conditions, eight of the 634 rain-dominated subwatershed and three of the 471 rain-on-snow subwatersheds would be susceptible to increases in peak flows because of timber harvest. Sensitivity analysis revealed that climate conditions would have more effect on susceptibility to peak flow increases than timber harvest (BLM 2008).

Water Quality

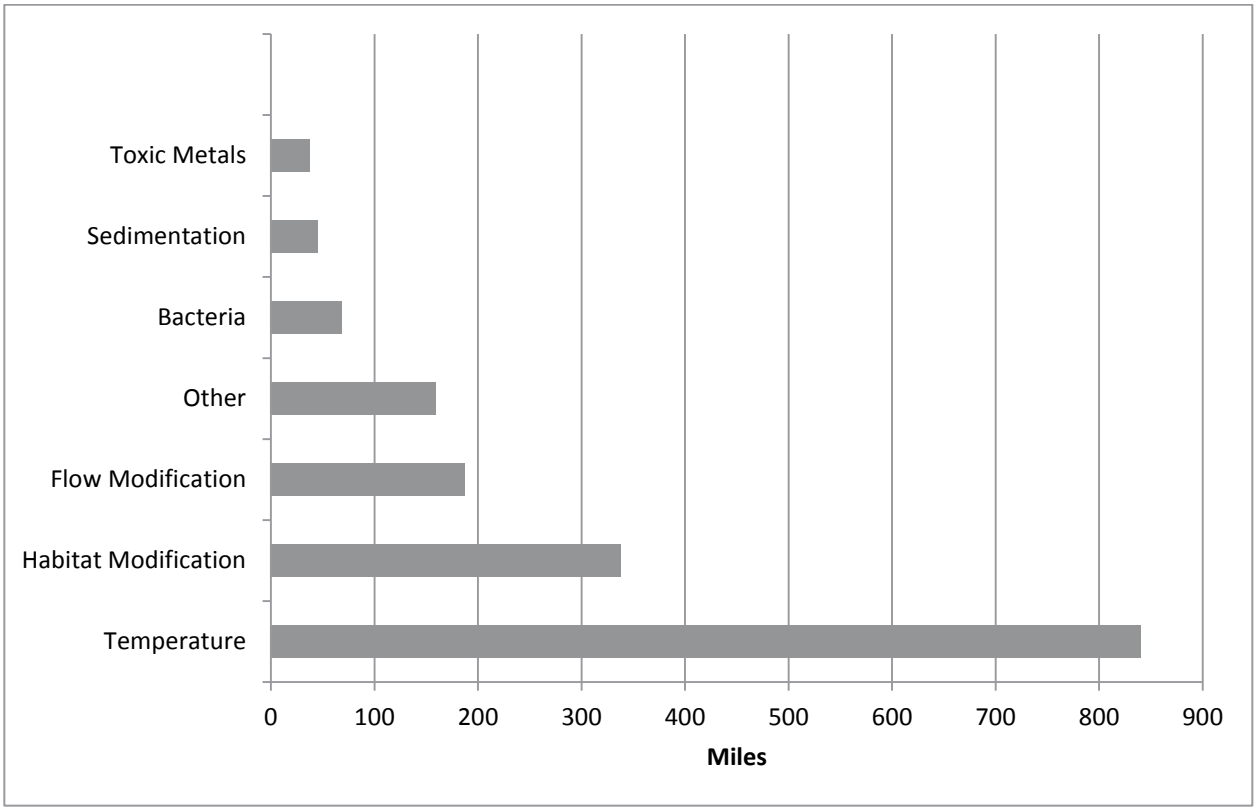
The 1972 Federal Clean Water Act (33 U.S.C. §1251), as amended in 1987, directs federal agencies to comply with state water quality requirements to restore the physical, chemical, and biological integrity of the nation's waters and maintain water quality necessary to protect beneficial uses. Under Section 303 of the Clean Water Act, the Oregon Department of Environmental Quality identifies flowing and standing water that do not meet state established water quality standards for one or more designated uses, and these streams, rivers, and lakes are included on the state's "303(d)" list.

The Department of Environmental Quality develops a Total Maximum Daily Load (TMDL) and a Water Quality Management Plan with strategies and targets for reducing water pollution. The BLM is a Designated Management Agency with responsibilities for developing and implementing Water Quality Restoration Plans. The Department of Environmental Quality has prepared about 20 TMDL management plans in river subbasins of the state, but some remain to be completed.

In watersheds with BLM-administered lands, ODEQ has included 1,674 stream miles on the 303(d) list for exceeding at least one water quality measure standard (Figure 5). However, either 78 percent of these impaired stream miles has an approved Water Quality Restoration Plan, or the stream mile was 303(d)-listed due to habitat and flow modification issues and thus, does not require a TMDL. By far the most common reason for listing on BLM-administered lands is temperature. Only seven percent of BLM's total stream miles are 303(d) listed.

The high proportion of 303(d) streams listed for temperature shown in Figure 5 can be misleading. This is because listings typically involve stream segments where summer stream temperatures, that do not meet standards, are well downstream of BLM-administered lands. However, DEQ's TMDLs address 303(d)-listed streams from mouth to headwaters in a watershed and many streams pass through both forest and agricultural landowners with varying land practices. Water temperatures on most BLM-administered lands, even though listed, are within standard; these temperatures are maintained by the highly effective shade conditions provided by the well-stocked or mature forests in Riparian Reserves. Contributing to this success has been the implementation of the 1995 RMPs and the growth of riparian forests. Where BLM has undertaken detailed shade modeling assessments, the conclusions usually indicate that federal riparian forests are fully functional and meet effective shade goals and are expected to maintain water quality at an anti-degradation level. Therefore, the preparation of water quality assessments and Water Quality Restoration Plans may be redundant with current controls and practices. The BLM and Forest Service within the Northwest Forest Plan area have developed the strategy documented in "Northwest Forest Plan Temperature TMDL Implementation Strategy; Evaluation of the Northwest Forest Plan Aquatic Conservation Strategy, May 25, 2012." This streamlined approach relies upon the pattern of Riparian Reserves, Aquatic Conservation Strategy, and implementation of the Northwest Forest Plan Standards and Guidelines. This framework is expected to maintain and restore water quality through time. The BLM could update management direction to recognize load targets associated with approved TMDLs (e.g., shade targets).

FIGURE 5. STREAMS WITHIN THE PLANNING AREA THAT ARE 303(D) LISTED BY LISTING PARAMETERS



Best Management Practices

Best Management Practices (BMPs) are a water pollution control required by the federal Clean Water Act to reduce nonpoint source pollution to the maximum extent practicable. Application of BMPs is in conformance with the 1995 RMPs and, when applied, is expected to meet water quality standards. Monitoring of BMPs is an adaptive management process; lessons learned from site-specific application of practices and effectiveness is used modify the treatment, if appropriate. The BLM BMP reviewed, updated, and developed with a consistent format BMP practices in the 2008 RMP/EIS. In addition, the Medford District developed a specific set of BMPs for the highly erosive granitic, schist and pyroclastic soils that occur within its boundaries. Updated or new BMP practices or deletions were incorporated into the 1995 RMPs by plan maintenance since 2008. A further review of BMPs for roads and landings was completed in 2011, focusing on runoff and sediment delivery to stream channels from logging roads. Based upon that BMP review, new plan maintenance changes were made where necessary.

Roads

Roads can be a source of sediment delivery to streams, depending upon a variety of factors including topographic location, proximity to streams, design, and newness of construction, surfacing (i.e., pavement, gravel, or dirt), road slope, adequacy of drainage relief, road cut and fill stabilization, use and season, climate, and maintenance level. Individual road segments may have short-term sediment delivery, chronic delivery, or none at all. Winter storm flow runoff is a main driver of road erosion, and concentrated water flow in roadside ditches can deliver sediment to stream if cross-drains are insufficient. Erosion rates from roads, based on underlying geology, are much greater in the first two years after construction while cut and fill slopes and roadside ditches are stabilizing with vegetation (Walker and King 1969).

Existing roads are providing an average watershed potential fine sediment delivery to streams of 2.8 tons mi^2/year, which is a minor portion of total basin sediment yields (BLM 2008). Wallick *et al.* (2009) reported that sediment yield from 26 basins in the Cascades and Coast Ranges of Oregon, and northern California, for sediment volumes deposited at river or stream entrances, average 942 tons mi^2/year and vary from 17 to 7,078 tons/mi^2/year. The application of BLM Best Management Practices is the primary reason that BLM roads result in a minor portion of the total sediment delivery to streams from roads. The 2008 RMP/EIS calculated that new road construction under the 1995 RMPs would result in an increase of only 0.06 tons mi^2/year of sediment delivery to streams.

Road maintenance schedules are an important consideration in limiting sediment delivery. High-traffic volume or heavy haul for timber management requires increased maintenance. All-season-use of natural- and gravel-surfaced roads can increase sediment delivery, unless mitigated with an increased level of Best Management Practices (BMPs). The 2008 RMP/EIS contains the estimation that 38,115 miles of BLM roads would need to be maintained per decade to keep up current infrastructure. Road maintenance activities are beneficial in controlling sediment delivery to streams. Reduced timber harvest in recent years has led to less road maintenance fee collections from timber purchasers who use BLM roads to haul timber and an increased length of time between maintenance.

Approximately 600 miles of roads in the planning area have been decommissioned, or put in a state that will not require future maintenance; resulting in a total decrease of four percent in road miles. Decommissioning roads near stream channels would have the highest benefit in reducing sediment delivery and lowering the hydrologic risk of culvert or fill failures. However, only a small percentage of the decommissioned roads were near streams.

Source Water Protection

Oregon's drinking water protection program involves a partnership between the Department of Environmental Quality and Oregon Health Authority, which regulate public water systems. A public water system is defined as having greater than three hookups or serving more than 10 people year-round. About 10 percent of Oregonians rely on surface sources, about 55 percent rely on a combination of surface and groundwater, and 35 percent solely on groundwater. Source water assessments have been completed for all Oregon public water systems, as required by the 1996 amendments to the federal Safe Drinking Water Act. The Department of Environmental Quality and the Oregon Health Authority have delineated source water areas and conducted inventories of potential sources of contamination and risk assessments. The Riparian Reserve land use allocation under the 1995 RMPs has complementary goals to achieve public water protection. Under the Clean Water Act, the Department of Environmental Quality has no specific streamside buffer requirements for drinking water supplies. The Department of Environmental Quality does require forest shade targets for approved TMDLs and prohibits degradation of waters of the state that meet standards for temperature, turbidity, and other water quality standards. For public water systems, there are approximately 80 source water watersheds in the planning area with varying amounts of BLM-administered lands (BLM 2008).

The system of Northwest Forest Plan Key Watersheds were primarily designed for aquatic refugia, but also included a Tier 2 classification for water quality protection of "high quality waters." There are three Tier 2 Key Watersheds with a total of 5,861 acres in the planning area. Most source water protection areas on BLM-administered lands that deliver water to public water systems are not Tier 2 Key Watersheds.

Riparian Area Management

Hydrologic functions and processes of riparian areas include:

- Shading and thermal protection from the sun
- Stabilizing stream banks
- Filtering to prevent delivery of solids or nutrients from upslope areas
- Retaining of moist microclimates

- Recruiting of large and small wood through natural mortality, stream undercutting or blowdown
- Distributing water, wood, sediment and nutrients to downstream reaches

Hardwood riparian trees recolonize in disturbed areas and particularly along streams, debris torrent tracks, and landslide areas following floods. Hardwoods have also aggressively colonized along roads near streams and compacted areas. They provide a seed source for hardwood establishment in conifer streamside areas.

Riparian Reserve Widths

Riparian Reserve widths under the 1995 RMPs are based upon fish presence and stream periodicity (intermittent or perennial). A site-potential tree-height or multiples thereof are then applied to these biological and physical attributes to obtain the overall width. Site-potential trees vary with the stand-level soil, water, and climate relationships and may vary from 90-240 feet. Under the 1995 RMPs, Riparian Reserve widths are two site-potential tree-heights on either side of the stream on fish-bearing streams and one site-potential tree-height on either side of the stream on non-fish-bearing streams. Riparian Reserve widths were originally meant to be "interim" pending the outcome of watershed analysis, but the BLM's attempt to change these has largely been unsuccessful.

The Aquatic Conservation Strategy

The Northwest Forest Plan included the Aquatic Conservation Strategy to protect aquatic ecosystems and the ecological health of watersheds. The strategy includes:

- Riparian Reserves
- Key Watersheds, 40,000-200,000 acres in size (HUC 10)
- Watershed analysis by HUC 10 watersheds
- Watershed restoration projects

Management activities within Riparian Reserves must be consistent with the Aquatic Conservation Strategy objectives. Reviewing compliance with the nine Aquatic Conservation Strategy objectives can be confusing. The Aquatic Conservation Strategy objectives are, in fact, primarily goal statements, in that they are broad statements of desired outcomes that are usually not quantifiable and do not have established timeframes for achievement. Compliance must be evaluated at multiple temporal and spatial scales, and evaluating short-term and site-specific compliance can be problematic because many of the Aquatic Conservation Strategy objectives were intended to be accomplished over long periods (100+ years) and at the landscape level. This is further complicated by the lack of attainability criteria to evaluate the progress towards meeting the broad Aquatic Conservation Strategy objectives and by the checkerboard nature of BLM-administered lands.

Trends And Forecasts

Monitoring shows that watershed condition in the planning area is improving. The interagency Aquatic and Riparian Effectiveness Monitoring Program (Lanigan *et al.* 2012) evaluated watershed condition and trend for a fifteen-year period (1994-2008) in the Northwest Forest Plan area. From this data, a customized report was prepared for selected subwatersheds that are in the planning area and have at least 25 percent BLM ownership. Figure 6 displays current condition scores, while Figure 7 shows the change in trend. The watershed condition scores, while relatively low, improved in 86 percent of subwatersheds, while declining in 14 percent of subwatersheds.

Sixty-four percent of the subwatersheds had small positive trend score increases between zero and +0.1, (0-5 percent) due primarily to an increase in vegetation and a decrease in landslide risk. Upper Lobster Creek in the Salem District, increased the most (>15 percent), because approximately fifteen miles of road were decommissioned in this subwatershed. North Fork Silver Creek (Biscuit Fire 2002) and Elk Creek/Flat Creek (Timbered Rock Fire 2002) subwatersheds on the Medford District both declined by more than 5 percent. Key Watersheds showed positive changes (>5 percent).

FIGURE 6. WATERSHED CONDITION STATUS (2008) IN SELECTED BLM SUBWATERSHEDS

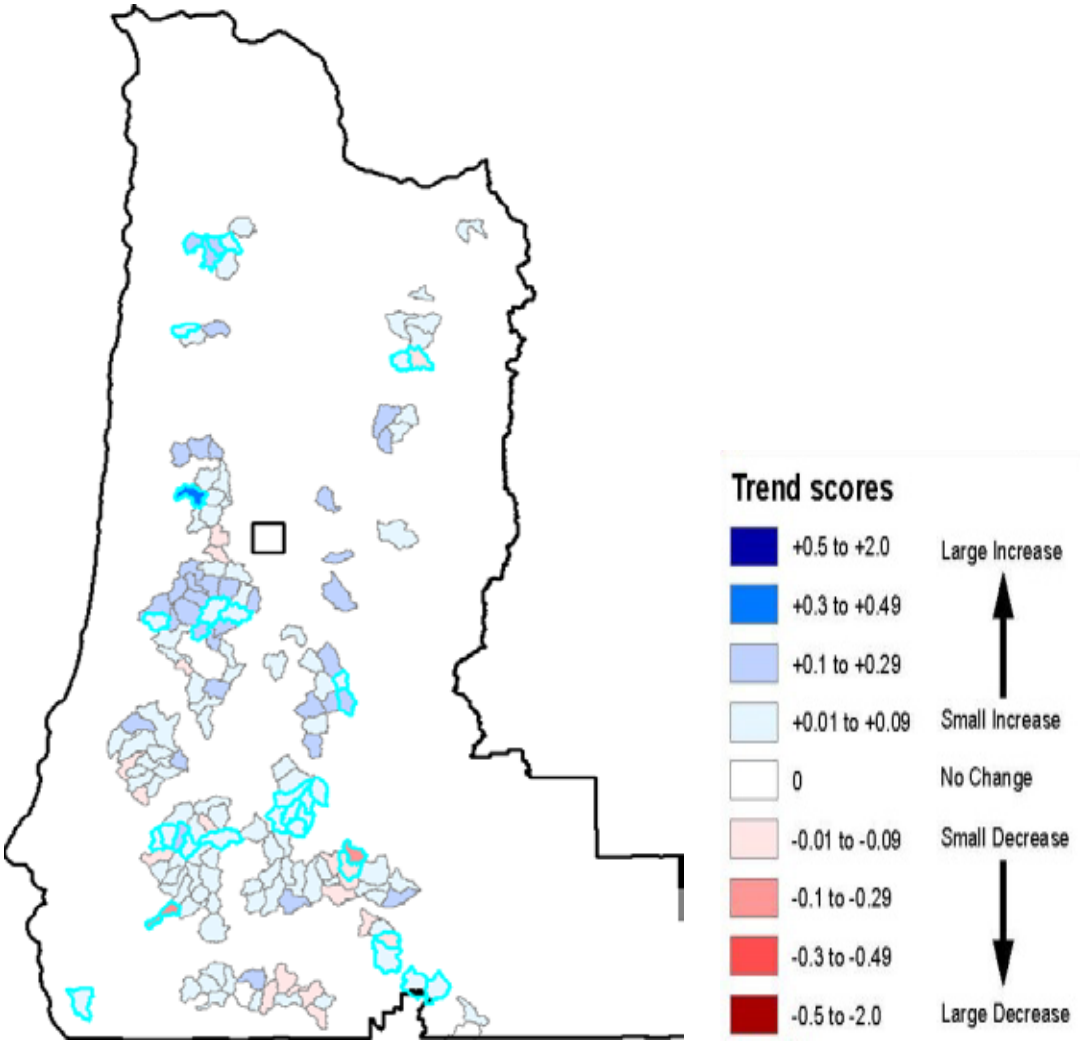


Figure source: Lanigan, S.H. *et al*, 2012

Near-stream riparian forest stand structure has been improving over the last two decades, with approximately 55 percent of the Riparian Reserve allocation in the planning area progressing to mature or older forest and almost all of the remaining area in young forest (BLM 2008). This forest development is a result of limited or no stand management near streams.

Riparian forests on BLM-administered lands are currently providing high levels of stream shade (BLM 2008). Currently, riparian forests on BLM-administered lands provide at least 95 percent of the effective shade that would be attained from uniformly fully stocked forest stands. More importantly, these current levels of streamside shade are expected to avoid any measurable increases in water temperature during the summer months. The existing Riparian Reserves are an effective filter strip to intercept and limit sediment delivery with the near-stream zone playing the most important role in this function. Rashin *et al.* (2006) found that 94 percent of erosion features that delivered sediment to streams, where no Best Management Practices were present, were closer than 33 feet. Further, the near-stream zone is also an important area for retention of cool, moist microclimates. Anderson *et al.* (2007)

Figure 7. Watershed condition trend, 1994-2008 in selected subwatersheds, Key watersheds are highlighted

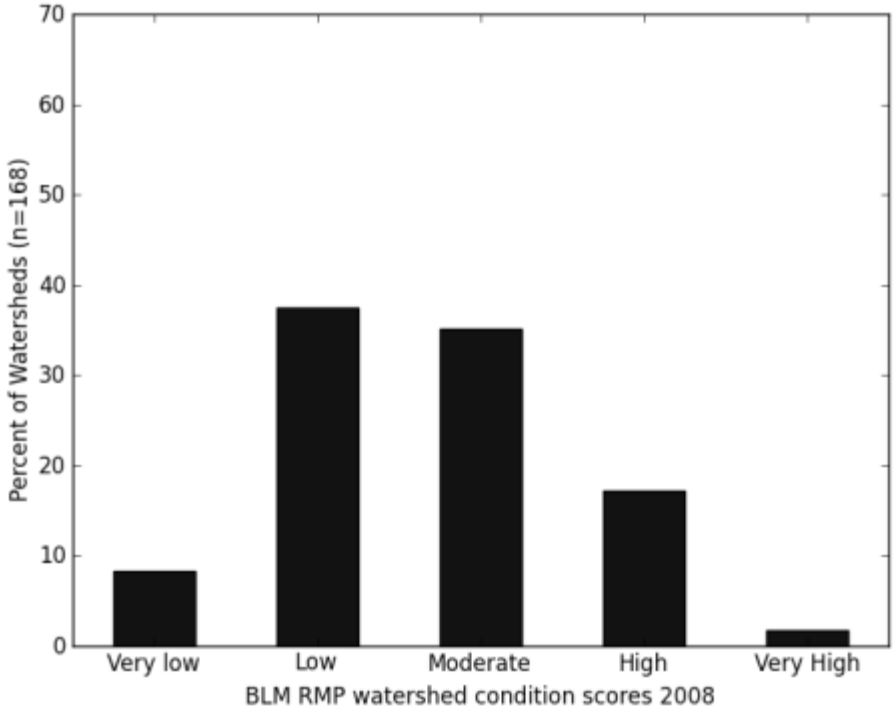


Figure source: Lanigan, S.H. *et al*, 2012

examined buffer width and density management effects on riparian microclimates of headwater streams in western Oregon and found that microclimate gradients were always strongest within 33 feet of a stream center. Thinning resulted in subtle changes in microclimate, as mean air temperature maxima were 1 to 4°C higher than in unthinned stands. With buffers 50 feet or greater in width, daily maximum air temperature was less than 1°C greater, and daily minimum relative humidity was less than 5 percent lower than for unthinned stands.

Management Opportunities

Although the existing Riparian Reserves provide full stream protection and are oftentimes wider than necessary to protect water quality, their boundaries do not always line up with relevant physical and ecological landscape processes and attributes. Widths of riparian buffers could be determined by two approaches that differ from the current standard. The first approach could retain fixed buffer widths, but improve the underlying classification. The second approach could define variable riparian buffers that are spatially explicit for the resources and protection needs involved, instead of uniform tree height distances. Various geospatial analyses could be used to define variable riparian buffers. For example, the Coos Bay District developed a spatially explicit shade model in 2010 that uses LiDAR. Other alternative modeling techniques include NetMap (Benda *et al.* 2007), which has been recently developed with a suite of tools for spatially explicit cell-by-cell analysis of landscapes. These types of approaches can provide evaluations at multiple spatial and temporal scales and lead to definition of a variable riparian buffer boundary.

Underlying stream periodicity (perennial, intermittent, or ephemeral) could be supported by merging with a more definitive and consistent geospatial approach. For example, geospatial data for small streams that are always intermittent, based on stream gradient and stream width, could be used to verify the stream periodicity data layer.

The BLM could work with cooperators, using existing Water Quality Restoration Plan implementation and monitoring history, to show that the BLMs riparian management objectives and management direction are as effective as preparing a Water Quality Restoration Plan. Management direction could be developed to recognize load targets associated with TMDLs (e.g., shade targets).

The BLM could also develop clear, implementable management direction for the Riparian Reserves that maintains aquatic conservation at multiple spatial scales through time. The Tier 2 Key Watersheds could be moved to better align with source water protection areas for public drinking water systems.

Invasive Species

Key Points

- Invasive species management, defined in Executive Order 13112 – Invasive Species (3 February 1999), pertains to not only noxious weeds and invasive plants, but also includes microorganisms, invertebrates, fish, birds, and mammals.
- The BLM has an active noxious weed control program.
- Increased awareness about all invasive species taxa and their impacts is likely to generate more prevention actions, detections, and active management of high priority invasive species taxa and in high priority areas (BLM 2010).
- In many watersheds, invasive species populations occupy large portions of the landscape. Invasive species management priorities generally target prevention of new introductions into uninfested areas and treatments of new invader species, small outlier infestations, and containment of large infestations (BLM 2010).
- Sudden Oak Death quarantine area has expanded in Curry County and all districts in western Oregon are at risk of infestation.
- The ability to use a broader suite of herbicides to treat invasive plants and unwanted vegetation, as well as noxious weeds, would allow for more effective and efficient treatments of many invasive plant infestations.

Current Conditions And Context

Invasive species are degrading ecosystem health in western Oregon at a rapid rate. Adverse environmental effects created by invasion of non-native, invasive species include displacement of terrestrial and aquatic native plant and animal species; reduction in habitat and forage of wildlife and livestock; loss of special status species; increased soil erosion and reduced water quality; and changes in intensity and frequency of fires. Not well documented and frequently overlooked, negative impacts of invasive species on resources sometimes reach critical thresholds or threaten specific resources to the point they require attention. Invasive species affect all ownerships and are spread between public and private lands by a wide range of land management activities. In many watersheds, invasive species occupy large portions of the landscape.

Executive Order 13112 and the Oregon Department of Agriculture provide the following definitions to use in discussing invasive species including noxious weeds:

- **Non-native species** are defined with respect to a particular ecosystem, to be any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.
- **Invasive species** are non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health.
- **Invasive plants** (or weeds) are non-native aggressive plants with the potential to cause significant damage to native ecosystems and/or cause significant economic losses.

- **Noxious weeds** are a subset of invasive species that have been declared a menace to public welfare (ORS 569-350) and are injurious to public health, agriculture, recreation, wildlife, or any public or private property.

The long-term success of BLM's invasive species management efforts depends not only on management actions within the BLM but on the collective actions of BLM partners and neighbors. In the BLM's checkerboard land ownership pattern, coordination with other entities is necessary.

Numerous invasive species identified in the Oregon Conservation Strategy (ODFW 2006) are known to occur in the planning area. Some of these invasive species include the fungus Phytophthora ramorum (which causes Sudden Oak Death), New Zealand mud snails, ringed crayfish, bullfrogs, bluegill. Other priority invasive species with documented sightings in western Oregon that have the potential to be introduced and documented in the planning area include feral swine, quagga mussels, Eastern snapping turtle, and Louisiana swamp crawfish. Enough baseline occurrence data exists in iMapInvasives for Asiatic clam, nutria, bullfrog, and New Zealand mud snails to allow for an analysis of some invasive animal species between alternatives.

Ailments caused by invasive species on deer are known to occur in western Oregon, including chronic wasting disease and sudden hair loss syndrome. Chronic wasting disease is probably caused by a bacterium, Spiroplasma, which causes neuro-degeneration in infected deer and elk and is always fatal. Muscle worms, transferred by Asian louse on black-tailed and Columbian white-tailed deer cause sudden hair loss syndrome. Animals infected with the muscle worm lose excessive amounts of hair and become susceptible to other health problems. Some deer recover from this syndrome the subsequent year.

The Oregon Conservation Strategy (ODFW 2006) uses the Meeting the Invasive Species Challenge: National Invasive Species Management Plan that works best when implemented in an integrated and coordinated manner and at multiple spatial scales. The national plan includes the following management approaches:

- Prevention
- Assessment/risk analysis
- Monitoring
- Early detection
- Rapid response
- Containment
- Restoration
- Adaptive management

The Noxious Weed Strategy for Oregon/Washington BLM (1994) defines the activities of the invasive plant program and is mirrored in other state and federal invasive species strategies, like the Oregon Invasive Species Action Plan (ODFW 2005) and Executive Order 13112. The basic components of the strategy include:

- Planning
- Coordination
- Inventory
- Detection and prevention
- Integrated control methods, including restoration
- Awareness and education
- Monitoring and evaluation

The Noxious Weed Strategy is designed to prevent and control the spread of invasive plants on BLM-administered lands through cooperation with partners. In western Oregon, the focus is on preventing infestations, particularly in

areas that are not infested and reducing adverse effects caused by invasive plants on natural habitats, recreational experiences, and reforestation efforts. Maintaining healthy environments resists invasions. Treatment priorities generally target infestations of new species, infestations of common species outside primary infestation areas, and containment of larger infestations.

Integrated Pest Management

The BLM uses combinations of biological, cultural[3], physical or mechanical and chemical tools to control and eradicate invasive species established populations and introductions. Small outlying invasions, particularly of new invasive species, are the highest priority for treatment. Eradication is often a realistic goal in these situations. Examples of small invasion eradications due to early detection and rapid response in the planning area include:

- Diffuse knapweed in the Salem and Medford Districts
- Russian knapweed in the Klamath Falls Field Office
- Distaff thistle in the Medford District
- Feral swine on private land near Scio in the Salem District
- Gypsy moth in Oregon

BLM directs most of the on-the-ground invasive species control efforts at invasions of more widespread species to reduce impacts to valued resources and to prevent further spread and resource degradation. It is unrealistic to expect eradication of well-established and widely distributed species.

Consistent with national trends, the amount of acres currently treated annually for invasive plants has increased more than twenty-five times over what was treated in 1996. Table 15, which is based on total acres treated since adoption of the 1995 RMPs, shows that there is a high degree of diversity among the districts in the species mix and acres treated. Scotch broom, French broom, yellow starthistle, thistles, and invasive blackberries are the most commonly treated species. Scotch broom, thistles, blackberries, meadow knapweed, tansy ragwort, and the knotweeds are species treated in most of the western Oregon districts.

The Eugene District's control program relies very heavily on manual and mechanical treatments. Herbicide applications are the predominant control method used in Klamath Falls Field Office. Salem, Roseburg, Coos Bay, and Medford Districts' integrated weed management programs are a mix of herbicide and physical control treatments. All districts use biological control agents. Occasionally cultural and non-traditional biological control methods are used.

A large proportion of new infestations are found by way of combined invasive plant and rare plant pre-project surveys. Areas selected for invasive plant treatments are often associated with timber harvest activities, along roadsides and in gravel sources, to reduce the amount of spread. Other high priority areas for invasive species treatments include natural areas, habitat for special status species, recreational areas (e.g., Dean Creek Elk Viewing Area in Coos Bay District), riparian areas, special habitats, and Areas of Critical Environmental Concern. The BLM prohibits the possession, use, or storage of hay, straw, or mulch not certified as free of noxious weeds on BLM-administered lands in the Oregon and Washington.

Invasive plant treatments are usually repeated at the same site for several years, especially when eradication is the goal. Treatments are usually repeated at a site for several consecutive years and are often directed at more than one target species at any given site. Funding levels and availability of staff, rather than infestation levels, determines the amount of species and acres treated each year.

In 1984, the U.S. District Court of the District of Oregon enjoined the Forest Service and Bureau of Land Management from the use of herbicides in Oregon. The injunction limited BLM's herbicide use to treat noxious weeds with these four active ingredients: dicamba, 2,4_D, glyphosate and picloram. Currently the districts are

[3]In this context, "cultural" refers to activities that cultivate the soil, such as seeding, mulching, and fertilizing.

TABLE 15. MOST COMMONLY TREATED INVASIVE SPECIES BY ACRES AND DISTRICT

Species or Group	Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem	Western Oregon Totals
Scotch broom	3,511	10,947	2	3,582	9,117	6,368	33,527
French broom	13,375	0	0	18	215	0	13,608
Yellow starthistle	0	0	663	10,605	399	0	11,667
Thistles (Canada, Bull, Italian)	5	0	225	5,153	358	3,576	9,317
Blackberry	45	0	0	477	4,202	3,421	8,145
Portuguese broom	0	0	0	0	2,054	0	2,054
False brome	0	1241	0	0	30	754	2,025
Dyer's woad	0	0	12	1,903	0	0	1,915
Meadow knapweed	0	1421	0	2,525	33	323	4,302
Tansy ragwort	0	0	16	102	11	1,355	1,484
English ivy	0	0	0	28	67	761	856
Yellowtuft alyssum	0	0	0	650	0	0	650
Puncturevine	0	0	0	592	0	0	592
Rush skeletonweed	0	0	0	369	178	0	547
St Johnswort	0	0	37	0	0	431	468
Musk Thistle	0	0	448	0	0	0	448
English hawthorn	0	0	0	0	391	0	391
Knotweeds	1	36	0	39	7	283	366
Leafy spurge	0	0	293	20	0	0	313
Scotch thistle	0	0	284	0	0	0	284
Clematis	0	0	0	0	0	230	230
Shining geranium	0	0	0	0	2	150	152
Spotted knapweed	0	0	9	127	0	2	138
Diffuse knapweed	0	0	54	55	5	0	114
Evening Primrose	0	0	0	0	0	105	105
Dalmatian toadflax	0	0	57	13	0	0	70
Gorse	35	0	0	0	7	0	32
Yellow Flag Iris	5	0	0	0	0	0	5

SOURCE DATA: ANNUAL PROGRAM SUMMARIES AND DISTRICT RECORDS 2006-2011

treating invasive plants in accordance with the Records of Decision (RODs) for the Northwest Area Noxious Weed control Program EIS and the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (September 2007). Many species cannot be controlled with manual and mechanical methods alone because they tend to resprout or because soil disturbance from the treatments creates a seed bed susceptible to reinvasion. The four active ingredients listed above do not effectively control all listed noxious weeds and their use is only approved for listed noxious weeds. As a result, some invasive plant infestations continue to persist under an aggressive integrated weed management program.

In 2010, the BLM completed the Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement and signed a ROD. Site-specific environmental assessments are under development for each of the districts. The ROD, in combination with the amended herbicide injunction and the completed district environmental assessments, will make 14 herbicides available for various vegetation treatments in western Oregon and expand their use beyond listed noxious weeds. The additional ten active ingredients will provide access to a broad array of herbicides that are more target-specific and effective than the four herbicides currently used. Weed control effectiveness is expected to increase as new herbicides become available. These herbicides cannot be applied aerially in western Oregon, and may not be used for commercial timber enhancement or livestock forage production.

Biological control in the western Oregon BLM districts is coordinated through the Oregon Department of Agriculture. Biological control using approved natural enemies has been an important tool in the weed control arsenal for BLM districts in western Oregon since the 1970s. In the U.S., the western Oregon BLM districts contain the most intensive and diverse biocontrol program. Between 1994 and 2011, biological control agent releases have been made on BLM-administered lands in western Oregon to control Dalmatian toadflax, leafy spurge, Mediterranean sage, field bindweed, diffuse knapweed, yellow starthistle, and purple loosestrife. In Oregon, 71 species of biocontrol agents have targeted 31 weed species. Cooperators and BLM are conducting biological control projects in western Oregon on knotweeds, gorse and Scotch broom.

The Roseburg District used fire to control medusahead wildrye in 2011.

Sudden Oak Death, caused by *Phytophthora ramorum*, threatens Oregon's forest and nursery industry. This pathogen causes mortality in susceptible oak, tanoak, rhododendron, viburnum, evergreen huckleberry and other plant species. It also causes disease in other susceptible species. All of the western Oregon districts are at risk for Sudden Oak Death infestations. Coos Bay is the only district with reported sites of Sudden Oak Death. The Coos Bay District has been coordinating treatment activities with adjoining landowners, the Oregon Department of Forestry and the U.S. Forest Service to control Sudden Oak Death infection sites in the state-designated quarantine area. Oregon's infestation of Sudden Oak Death was first discovered in 2001 and the quarantine area was expanded to include all of Curry County in 2013.

Treatments for Sudden Oak Death involve cutting, piling, and burning cut material to include the infected plants and adjacent vegetation. Treatment areas are then planted with Douglas-fir within two years of treatment. Pathologists from the Oregon Department of Forestry and the U.S. Forest Service perform follow-up surveys until the area has been determined to be disease-free for two successive years. If the disease is still present, the area is retreated. In 2011, more than one hundred acres had initial treatments of cutting, piling, and pile burning and more than seventy acres had retreatments of cutting and piling. Cumulative treatments since 2001 include more than five hundred acres of cutting and piling, more than 300 acres of pile burning, seventeen acres of broadcast burns and almost eighty acres of retreatments. The BLM decided to add the use of the herbicide glyphosate into the Sudden Oak Disease control program in the Coos Bay District in 2010.

Active integrated pest management has occurred in some pump chances on the Roseburg District where bullfrogs and bluegill were out-competing the native amphibians. A BLM biologist arranged to drain pump chances to eradicate the fish and reduce the bullfrog populations, before having them filled back up with water. The treatments were effective in eradicating the bluegill and greatly reducing the bullfrog populations in the pump chances.

Trends And Forecasts

In general, the districts have increased the number of species which are inventoried, tracked and managed in response to an awareness of more invasive plants being introduced onto public lands in western Oregon. The number of invasive plant species actively managed has more than doubled since 1996 (Table 16).

Table 16. Invasive plant species treatment trends from 1996-2011

District/Field Office	Number of Species Treated in 1996	Number of Species Treated 1997-2011
Coos Bay	3	7
Eugene	2	4
Klamath Falls	13	20
Medford	3	28
Roseburg	4	32
Salem	5	28

Increased cooperation and partnerships between federal, state, and private landowners has greatly improved the capacity and effectiveness of invasive species management and has been especially important because of the checkerboard land ownership pattern of private and public lands.

Increased public awareness about the spread and impacts of invasive species has fostered strategies that pooled funding resources and increased participation in integrated pest management activities resulting in more acres treated and infestations controlled. The requirement to prohibit non-certified weed free hay, straw, and mulch is evidence of cooperation across ownerships towards preventing the spread of invasive plants.

The BLM Manual 9015 for Integrated Weed Management is under revision and will become Integrated Pest Management focusing on all invasive species.

Management Opportunities

Broadening management objectives and direction to include all invasive species groups, including aquatic species, animals, insects, and pathogens, as well as plants into the resource management plans (Executive Order 13112) could prevent undesirable economic and ecological impacts. Management opportunities include inventories to detect invasive species, integrated pest management, monitoring to determine the effectiveness of control efforts and restoration actions following invasive species control projects. Conducting risk assessments early in project planning would identify the potential for invasive species introduction, the consequences of establishment (BLM Manual 9015) and limit their spread in project designs.

Collaboration with other agencies and land managers to provide early detection and rapid response to new invasions and identification of high priority invasive species occurrences may be the only way to effectively eradicate or control them where ownership patterns are mixed. Cooperation works well to clarify responsibilities, conduct inventories, prioritize and implement control projects, monitor the effectiveness of treatments, and restore habitats previously occupied by invasive species.

Incorporating the concepts within the Oregon Conservation Strategy (ODFW 2006) and the Noxious Weed Strategy for Oregon/Washington BLM (1994) could improve the effectiveness of BLM's overall invasive species management. BLM's Partners Against Weeds Plan (1996) was based on the earlier Noxious Weed Strategy for Oregon/Washington. All of these strategies describe a holistic and collaborative approach to invasive species management integrating several program elements.

Strategic inventories provide opportunity for early detection of invasive species. Rapid response to isolated invasive species detections maximizes the chances of successful eradication and control. When eradication is not feasible, containment to limit the spread of the harmful species is the next best option. Restoration projects, following invasive species control are an important step toward habitat recovery and improved resiliency against reinvasion. Conducting risk assessments early in project planning will help identify invasive species occurrences and allow for the integration of management prescriptions to limit their spread in the project design. Monitoring the results of invasive species control activities provides information needed to determine if a different approach for effective invasive species control is prudent.

Lands and Realty

Key Points

- The Oregon Public Lands Transfer and Protection Act, PL 105-321 (23 October 1998), which passed after the adoption of the 1995 RMPs, establishes a policy of No-Net-Loss of O&C land, Coos Bay Wagon Road land, and Public Domain land that is available for timber harvest within the planning area. The Bureau of Land Management (BLM) is required to account for the No-Net-Loss requirements through land tenure adjustments if sales, purchases, and exchanges affect these lands.

- The access and transportation rights-of-way program is the most active lands and realty function for the BLM in western Oregon.

Current Conditions And Context

Land Tenure, Acquisition, and Disposal

BLM-administered lands within the planning area are identified in one of three land tenure zones:

- Zone 1 – Retention and acquisition zone
- Zone 2 – Exchange and consolidation zone
- Zone 3 – Disposal zone.

The current acreage distribution by land tenure zone is shown below in Table 17.

Within the planning area since 1994, the BLM acquired approximately 33,763 acres of land and disposed of approximately 17,370 acres of land through a variety of land tenure adjustment actions, including land sales, exchanges, acquisitions, and transfers (Table 18). The majority of land tenure activity was directed through federal legislation, including establishment of the Coquille Forest (5,409 acres), Longview Fiber Land Exchange (1,453 acres), Rogue National Forest interchange (3,018 acres) and the Merlin Landfill transfer (317 acres). Approximately 10,273 acres of public domain lands were designated by Congress to either O&C or Coos Bay Wagon Road lands status to make up for losses in acreage and timber revenue where legislative action designated other purposes for existing O&C lands.

Key land acquisitions by the BLM are located within the Sandy River/Oregon National Historic Trail project in the Mt. Hood Scenic Corridor, on the Salem District. More than 2,691 acres have been acquired for resource protection and recreational values. Since 2005, the primary source for acquisition funds has been provided through annual appropriations from the Land and Water Conservation Fund. The two primary Land and Water Conservation Fund

Table 17. Acreage of BLM-administrated land tenure zones

Land Tenure	Acres	Total Area (%)
Zone 1	759,705	30
Zone 2	1,730,688	68
Zone 3	54,982	2

Table 18. Land tenure adjustments 1994-2013

Adjustment		Acres
Acquisition	Purchase*	8,962
	Exchange	22,390
	Donation	2,150
	Conservation Easement	261
	Total	33,763
Disposal	Sale	3,798
	Exchange	7,367
	Transfer	5,861
	In-Lieu Selection	344
	Total	17,370
Re-designation from Public Domain to O&C lands		7,543
Re-designation from Public Domain to Coos Bay Wagon Road lands		2,730

* Does not include Cascade Siskiyou National Monument Acquisitions

projects are the Sandy River project and the Cascade Siskiyou National Monument project. The monument is not within the decision area for this RMP.

The BLM typically uses land exchanges to resolve trespass issues or help consolidate federal lands. As a rule, the land coming to the U.S. in an exchange must be of higher resource value than what the BLM exchanges out in return. Western Oregon districts have acquired 22,390 acres through exchange since 1994 (Table 18). However, land exchanges have become extremely controversial and difficult to complete. Since 2004, there have been no significant exchanges within the planning area. At this time, land exchanges are of limited use as a land tenure adjustment tool.

Land sales are generally used to dispose of land where the BLM has no legal access rights. There have been a small number of public lands sales, primarily to resolve unintentional occupancy trespass or to dispose of small tracts created by survey hiatus. There is continued public interest in purchasing isolated tracts of public lands in western Oregon.

Section 212 of the FLPMA – the Recreation and Public Purposes (R&PP) Act of 1926 (43 U.S.C 869) – authorizes the sale or lease of public lands for recreational or public purposes to state and local governments and to qualified nonprofit organizations. Examples of typical uses under the Act are historic monument sites, campgrounds, schools, firehouses, law enforcement facilities, municipal facilities, landfills, hospitals, parks, and fairgrounds. The Act applies to all public lands, except lands within national forests, national parks and monuments, national wildlife refuges, Indian lands, and acquired lands. Public agencies only may lease O&C lands and Coos Bay Wagon Road grant lands under the Act.

For Recreation and Public Purpose (R&PP) conveyances, the BLM inserts a reversionary clause in the land patent that means that if the patentee is not using the property as intended, the lands may revert to federal management. Due to the individual nature and purpose of an R&PP conveyance, it is difficult to make a general decision for all R&PP conveyances if the land were to be reverted back to the BLM. Therefore, decisions are made on a case-by-case basis. Conveyances of lands or reversionary interests in lands through sale or exchange must be identified in the current RMP.

Of the total acres of R&PP sales and leases (Table 19) within the planning area, the largest is the Molalla River Recreation Area lease consisting of 4,441 acres. There have been no new substantial R&PP actions since the 1990s.

The Oregon Public Lands Transfer and Protection Act, PL 105-321 (23 October 1998), established "No-Net-Loss" requirements for lands administered by the BLM in western Oregon. The Act applies only to discretionary agency actions involving sale, purchase, or exchange of land. In addition, the Act requires monitoring of changes in land and harvestable timber acres and balancing every ten years. To date, western Oregon BLM shows a surplus of 49 acres of O&C land and a deficit of 64 acres in harvestable timberland. There has been a decline of sales and exchanges involving O&C lands and Coos Bay Wagon Road lands since the enactment of this law (Table 20).

Table 19. Authorized recreation and public purpose sales (R&PP) and leases within the planning area

	Number	Acres
R&PP Sales	16	603
R&PP Leases	20	6,158

Table 20. No-Net loss summary 1998-2012

	Acres Acquired	Acres Disposed
O&C Lands	275	226
Coos Bay Wagon Road Lands	0	0
Harvestable Timberlands	661	725

The Federal Land Transaction Facilitation Act (PL 106-248), signed into law on 25 July 2000, expired in 2010. It is unknown at this time if Congress will renew this Act. This Act provided for agency retention of land sale receipts and land exchange equalization payments in a Federal Land Disposal Account for use in purchasing land or interests in lands that contain exceptional resources. Western Oregon BLM has a separate account for O&C and Coos Bay Wagon Road land revenue for use within the O&C counties of western Oregon. Since the Federal Land Transaction Facilitation Act has expired, there is one less tool for supplying funding for land purchases.

Rights-of-Way

The rights-of-way program is the most active lands and realty function for the BLM Districts and Field Offices in western Oregon. Administration of reciprocal rights-of-way agreements continues to be the predominant use authorization activity in all districts. Transfers of private timberland have increased BLM's workload for various types of rights-of-way actions; these include amendments, crossing plat reviews, and permit assignments.

The BLM continues its efforts to obtain access for timber sales, forest health and restoration projects, and recreation. Forest management needs within the planning area are being met primarily through the O&C logging road rights-of-way program. However, the BLM has been experiencing increased difficulty in completing satisfactory easement negotiations with private landowners. One challenge within the planning area is that private owners are increasingly gating private forest roads to deny public access because of an increase in vandalism and other resource damage.

Currently, there is an effort to collect and maintain easements and reciprocal rights-of-way agreements in GIS to help model existing access rights in western Oregon; the BLM has collected 2930 easements and 741 reciprocal rights-of-ways. The Western Access Rights Project is scheduled for completion in summer 2013 and will be used to aid in determining public access for this RMP revision and the Transportation Management Plan that will follow.

Energy Development and Transmission

The BLM plays a vital role in managing and facilitating access to energy resources, not only through its leasing function but also through the issuance of rights-of-way that authorize private energy producers and transporters to build the necessary infrastructure on public lands to produce or transport energy.

The 1995 RMPs did not anticipate potential solar and wind energy development. Although opportunities for solar and wind energy development do exist within the planning area, the current level of interest in site testing and monitoring is limited. There is only one application that has been received for development of an energy production facility in the plan area, the Swan Lake Hydroelectric Pump Storage Project within the Klamath Falls Field Office.

The most significant energy-related rights-of-way development was the Coos County Natural Gas Pipeline project, which involved the installation of a 12-inch natural gas pipeline over BLM-administered lands in Douglas and Coos counties. The Record of Decision was signed in 2002 and project work was completed in 2004. The more recent Ruby Pipeline Record of Decision was signed in 2010. The completed pipeline runs from Wyoming, Utah, Nevada, and ends in southern Oregon, primarily within the Klamath Falls Field Office. A current effort underway includes the Pacific Connector Gas Pipeline, which is proposed from Coos Bay to Malin, Oregon.

The recent revision of utility corridor needs published by the Western Utility Group did not identify additional utility corridors within the planning area. However, there is ongoing interest in the expansion of the regional natural gas transmission and distribution system that includes routes over BLM-administered lands.

Long linear rights-of-way projects such as the natural gas pipelines have proven difficult to complete. Conflicts with the provisions in the 1995 RMPs for Late Successional Reserves, survey and manage, and the Aquatic Conservation Strategy pose challenges for any long, linear project. Minimizing these challenges may require creative mitigation strategies. Difficulty of implementing these projects is also due to the checkerboard pattern of the BLM-administered lands and private lands in the planning area.

Communication Sites

The communication sites program is active within the decision area and consists of 220 authorized sites. Since 1994, the BLM has granted 72 new sites, ranging from two to eight grants per year. Communication site management can prove challenging if sites exist in areas with conflicting management needs such as Late Successional Reserves or Riparian Reserves. Each communication site should have an individual site plan that outlines management and have secured adequate legal access.

Withdrawals and Classifications

There are two primary purposes for creating withdrawals: to transfer management jurisdiction from one agency to another; or to withdraw lands from some or all of the public land laws or mining laws to avoid irreparable damage that may be caused by nondiscretionary activities.

Currently the primary non-discretionary activities deal with locatable mineral entry such as mining claims. Therefore, new withdrawals could be considered if a surface resource value of national significance exceeds the subsurface mineral values. If the surface value does not have national significance, does not exceed subsurface value, and other existing laws do not adequately protect the resource, then other mechanisms may be determined more appropriate and potentially more expedient, depending on the purpose such as rights-of-ways.

Withdrawals have the ability to restrict use of federal rights for the surface or the subsurface estate. However, a withdrawal, depending on the order, does not always restrict both the surface and subsurface estates. It is possible for a withdrawal to restrict the operation of the public land laws (surface), but still allow for non-discretionary mineral entry (subsurface).

Management Opportunities

Land tenure adjustment objectives could be reconsidered in light of legal mandates through The Oregon Public Lands Transfer and Protection Act, which prohibits loss of O&C, Coos Bay Wagon Road, and Public Domain acres with harvestable timber.

The BLM could include management objectives and management direction designed to secure legal public or BLM administrative access to isolated tracts of land depending on the purpose and function of the need for access.

The BLM could provide for the disposal of public land affected by inadvertent occupancy trespass or isolated tracts discovered to be public land because of survey hiatuses using automatic allocation of such lands to Land Tenure Zone 3.

Minerals

Key Points

- Use of rock from BLM rock quarries has declined dramatically because of the reduced need of the timber sale program for road construction and maintenance.
- Most of the mining claims, operations, and proposals in the decision area are in the Medford District. All of the mining operations or proposals are for lode or placer gold.
- This revision of the RMP provides a mechanism to allow notice level mining proposals in critical habitat for threatened and endangered species, to remain at the notice level, as opposed to requiring a plan of operations.
- There is ongoing interest in Coal Bed Natural Gas, which is an unconventional-type of petroleum deposit, adjacent to federal lands in the Coos Bay District. Identification of any source of unconventional-type petroleum deposits allows the nation to develop, on BLM-administered lands, this domestic source of energy.

- There are no oil, gas, or coal leases in the decision area. However, oil and gas prospects, including unconventional-type petroleum deposits, have been identified and could serve as a potential for a domestic source of energy.
- Abandoned mines with physical and environmental hazards requiring remediation are scattered throughout western Oregon.

Current Conditions And Context

The planning area contains five physiographic provinces: Coast Range, Klamath Mountains, Willamette Valley, Cascade Mountains, and the Basin and Range. The unique geologic origins and morphology of each province controls the potential for mineral occurrences. The Coast Range province shoreline depositional basin has high potential for the accumulation of natural gas and Coal Bed Natural Gas. The Cascade province has a moderate potential for geothermal energy and isolated moderate potential for hydrothermal metallic deposits. The Klamath Mountains province has a high potential for hydrothermal metallic deposits and secondary enrichment zones that can give rise to downstream placer deposits. The Basin and Range province has a high potential for geothermal resources and may have potential for natural gas in lake-filled basins.

Metal mines and prospects are primarily located in the Klamath Mountains province. The Department of Geology and Mineral Industries has issued just over 100 mining permits for precious metal mining in the planning area. These permits are for the removal of more than 5,000 cubic yards per year or for sites over one acre in size. The majority of the permits are for gold, and about ten are for silver, platinum, nickel, copper, or chromium. Other permits were for mercury, uranium, zinc, and lead. About 65 permits are in Josephine County, 20 are in Douglas County, and 15 are in Jackson County, with less than 10 in the remaining counties within the planning area. Overall, only a handful of the permits are still open.

The Coos Bay and Salem Districts have the most potential in the decision area for oil and gas, with a potential rating of moderate to high for occurrence and low to moderate for resource development. The Eugene and Roseburg Districts have a moderate potential for occurrence and a low potential for development. The Medford District and the Klamath Falls Field Office have low potential for oil and gas occurrence and development. The Coal Bed Natural Gas located in Coos County has a high potential for occurrence and development potential is moderate to high.

Salable Minerals

The Minerals Materials Act of 1947 (30 U.S.C. §601), provides the BLM the authority to dispose of (i.e., sell) sand, gravel, and other mineral materials. The development of these salable minerals is necessary to meet public, private, and governmental demands and infrastructure needs. BLM has discretion over the development and utilization of aggregate sources, therefore a “withdrawal” from these activities in a land use delegation is not necessary to limit development. Regulations addressing cost recovery for certain actions went into effect in 2005.

The BLM›s policy is to make mineral materials available to the public and local governmental agencies whenever possible and wherever environmentally acceptable. BLM sells mineral materials to the public at fair market value. The BLM does not charge states, counties, other government, or non-profit entities for the value of the rock, but manages these transactions by Free-Use Permits.

Rock from BLM quarries is used for road construction/resurfacing, stream improvement projects, boat ramps, and other projects on public and private lands. BLM also uses rock quarry sites for aggregate stockpile sites, helicopter landings, disposal areas for side cast material (e.g., ditch cleanings and landslides), and logging deck areas. The public has used quarries primarily for the use of rock and gravel, but also for dispersed camping activities and shooting ranges.

There are over 400 inventoried rock quarries in the decision area, with the majority being in the Medford and Roseburg Districts and the fewest in the Klamath Falls Field Office. The BLM developed most of the quarries two to four decades ago in support of the timber sale program for road construction, road resurfacing, or the creation of stockpiles for road maintenance. Over twenty years ago, it was typical to utilize 20,000 cubic yards to 40,000 cubic

yards of rock from a single quarry for each timber sale. In the 1980s, the Medford District utilized an average of 600,000 cubic yards of rock per year in support of the timber sale program. This volume has decreased to an average of less than 10,000 cubic yards per year. In some parts of the planning area this reduced use of rock has led to quarries being left in an inactive state. This decrease in rock production has also meant the BLM has not been able to replenish many of the maintenance stockpiles; therefore, many stockpiles are currently dwindling or depleted.

Resurfacing of parts of the road network can become necessary because the crushed rock surfacing on roads wears away through time. Aggregate surfacing is one of the tools that helps reduce the transfer of sediment.

Locatable Minerals

The General Mining Act of 1872 (30 U.S.C. §22-42), opened the public lands of the United States to mineral acquisition by the location of mining claims. Mining claims are for locatable minerals, which include precious metals (gold, silver, nickel, mercury, and uranium), nonmetallic minerals (fluorspar and gemstones) and uncommon variety minerals (certain limestone, and silica). Unlike salable or leasable minerals, a royalty is not collected on locatable minerals. Regulations addressing cost recovery for certain actions went into effect in 2005 and was updated in 2012. A mining claim gives the owner a possessory interest in the minerals and the claimant is entitled to utilize as much of the surface of the land as is reasonably incident. The BLM can manage the surface of a mining claim as long as it is done in a manner that does not endanger or materially interfere with prospecting, mining or processing operations on the claim (30 U.S.C. §612). Prior to implementing certain actions (for example the addition of wood logs into streams for habitat enhancement projects), the BLM should coordinate with any mining claimants to avoid conflicts.

Mining actions are divided into three levels: casual use activities, notice-level activities, and plans of operations. All levels of mining require reclamation, adherence to the BLM surface regulations, and for the claimant to acquire all necessary state and federal permits.

Casual use: Activities that result in no or negligible disturbance of public lands or resources. This level of mining includes the collection of geochemical, rock, soil, or mineral specimens using hand tools, the use of metal detectors and hand panning, non-motorized sluicing, or some types of suction dredging. The claimant does not need to notify the BLM of his activities. The state regulates suction dredging, and the number of permits issued for this activity increased, statewide, from 934 permits in 2009 to 1,941 permits in 2012. The state issued nearly 30 percent of suction dredge permits in 2012 to non-Oregon residents. The majority of the permits are for southwest Oregon. In 2009, California issued a moratorium on suction dredging, likely increasing the interest in Oregon.

Notice level: Activities in which a claimant must submit a complete notice of their operation fifteen calendar days before commencing exploration with a surface disturbance of five acres or less. Notice-level activities are also restricted to the processing of less than 1,000 tons of presumed ore. The notice is non-discretionary, not approved by BLM, and does not require NEPA analysis. BLM has fifteen days to review a notice and a bond is required. In any of the following special areas, a claimant must submit a proposal as a "plan of operations" (see below), rather than a notice:

- Areas in the National Wild and Scenic Rivers System, and areas designated for potential addition to the system
- Areas of Critical Environmental Concern
- Areas designated as part of the National Wilderness Preservation System and administered by BLM
- Areas designated as "closed" to off-road vehicle use, as defined in 43 CFR §8340.0–5
- Any lands or waters known to contain Federally proposed or listed threatened or endangered species or their proposed or designated critical habitat, unless BLM allows for other action under a formal land-use plan or threatened or endangered species recovery plan
- National Monuments and National Conservation Areas administered by BLM

Plan of Operations: Activities in which a claimant must submit a plan and obtain the BLM's approval before beginning operations with a surface disturbance greater than five acres, any bulk sampling in which the claimant will remove 1,000 tons or more of presumed ore, and activities defined as actual mining, not exploration. Claimants must submit a plan any surface disturbance greater than casual use in the special areas described above. The BLM has thirty days to review a plan for completeness and a bond is required. Unlike a notice, approval of a plan of operations is a discretionary action and requires NEPA analysis and a decision by the BLM.

Revisions to the Surface Management regulations (43 CFR §3809) in 2001 require a claimant to submit a plan of operations for any proposal causing surface disturbance greater than casual use in any lands or waters known to contain Federally proposed or listed threatened or endangered species or their proposed or designated critical habitat, unless BLM allows for other action under a formal land-use plan or threatened or endangered species recovery plan. This regulation was not in effect until after approval of the 1995 RMPs. In the Medford District, all of the pending plans and approximately half of the notices are in designated critical habitat for the northern spotted owl, Southern Oregon/Northern California Coast coho salmon, Oregon Coast coho salmon, or various botany species.

The majority of the mining claims, operations, or pending operations are in the southwest portion of the decision area (Table 21). The number of mining claims has remained relatively constant for all the districts since 2005, with the exception of the Medford District, where an additional 202 mining claims are currently located. The Roseburg and Medford Districts have a handful of expired notices that may need reclamation.

It is unknown how much revenue that mining activities on BLM-administered lands contribute to the economy of the planning area; there are a few mining shops in the region that mining activities on BLM-administered land might help support. Recreational mining, particularly suction dredging for which about 500 state permits were issued to out-of-state miners, likely adds to the economy through hotels, restaurants, gas stations, campgrounds, and shops. The BLM does not collect information on the value of precious metals recovered from mining claims.

All of the mining operations and proposals in the decision area are for lode or placer gold and typically range in size from less than one acre to three acres. Most of the placer mines are in riparian areas, and the lode mines tend to be on hillsides and ridge tops. Statewide, covering all ownerships, there are thousands of active, historic, and prospective gold mines. Most the sites are in the southwest or northeastern area of the state.

Any withdrawal from appropriation under the mining laws is subject to the valid existing rights of any current mining claimants. However, no new mining claims can be located in a withdrawal. A withdrawal is the only mechanism to remove lands from future mineral entry. Congress can designate withdrawals, or the BLM can undertake a withdrawal process with a decision signed by the Secretary of Interior. An RMP decision does not automatically withdraw Riparian Areas or Riparian Management Area land use allocations from mineral entry.

A patented mining claim is tone for which the Federal Government has passed its title to the claimant, making it private land. Congress imposed a moratorium for processing most mineral patents in 1994. There are less than twenty mineral patents still being processed nationwide: four of these cases are located in the Medford District.

TABLE 21. MINING CLAIMS, NOTICES, PLANS OF OPERATIONS, AND RECREATIONAL MINING IN THE PLANNING AREA

District/Field Office	Mining claims 2005	Mining claims 2013	Notices Authorized	Notices Pending	Plans Authorized	Plans Pending	Recreational Gold Mining Sites
Coos Bay	26	38	1	0	0	0	1
Eugene	36	36	1	0	0	0	1
Klamath Falls	3	1	0	0	0	0	0
Medford	638	840	24	3	2	8	4
Roseburg	119	123	0	0	1	0	1
Salem	9	7	1	0	0	0	2

Leasable Minerals

The Mineral Leasing Act of 1920 (30 U.S.C. §181), and the Mineral Leasing Act for Acquired Lands of 1947 (30 U.S.C. 351), gives the BLM responsibility for oil and gas leasing on BLM-administered lands, National Forest, and other federal lands, as well as private lands where the federal government has retained mineral rights. There is no current BLM oil, gas, or coal leases, including for unconventional-type petroleum deposits, in the decision area, but there have been historically.

There are current state and county leases, as well as private agreements, in areas such as the Coos Basin. The Coos Basin is an unconventional-type petroleum deposit in which there may be coalbed methane deposits. These lands are adjacent to federal lands. Private investors have obtained and preserved leases of state and county lands; they have also obtained rental agreements with private landholders. These investors have constructed wells and have conducted tests of hydraulic fracturing (i.e., fracking). The State of Oregon has issued water discharge permits, and discharge infrastructure is currently in place.

Oregon has a designated natural gas field, the Mist Gas Field, outside of Jewell, Oregon (Columbia/Clatsop County). This area has active drilling, production, and storage of natural gas on state and county leases, as well as private lands. Active exploration continues outside of the developed resource in the Mist Field. There are other prospects in western Oregon that have had historic interest, as well as offshore and near shore basins that have had recent interest. The Mist Gas Field in Columbia County is the only producing natural gas field in the Pacific Northwest and total natural gas production has exceeded $120 million. In addition, three depleted gas reservoirs at the Mist Gas Field store 14 billion cubic feet of imported pipeline gas during the summer to meet peak demands during colder months. Hydraulic fracturing has not been necessary for the Mist Gas Field because the wells tap into porous sandstone in which the gas moves easily.

Mineral leases can include the stipulations of no surface occupancy, conditional surface use, or timing restrictions to protect surface resources. Leasable minerals can also be withdrawn; however, the leasable minerals could be removed by an adjacent operation potentially allowing for drainage of the Federal estate.

Abandoned Mine Lands

The BLM currently has an inventory of over 500 known abandoned hard rock mines on public lands in western Oregon. Several district inventories are underway to determine the actual number of sites and extent of physical and environmental issues. Over 200 hard rock mines have been identified as having potential physical safety hazards and three have been identified as having environmental hazards. It is estimated there may be over 1,000 abandoned mine land sites on BLM-administered land in Oregon that have not been properly evaluated for physical and environmental hazards. A more complete inventory will allow prioritization of sites for physical and environmental remediation. The main historical mining areas in western Oregon are located in the southwest part of the state around Medford, Grants Pass, and Roseburg.

Trends And Forecasts

Salable Minerals

Additional resurfacing of logging roads and the replacement of maintenance stockpiles above the current level would require larger volumes of rock than currently used for most projects. This additional rock may come from BLM sources. Generally, most districts have not developed new rock sources in the last twenty years but are utilizing existing BLM or commercial quarries.

BLM rock resource development can be dependent on private and public timber harvest rates, infrastructure development, and urban growth and expansion. Aggregate production tends to be cyclical reacting to the levels of activity in private and public infrastructure projects, commercial, residential, and other construction markets. Statewide, the average amount of rock produced from 1997 to 2007 was 32 million cubic yards, this dropped to an estimated 20 million cubic yards from 2008 to 2011. The downward trend starting in 2008 was due to the recession. As the economy recovers, it is likely that aggregate production will increase statewide. The amount of rock utilized

from BLM quarries is small compared to the usage statewide. Some owners of commercial quarries that are located adjacent to BLM-administered lands are showing an interest in expanding their quarries onto BLM. This would be accomplished through a sale.

Locatable Minerals

The high price of gold, a poor economy, and the California suction dredging moratorium have sparked an interest in mining and suction dredging, primarily in the southwest region of the planning area. There is no indication of a future decrease in the precious metal market.

Within the decision area, each year the BLM receives or renews fifteen to twenty notices, and typically, less than five plans of operation. However, the number of notices has increased slightly in the last five years, and the number of plans of operation has increased significantly. An increasing number of mining proposals are expected be submitted in critical habitat.

Currently there are bills being introduced in the Oregon Senate that would limit suction dredging in various ways. Depending on the outcome, this could affect recreational use.

Leasable Minerals

There is an ongoing interest in coalbed methane on state, county, and private lands in the Coos Bay District. However, marketable development has not yet occurred. This is because of is the boom in natural gas production in other parts of the nation, making profits marginable for new speculation. If FERC (Federal Energy Regulatory Commission) approves the Pacific Connector Gas Pipeline and the Jordan Cove Natural Gas Export facility for gas exports, the export value of the Coos Basin coalbed methane resource may bring this site into production. If such value were to increase and become economical, interest in the Coos Basin would focus predominately on federal holdings, especially those lands without and existing lease.

Similar geology and structures like the Mist Gas Field exist under at least 9,000 acres of BLM-administrated surface estate southeast of the Field. These could be explored and developed in the future as economics dictate.

Abandoned Mine Lands

Inventories and remedial activities are scheduled to continue based on available funding. In Oregon, the highest priority for remediation is given to sites on BLM-administered land that affect water quality or endanger human life. Additional priorities include establishing partnerships with other state and federal agencies, identifying viable responsible parties, and minimizing the need for long-term remediation and monitoring. Priority sites that pose a risk to human health and the environment include:

- Metal-laden acidic drainage from mine openings and waste dumps
- Toxic mine tailings near recreation areas, or easily accessible by the public
- Mine tailings in stream channels
- Open shafts and adits accessible to the public and wildlife

Management Opportunities

Salable Minerals

Completed inventories of rock sources could be utilized to determine which quarries are depleted and need reclamation, which sites have sufficient room for the disposal of end haul materials (landslides, ditch cuttings or other materials), and which quarries are contributing to sedimentation delivery to creeks. Approximately 30 percent of existing quarries in the decision area are located in riparian areas. Often one of the best and most efficient ways to reclaim a rock source is to “develop to reclaim”, which means the quarry may need to be expanded to not only remove the desired amount of rock but to efficiently and safely reclaim it. This could also be accomplished through

multiple entries. Utilizing the existing rock quarry, even if expansion is necessary, often can be the most economical option to obtain rock required for the project. The geology, for example size and suitability of the rock deposit, along with the topography determines where a rock source can be located; often the existing site (possibly in a riparian area) is the only possible location for a rock quarry in the area. The development of a quarry is a capital improvement and many have reserves that will last the BLM multiple decades.

The Salem and Medford Districts have designated a few rock sources for the public to purchase small amounts of rock, without the utilization of heavy equipment, for landscaping and other uses. This is a popular service to the community, and the Medford District sells forty to sixty permits a year. Other Districts could consider a similar program.

Quarries that are close to the urban interface, county or federal roads could be an economically efficient source for private developers, the Federal Highway Administration, and Oregon Department of Transportation. The BLM could analyze these sites for these probable future needs.

Locatable Minerals

The BLM could develop management direction within the RMPs that would allow BLM to process mining notices that are located in designated or proposed critical habitat at the notice level of review, instead of requiring a plan of operation (43 CFR §3809.11).

Leasable Minerals

Since energy development is a high priority for the administration, the BLM could address development of these resources, including unconventional-type petroleum deposits or natural gas, in this RMP.

Abandoned Mine Lands

Management objectives and direction could address prioritization of remediation on abandoned mine sites with physical and environmental hazards. They could also address development of mine waste repositories on public lands to contain contaminated mine tailings at abandoned mine sites that meet hazardous waste exclusion criteria in 40 CFR §261.4 (b)(7).

Paleontological Resources

Key Points

- Paleontological resources are distributed unevenly across the planning area, but occur on all of the Districts and the Klamath Falls Field Office.
- The academic community has studied a few significant paleontological localities.
- Archaeologists are not trained to identify paleontological resources and typically do not survey for localities.

Current Conditions And Context

Paleontological resources include the fossil remains of plants (leaves and wood), vertebrates (animals with backbones), and invertebrates (animals without backbones). They also include the traces of animals or plants, such as the tracks or claw marks and skin impressions. Paleontological resources may also include geological settings where fossils are known to occur, or where processes important in the formation of fossils have been identified.

Fossils are considered fragile and non-renewable resources, and are susceptible to damage from weathering and erosional processes as well as from public and federal land management activities. Locations on the ground where fossils occur are known as localities, not sites. Most of the significant paleontological localities in Oregon are found on the east side of the state. However, there are scattered fossil localities within the planning area. Significant

paleontological finds are considered those that can provide data on the taxonomy and phylogeny of ancient organisms or information on paleoecology and the nature of paleo-environments. They can be either especially productive localities or localities where relatively rare fossils are located. Isolated localities are considered to be where only one type or specimen may have been found.

The primary resource indicator for paleontological resources is the characteristics of the fossil locality or feature that gives it importance and value for scientific or educational use. Natural weathering, decay, erosion, and improper or unauthorized removal can damage those characteristics that make the paleontological resource scientifically important.

Paleontological resources are managed in accordance with the Paleontological Resources Preservation Act of 2009 (PL 111-011) and BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management). In accordance with this handbook, locations likely to contain vertebrate fossils or exceptional invertebrate or plant fossils are to be identified on BLM-administered lands. The collection of vertebrate or other scientifically important fossil specimens, including trace fossils on BLM-administered lands is regulated by a permit system. Qualified paleontologists and academic institutions can obtain permits from the BLM for collecting. Permits are not necessary for most invertebrate and plant fossils as the public is allowed to collect reasonable amounts for personal use. The rules for the collection of petrified wood are addressed in 43 CFR §8365.

There are a number of geologic formations that occur across the five districts and field office, all of which span the Mesozoic and Cenozoic Eras (approximately 213 – 2 million years ago). The majority of paleontological resources within these formations are invertebrates and plants. Although vertebrate fossils are relatively less common, there are isolated occurrences of vertebrates that have been found mostly in cave settings within the planning area. There have also been trace fossils found in caves. The most prominent time period represented by vertebrate fossil localities within the planning area date from the late Miocene to early Pliocene epochs (approximately 23 million years to 1.8 million years ago, while the time frames for plants and invertebrates covers the Jurassic and Tertiary periods. There has been some marine mammal fossils dated from the Mesozoic epoch reported from the coastal areas; these are in addition to a small sample of terrestrial mammals from the late Cenozoic epoch.

Paleontological resources are scattered across the planning area, but every district has some. Reported paleontological localities on BLM-administered lands in the planning area include significant as well as isolated finds. Significant finds have been identified in the Eugene and Salem Districts along the margins of the Willamette Valley. Scattered localities are also found in the Coos Bay, Roseburg, and Medford Districts. The condition of these localities is unknown as BLM archaeologists are typically not trained to identify or monitor paleontological resources. Although management direction for paleontological sites is avoidance and preservation, there is little to no actual management of these localities. Typically, localities would be avoided during project implementation if they were identified. No surveys are conducted for the sole purpose of identifying paleontological localities. There have been several formal academic studies undertaken within the planning area, including studies that focused on paleo-climate change.

Trends And Forecasts

Paleontological resource localities will continue to be exposed and affected by ongoing natural processes and erosion resulting from human activities. Projected increases in OHV and other recreational activities may contribute to increased exposure and risk of damage to paleontological resources. Increased exposure may contribute to unauthorized collection activities or vandalism in fossil localities.

Although some BLM archaeologists have been trained to recognize fossils and identify localities, the majority are not trained as paleontologists. Because of this, there is a lack of survey and recognition of paleontological resources across the planning area. There are, however, a number of publications and maps that discuss and identify paleontological resources and their locations, and more are being produced each year. This may lead to increased public awareness of these resources.

Management Opportunities

Management activities to identify and protect sensitive fossil areas or to mitigate impacts to paleontological resources could reduce overall impacts to sites. BLM archaeologists could use a variety of sources to identify potential areas of paleontological resources and focus on those areas to prioritize surveys. These resources include geological maps and reports, soil surveys and other geological or paleontological investigations, reports and reference materials. The BLM could also designate Resource Natural Areas (RNAs) and Areas of Critical Environmental Concern (ACECs) to protect significant finds of paleontological resources.

Rare Plants and Fungi

Key Points

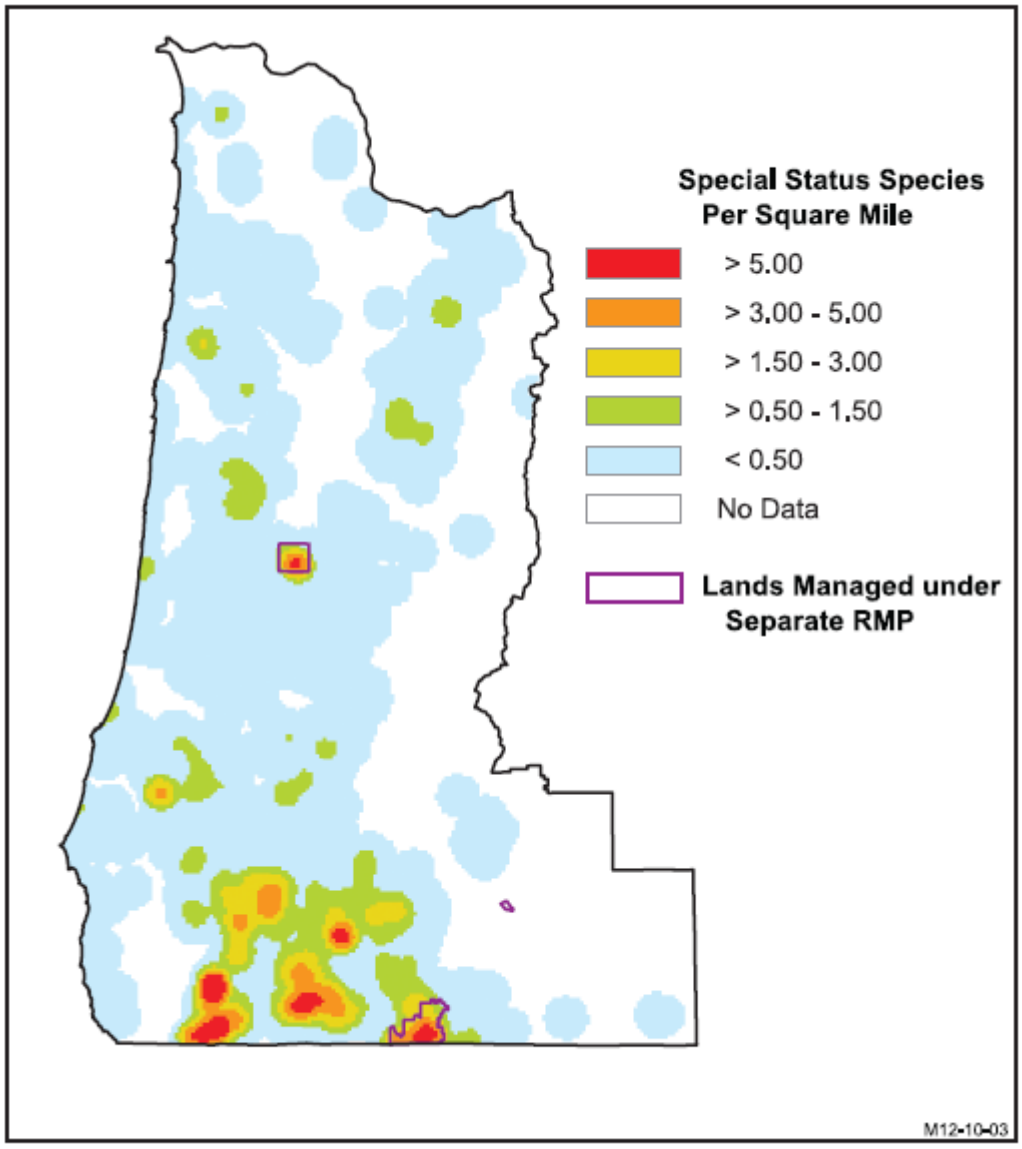
- Rare plant and fungi species are not evenly distributed across the landscape. Some species are specialists and associated with a discrete habitat feature or plant community. Other species have wider amplitude and can be found in different plant communities or on different substrates.
- Conservation plans provide a management framework and may prevent special status species from becoming federally listed. Conservation plans integrating rare flora occupying similar habitat can streamline planning and management strategies.
- Active management is necessary to maintain and improve habitat conditions for many special status species and rare plant communities.
- There have been many changes to the special status species and survey and manage lists over the last several years. Species Fact Sheets, Conservation Assessments, and Conservation Strategies available through the Interagency Special Status/Sensitive Species program for many of the species on both of these lists aid in management of these species.

Current Conditions And Context

The planning area includes a broad range of plant communities including coastal sand dune and strand, grasslands, oak woodlands, and forest communities. Within the state of Oregon, there are more than 4,615 recognized taxa of vascular plants. Likewise, there is an incredible diversity of non-vascular plants (bryophytes and lichens) and fungi within the planning area; however, there is not a single comprehensive list of these organisms because scientists have not studied and catalogued these species as well as vascular plants. The overall diversity of plants and fungi within the planning area is reflected in the number of species included on the BLM's Special Status Species list: 179 vascular plants, 41 bryophytes (mosses and liverworts), 22 lichens, and 27 fungi. Included on the Special Status Species list are federally listed, proposed, or candidate species, Oregon State listed, and Bureau Sensitive and Strategic species. Within the Northwest Forest Plan area, species considered rare and thought to be associated with late-successional or old-growth forests receive special management attention under the Survey and Manage Mitigation Measure Standards and Guidelines. Some, but not all, of the survey and manage species qualify for inclusion on the BLM's special status species list. Of the 152 Survey and Manage species within the planning area, 28 are also on the Bureau Sensitive list and an additional 40 are on the Bureau Strategic list.

Rare plant species are not evenly distributed across the landscape. "Hot spots" are areas of high special status species richness and density. "Hot spots" can occur at fine spatial scales, such as special habitat features (meadows, wetlands, rock outcrops, and other non-forested areas), and at larger geographic scales where high levels of endemism occurs on the broader landscape level. Figures 8 and 9 show "hot spots" of special status plant site density and survey and manage species on BLM-administered lands, respectively. These figures are based upon data in the BLM's Geographic Biologic Observations (GeoBOB) database. Because the BLM does not have complete botanical surveys, these figures show relative density of special status species sites based upon current data. Both Table 23 and Figures 8 and 9 indicate that the greatest abundance and density of special status plant species within the planning area is within the Medford District. This is because the Medford District lies primarily within the Klamath Province

FIGURE 8: SPECIAL STATUS SPECIES



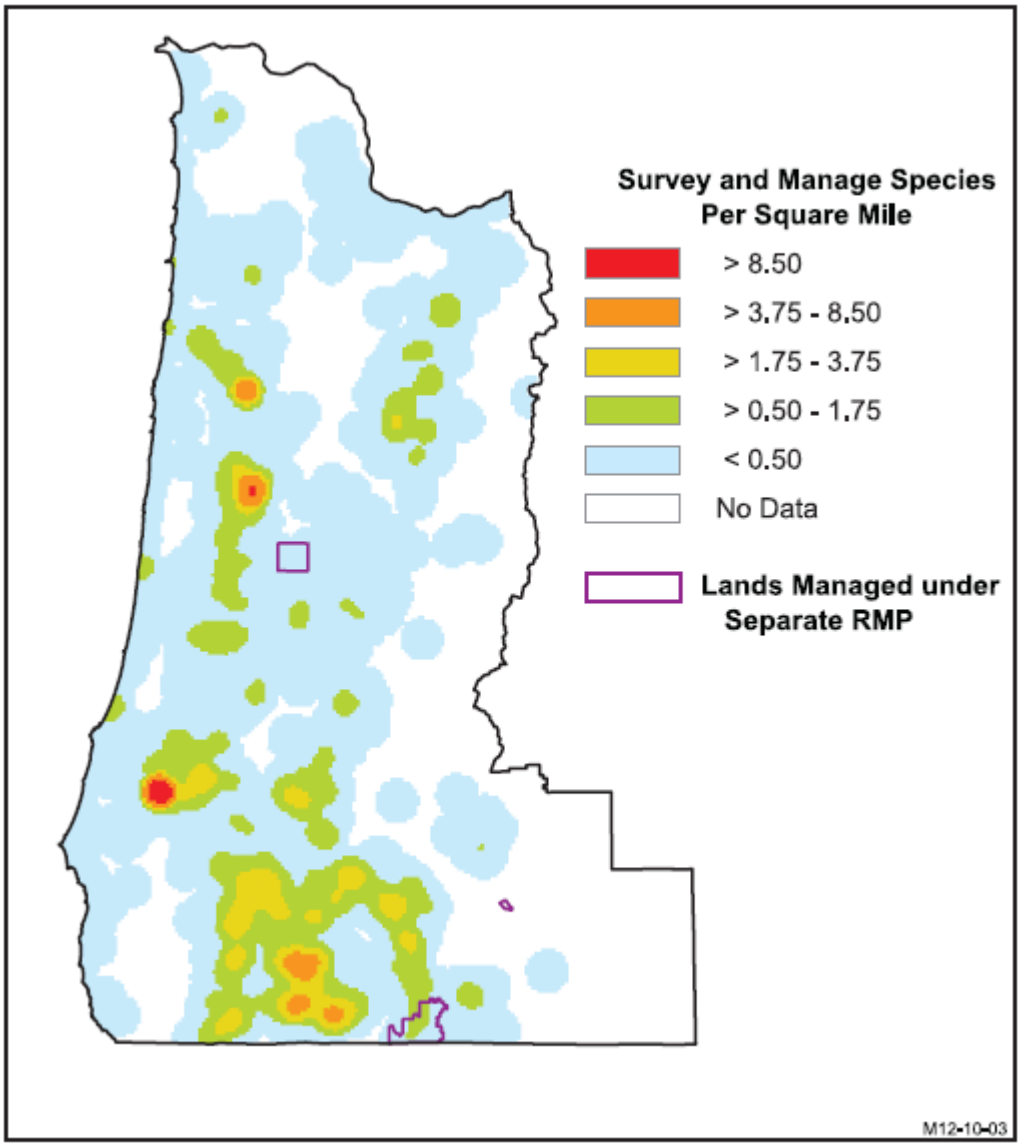
that has the highest total species richness of any province within the planning area. The complex geology of the Klamath Province supports diverse plant communities.

Federally Listed Species

There are 13 federally listed and one candidate plant species within the planning area. The BLM documents nine of these species on BLM-administered lands (Table 22). Critical habitat has been designated for four of the federally listed plants. Recovery plans are available for all of the federally listed plants within the planning area.

All but two of the federally listed species in the planning area occur in habitats uncommon in the planning area: wetlands, meadows, oak woodlands, or rocky areas (Table 23). The two remaining species – Gentner's fritillary and Kincaid's lupine – occur in mixed woodlands and hardwood/conifer habitat. Most occupied sites are very small: approximately 74 percent of all sites occupy approximately 1/10th of an acre or less or comprise less than ten individuals.

FIGURE 9: SURVEY AND MANAGE SPECIES



The federally listed plant species sites are not only very small on average but their habitat is fragmented and they are separated by long distances that impede cross-pollination and gene flow. As a result, many of the sites are at risk for inbreeding depression, which is the reduction of fitness and vigor caused by the mating of closely related individuals (USFWS 2010; 2012).

Bureau Sensitive and Strategic Species

The BLM Special Status Species program is designed to conserve rare species and their habitats, promote their conservation, and reduce the likelihood and need for species to be listed under the Endangered Species Act. The BLM Manual 6840 (Special Status Species Management; revised in 2008) provides policy guidance and includes specific implementation actions such as surveying BLM land for special status species; monitoring special status species populations and habitats; and developing conservation strategies to meet these program objectives. While the special status species policy applies to all lands managed by the BLM, according to the 6840 Manual: "The application of the special status species policy to provide specific protection to species that are listed by the BLM

Table 22. Federally listed plants within the planning area

Scientific Name	Common Name	Federal Status	Designated Critical Habitat	General Trend
Astragalus applegatei	Applegate's milk-vetch	Endangered	No	Declining
Erigeron decumbens var. decumbens	Willamette Valley daisy	Endangered	Yes	Stable
Fritillaria gentneri	Gentner's fritillary	Endangered	No	stable
Lillium occidentale	Western lily	Endangered	No	stable
Limnanthes pumila ssp. grandiflora	large-flowered wooly meadow-foam	Endangered	Yes	declining
Lomatium bradshawii	Bradshaw's desert parsley	Endangered	No	stable
Lomatium cookii	Cook's lomatium	Endangered	Yes	declining
Plagiobothrys hirtus	Rough popcorn flower	Endangered	No	stable
Castilleja levisecta	Golden paintbrush	Threatened	No	unknown
Howellia aquatilis	Water howellia	Threatened	No	unknown
Lupinus oreganus	Kincaid's lupine	Threatened	Yes	stable
Sidalcea nelsoniana	Nelson's checker-mallow	Threatened	No	stable
Calochortus persistens	Siskiyou mariposa lily	Candidate	No	unknown

Table 23. Occurrences of federally listed plants and their associated habitats within the planning area

Scientific name	BLM Sites (#)	Districts/Field Offices with Known or Potential Habitat	Habitat	Comments
Astragalus applegatei	0	Klamath Falls	Interior alkali grassland	Endemic to Klamath County
Erigeron decumbens var. *decumbens*	5	Eugene, Salem	Wet prairies	BLM sites are within West Eugene Wetlands.
Fritillaria gentneri	198	Medford	Woodland and forest openings and edges	Sites are very small and BLM has worked to augment sites since 2002. 36 of BLM sites are within Cascade-Siskiyou National Monument.
Lillium occidentale	1	Coos Bay	Bogs or coastal scrub on poorly drained soils within 4 miles of coast in SW OR and NW CA	One natural site on Coos Bay District and one introduced site that is not yet established
Limnanthes pumila ssp. *grandiflora*	0	Medford	Valley bottom vernal pools in gravelly swales and mounds	Documented on adjacent non-federal lands in a limited portion of the Rogue Valley
Lomatium bradshawii	7	Eugene, Salem	Wet prairies	BLM sites are all within the West Eugene Wetlands
Lomatium cookii	35	Medford	Seasonally wet meadows and oak woodlands; in Josephine County on serpentine influenced soils	Largest BLM populations in and adjacent to French Flat ACEC, but threatened by mining and illegal OHV use
Plagiobothrys hirtus	3	Roseburg	Wet meadows	BLM populations are introduced within the North Bank Habitat Management Area.
Castilleja levisecta	0	Eugene, Salem	Gravelly prairies at low elevations	Considered extirpated from Oregon. Potential for re-introduction in Eugene District
Howellia aquatilis	0	Salem	Low elevation ponds or sloughs, submersed or partially floating on the surface of slow moving water	Considered extirpated from Oregon. Historic sites from Multnomah, Clackamas, and Marion Counties
Lupinus oreganus	15	Eugene, Roseburg	Meadows, mixed woodlands, hardwood/conifer	5 of BLM sites are within the West Eugene Wetlands
Sidalcea nelsoniana	1	Salem	Meadows	Walker Flat ACEC
Calochortus persistens	1	Medford	Rocky open areas within conifer forests	Mostly known from northern California, BLM population is very small (less than 10 individuals).

TABLE 24. PLANT AND FUNGI SITES BY STATUS AND TAXONOMIC GROUP

Districts/Field Office	Bureau Sensitive* (# of sites)				Bureau Strategic (# of sites)				Total
	Bryophytes	Lichens	Vascular Plants	Fungi	Bryophytes	Lichens	Vascular Plants	Fungi	
Coos Bay	14	128	195	19	57	10	11	57	491
Eugene	8	23	92	8	7	19	1	24	182
Klamath Falls	0	0	53	6	0	0	2	4	65
Medford	9	0	2,918	11	35	165	48	38	3,224
Roseburg	1	40	103	9	5	18	0	18	194
Salem	16	171	29	102	3	14	0	73	408
Total	48	362	3,390	155	107	226	62	214	4,564

* DOES NOT INCLUDE FEDERALLY LISTED SPECIES

as sensitive on lands governed by the O&C Act must be consistent with timber production as the dominant use of those lands." The special status species policy directs each BLM State Director to establish special status species lists. In Oregon, the Bureau (BLM) Sensitive and Strategic Species lists are tied directly to the Oregon Biodiversity Information Center's list of rare, threatened, and endangered species of Oregon. The BLM updates the sensitive and strategic species lists approximately every two years.

In 2004, the BLM and Forest Service established an interagency program for the conservation and management of rare species in Oregon and Washington known as the Interagency Special Status/Sensitive Species Program (ISSSSP). The ISSSSP has funded a number of inventories, monitoring projects, and the development of species fact sheets and conservation assessments that aid in the management of special status species.

Table 24 lists the number of known special status plant and fungi sites per district. Sites range in size from just one or a few individuals that occupy much less than 1/10th of an acre to thousands of individuals that comprise several acres. Nearly 90 percent of the known special status plant and fungi sites are less than one acre.

Survey and Manage

The survey and manage mitigation measure standards and guidelines apply to the BLM and Forest Service lands within the Northwest Forest Plan area. The agencies adopted the survey and manage standards and guidelines late in the development of the Northwest Forest Plan to conserve rare and little known species thought to be associated with late-successional and old growth forests. Some species require pre-project surveys and prescribed management actions if found.

In 2001, the agencies amended the standards and guidelines to account for new species information and clarify the standards and guidelines. The 2001 amendment also established an Annual Species Review, an adaptive management process for removing or adding species and changing management categories. There are six categories of survey and manage. The categories consider species relative rarity, their level of association with late-successional/old-growth forests, and if pre-disturbance surveys are practical. In 2004, the agencies signed a Record of Decision that removed the survey and manage standards and guidelines from the Northwest Forest Plan. The agencies added the survey and manage species that qualified to the existing Forest Service Sensitive Species list and the BLM special status species list. Legal challenges to the 2004 Record of Decision resulted in a Court order in 2006 to set aside the 2004 ROD and reinstate the 2001 ROD. The Court did allow for four exemptions, referred to as the "Pechman Exemptions," to the application of the survey and manage Standards and Guidelines. Habitat-disturbing projects could occur in the following four categories without the application of the survey and manage mitigation measure:

1. Thinning in forest stands younger than 80 years of age

2. Culvert replacement/removal

3. Riparian and stream improvement projects, and

4. Hazardous fuels treatments which apply prescribed fire

The agencies responded to the Court order by preparing additional NEPA documents to address inadequacies in the 2004 EIS and ROD, which ultimately resulted in the Record of Decision and Final Supplemental EIS to Remove or Modify the Survey and Management Mitigation Measure Standards and Guidelines in 2007. This new 2007 ROD met with more legal challenges and in 2009, the presiding judge issued an Order granting Plaintiffs' motion for partial summary judgment. Plaintiffs and Defendants met in person throughout 2010 to identify principles for a settlement agreement. The parties filed a final Settlement Agreement in March 2011; however, in April 2013, the 9th Circuit Court reversed the District Court's 6 July, 2011, approval of the Settlement Agreement. The 9th Circuit has remanded the case back to the District Court for further proceedings on remedy consistent with its opinion.

The agencies are currently implementing the 2001 ROD as modified by the Pechman Exemptions. The number of Survey and Manage species is listed in Table 25.

For category A and C species, pre-disturbance surveys are required and any found sites would be managed. Strategic surveys are conducted for category B, D, and F surveys with management of identified sites while category F species have strategic surveys only. Strategic surveys are landscape-scale surveys designed to collect information about a species, including its presence and habitat and are required for all survey and manage species. The standards and guidelines specified that if strategic surveys were not completed for Category B species in fiscal year 2006 (fiscal year 2011 for fungi), then surveys equivalent to pre-disturbance surveys would be required prior to management disturbance in old-growth habitat. "Equivalent effort" surveys are required for two lichens, four bryophytes, and all Category B fungi species prior to disturbance in old-growth forests, as defined by the Northwest Forest Plan. Either the fungi equivalent effort survey protocol requires one-year or two-year surveys with four visits to the project site each year of the survey (two visits in the spring and two visits in the fall).

Rare Plant Communities

Plant communities that are less common in the planning area, such as oak woodland, serpentine meadows, serpentine wetlands (fens), vernal pools, and grasslands, generally support a higher density of BLM special status plants and fungi than conifer forests. Invasive species and the exclusion of fire have drastically altered many of these plant communities. Many of these non-forested plant communities are subject to encroachment of conifers. Without active management, the conifers will shade out oak trees and take over meadows, resulting in a successional change to conifer forests. Degradation and potential loss of rare plant communities will result in a loss in overall species diversity and increase the likelihood that additional species will become rare enough to be included on the special status species list and may contribute to the need to list species pursuant to the Endangered Species Act.

TABLE 25. NUMBER OF SURVEY AND MANAGE SPECIES BY TAXONOMIC GROUP AND CATEGORY FOUND WITHIN THE PLANNING AREA

Taxa Group	Categories A & C	Categories B, D, & E	Category F	Totals
Fungi	1	205	5	211
Bryophytes	2	14	0	16
Lichens	11	32	9	52
Vascular Plants	11	0	0	11

Trends And Forecasts

The numbers of taxa on the special status species list will likely increase due to the identification of new taxa and new records discovered on the districts.

Loss of habitat in the urban interface, habitat-disturbing activities, increased recreational use, and habitat changes due to invasion of non-native species and climate change all threaten rare plants and fungi. Species endemic to special habitats or to a narrow geographic area are more susceptible to climate change than species that occur in habitats that are more widespread or have a larger range (Damschen 2010). Climate change models predict substantial losses of native plant sites, particularly those that are small and isolated (Dunwiddie and Bakker 2011).

Many new sites of survey and manage species have been found through project surveys. More species would likely be found through surveys, possibly diminishing the need for some species to maintain the special status species designation.

Management Opportunities

The BLM could increase collaboration with other public and private entities to meet recovery plan goals and de-list federally listed species or to avoid listing additional species. Collaboration could focus on providing protection to sites on BLM-administered land, increasing effectiveness of seeding and transplanting, and developing protocols for augmenting sites and facilitating migration.

Active management could benefit rare plant communities and habitat that supports special status species. Management could include thinning, removal of conifer encroachment, control of invasive species, retention of legacy components (e.g., large trees, snags, and down logs), and prescribed fire. The BLM may want to consider restoring lands that were former oak woodland, but now have converted to mostly conifer forest, back to oak woodland or mixed hardwood/conifer forest.

Creation of new special status species sites, augmentation of populations (transplanting individuals or seeding within existing populations), and facilitated migration (moving individuals or populations to unoccupied habitats) to combat the threat of habitat loss due to climate change are opportunities to consider to maintain rare plant and fungi species.

The BLM could consider options for managing current survey and manage species. Options include continuing existing management under the 2001 ROD; absorbing species that qualify into the special status species program and removing the survey and manage requirement from those that remain; applying survey and manage mitigation only in reserve areas; and implementing the terms of the vacated 2011 Settlement Agreement.

Degraded or disturbed areas could be re-vegetated with species appropriate to the native or historic plant communities. Several of the districts have developed sources of a few species of native grass seed to use for erosion control but do not have access to adequate quantities of forbs and other grasses to aid in restoration of disturbed sites. Development of suitable native plant materials could include objectives addressing the needs of native pollinators.

Recreation, Visual Resources Management, and the National Landscape Conservation System

Key Points

- Activity-specific recreation demand is increasing, especially on BLM-administered lands in close proximity to communities.
- The BLM will continue to produce diverse, high-quality recreational opportunities that support outdoor-oriented lifestyles and add to participants' quality of life, enhance the quality of local communities, and foster stewardship of natural and cultural resources. This planning effort will achieve this by integrating new management direction related to recreation and visitor services, while taking a community level approach to public engagement.
- The BLM will evaluate the benefits and impacts of Wild and Scenic River designation on eligible river segments in Western Oregon. The BLM will be determining the suitability of these segments for potential inclusion into the National Wild and Scenic Rivers System; segments found to be unsuitable will be removed from protective management.
- Resource management planning provides an opportunity to update off-highway vehicle area designations in order to improve off-highway vehicle management on BLM-administered lands.
- Direction for Visual Resource Management needs to be updated and modified to determine the appropriate Visual Resource Management objectives across the landscape, factoring in protection of visual values, other resource management priorities and desired outcomes.
- Resource management planning provides an opportunity to determine the presence or absence of wilderness characteristics in the decision area through wilderness characteristics inventories and to determine if these areas will be managed to protect their wilderness characteristics.

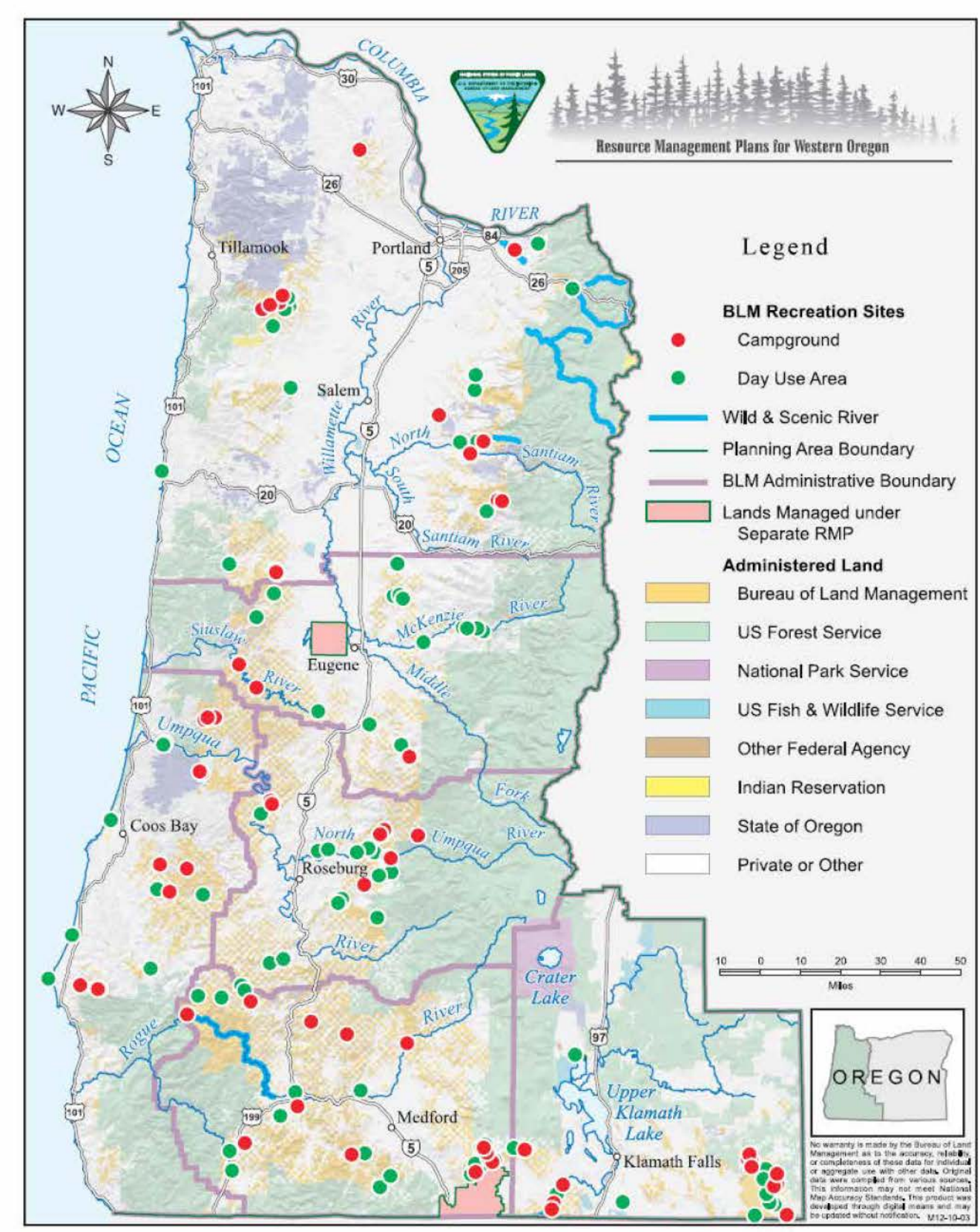
Current Conditions And Context

Recreation

BLM-administered lands in western Oregon provide opportunities for a variety of outdoor recreation activities and related benefits (Map 5). Many visitors view public lands as an escape from their day-to-day routines and as places for individual challenge and exploration, along with social development and an appreciation for the natural world. This broad spectrum of uses and activities provide for a diverse range of visitor needs and expectations. BLM–administered lands are not the sole provider of recreational settings and opportunities, and many additional opportunities exist on other federal, state, and county lands and at facilities throughout the planning area. An estimated 18 percent of all outdoor recreation participation in western Oregon occurs on BLM-administered lands.[4] For comparison purposes, BLM-administered lands account for 12 percent of all lands within the region.

Until recently, management of the BLM recreation program has been based primarily on providing a diverse array of programs that focus on specific activities. This activity-based management style was in response to the rapid growth in public lands recreational use and generally achieved the desires of the public and the goals of agency advocates. However, focusing on specific activities often caused the recreation program to function in isolation of other resources and interrelated functions. To counter this trend, the BLM transitioned recreation program management to an outcomes focused management approach that focuses on outcomes to individuals, communities, economies, and the environment. Benefits-based management integrates the management of recreation settings with desired recreation opportunities and benefits to these sectors.

[4]Outdoor recreation demand was estimated using visitor use data generated from BLM's Recreation Management Information System (RMIS 2012) and survery data collected for Oregon's Statewide Comprehensive Outdoor Recreation Plan (SCORP 2013). RMIS estimates arer for BLM-adminsitered lands only, whereas SCORP estimates apply to all lands in the region. 'Participation' was used for this comparison, which is defined as each time an individual engages in a single recreation activity.



Map 5: Recreation in the Planning Area

Recreation Management Areas

All BLM-administered lands within the planning area have intrinsic recreational value. However, not all these areas have recreation management objectives requiring specific management of those values. As such, Recreation Management Areas (RMAs) have been delineated to identify those areas with recreation management objectives; this is further refined as Extensive RMAs (ERMAs) and Special RMAs (SRMAs).

Under the 1995 RMPs, six percent of BLM-administered lands are identified as SRMAs, and all remaining BLM-administered lands (94 percent) are managed under the ERMA classification. Under the new policy, the ERMA designation changed purpose from those areas receiving only custodial management to areas with identified recreation objectives, managed settings and specifically detailed management actions and allowable uses. Recreation management within these areas is no longer only responsive to adverse conditions, but proactively seeks to facilitate visitor participation in targeted activities, eliminate potential use conflicts, and protect environmental resources. Although these areas require increased level of financial support and personnel, they are not the focus of the BLM's recreation management objectives.

The BLM issued new policy, direction, and guidance for planning for recreation resources as part of the land use planning process. New guidance focuses on the management of recreation settings to provide opportunities that allow visitors and local communities to achieve a desired set of individual, social, economic, and environmental benefits. The BLM now has a three-tiered system of designation for classifying lands for recreation purposes (SRMAs, ERMAs, and Areas Not Managed for Recreation)

The decision to identify Areas Not Managed for Recreation results from revised Recreation and Visitor Services Land Use Planning Guidance (BLM Manual 8320 – Planning for Recreation and Visitor Services, 2011). These areas essentially replace the custodial level of management assigned previously to the ERMA designation. Custodial management is reactive to problems and issues that arise, as opposed to proactively providing opportunities and directly managing the recreation resource. As the BLM does not specifically manage these areas for recreation, there are no identified or managed desired objectives for setting and targeted activities, benefits, and outcomes.

The planning area currently contains no areas identified as not managed for recreation. However, in areas where management focus is on other resources (e.g., timber management areas) or lands that are not publicly available (e.g., land-locked by private property or closed to the public), this designation would be suitable.

Special Recreation Management Area – SRMA is an administrative unit where the existing recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and distinctiveness as compared to other areas used for recreation. SRMAs are managed:

- To protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics
- As the predominant land-use focus, where specific recreation opportunities and recreation setting characteristics are managed and protected on a long-term basis

Extensive Recreation Management Area – ERMA is an administrative unit that requires specific management consideration in order to address recreation use, demand, and recreation and visitor services program investments. ERMAs are managed:

- To support and sustain the principal recreation activities and the associated qualities and conditions for which they were designated
- Commensurate with the management of other resource and resource uses

Travel Management Areas

Travel Management Areas (TMAs) have been delineated to address particular concerns and prescribe specific management actions for a defined geographic area. Either these are typically identified where motorized or non-motorized Travel and Transportation Management requires particular focus or there is increased intensity of management. TMAs are an optional planning tool to frame transportation issues and help delineate travel networks that address specific uses and resource concerns.

There is a direct link between recreation goals and outcomes and transportation planning. Specific indicators often result in a more detailed recreation based approach to travel management. These indicators can include increasing numbers of trails being built or maintained without authorization, trail impacts, and visitor conflicts.

Back-Country Byways

Back-Country Byways are corridors with high scenic, historic, archeological, or other public-interest values. They are primarily located on low-speed, gravel or paved roads designed for passenger vehicles that traverse the region's backcountry. In western Oregon, the BLM currently manages nine Back-Country Byways that total 233 miles.

Travel and Trail Management

The BLM manages 63 trail systems that total over 375 miles in western Oregon. Trail-based recreation opportunities in the region include trail systems for motorized and non-motorized users, providing a range of available activities across diverse settings. Popular activities include hiking, mountain biking, horseback riding, and Off-highway vehicle use.

Off-Highway Vehicle Designations

All public lands are designated as open, limited, or closed to motorized use:

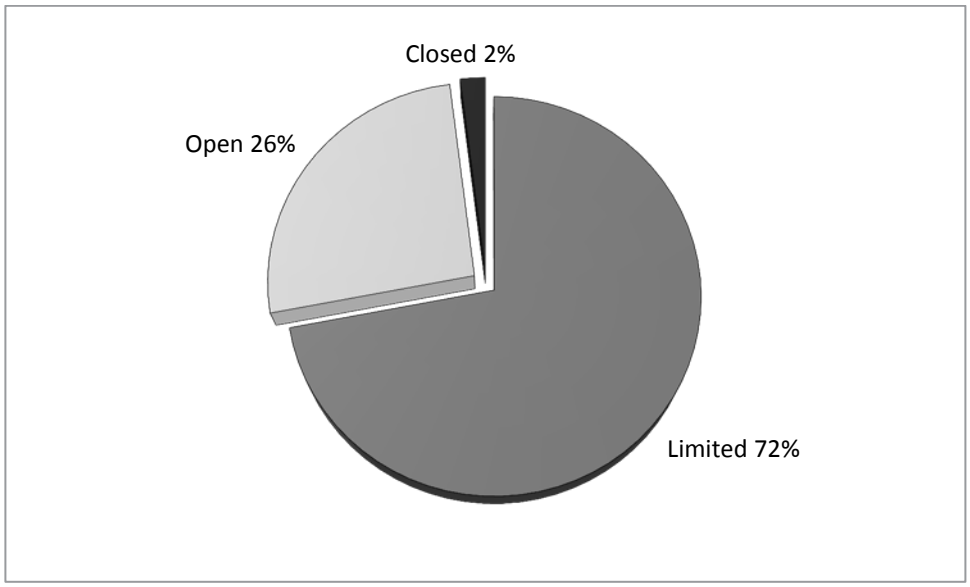
Open Areas – Areas where all types of vehicle use are permitted at all times, anywhere in the area and subject to certain operating regulations and vehicle standards. During the development of the 1995 RMPs, large tracts of BLM-administered lands were designated as open in the Medford District, Salem District, and Klamath Falls Field Office. Previously, large tracts of open land were not seen as an issue because off-highway vehicle use was low. Because of low use levels, there were no compelling resource protection needs, user conflict issues, or public safety concerns that warranted limiting cross-country travel. Currently, increasing levels of off-highway vehicle use in portions of these open areas have resulted in localized resource impacts, social conflicts between other recreation users and neighboring landowners, and safety concerns resulting from a lack of suitable off-highway vehicle opportunities for the public.

Limited Areas – Areas restricted at certain times, in certain areas, or to certain types of vehicles. The Eugene, Roseburg and Salem Districts and the Klamath Falls Field Office designated a majority of the 'limited' areas as limited to existing roads and trails. Since the BLM did not complete comprehensive route inventories at the times these designations were made, it is difficult to determine if new routes created by off-highway vehicle users actually 'existed' at the time of designation. Designating off-highway vehicle use to existing roads and trails also limits the BLM's ability to select which of these routes are in fact suitable for off-highway vehicle use. The Coos Bay and Medford Districts designated all limited areas as limited to designated roads and trails, allowing for the designation of specific off-highway vehicle routes.

Closed Areas – Areas where off-highway vehicle use is prohibited to protect resources, ensure visitor safety, or reduce user conflicts.

Under the 1995 RMPs, most lands were designated as limited to off-highway vehicles (Figure 10).

FIGURE 10. THE 1995 RMPS' OFF-HIGHWAY VEHICLE DESIGNATIONS



There has been a 7 percent increase in motorized recreation activity in western Oregon from 2008 to 2011. The level of growth in demand for off-highway vehicle use has exceeded what was projected on certain BLM-administered lands in the decision area.

Recreation Area Fee Revenue

The Federal Lands Recreation Enhancement Act of 2004 (PL 108-444), authorized the BLM and other federal agencies to implement fee collection activities at recreation sites across the country in order to offset operations and maintenance costs. All of the fees collected at BLM-administered recreation sites in the decision area are retained on site and used to pay for services including facilities maintenance, daily operations costs, visitor protection, resource protection and visitor information. The BLM charges standard and expanded recreation use fees at 40 developed campgrounds, day use, and group use sites in the decision area (Table 26).

TABLE 26. DEVELOPED CAMPGROUNDS, DAY USE AREAS, PERMITS AND USAGE FEES COLLECTED IN 2012 ON BLM-ADMINISTERED LANDS WITHIN THE PLANNING AREA.

District/Field Office	Recreation Use Fees ($)	Special Recreation Permit Fees ($)	Total ($)
Coos Bay	146,749	100	146,849
Eugene	43,855	1,530	45,385
Klamath Falls	81,804	72,093	153,897
Medford	141,208	240,543	381,751
Roseburg	96,808	2,679	99,487
Salem	645,702	2,065	647,767
Total Fees			**1,475,136**

Visual Resource Management

The BLM utilizes a Visual Resource Management system, in accordance with BLM manual 8400 (Visual Resource Management, 1984), for minimizing the visual impacts of surface-disturbing activities and maintaining scenic values for the future. It involves inventorying scenic values, establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to ensure conformance with visual resource management objectives.

Visual Resource Management designations in the existing RMPs need to be reviewed in light of the changing conditions related to outdoor recreation and tourism and the rapid growth and development of rural areas throughout western Oregon. Visual Resource Inventories will be updated as a component of the RMP process.

The Visual Resource Inventory involves identifying the visual resources of an area and assigning them to inventory classes using BLM's visual resource inventory process (BLM Manual H-8410-1 – Visual Resource Inventory, 1986). The process involves rating the visual appeal of a tract of land (Scenic Quality), measuring public concern for scenic quality (Sensitivity Level), and determining whether the tract of land is visible from key travel routes or observation points (Distance Zones). The BLM-administered lands are placed into one of four visual resource inventory classes based on the interrelationships among the three inventoried values.

In the Visual Resource Planning phase, visual values are considered in relation to other resource values to best ascertain the most appropriate Visual Resource Management class designation, factoring in protection of visual values, other resource management priorities and desired outcomes. The result of this process will be the establishment of new visual resource management classes (Class I – Class IV) for the decision area:

- Class I – Preserve the existing character of the landscape
- Class II – Allow for low level of change that retains the existing character of the landscape
- Class III – Allow for moderate level of change that partially retains the existing character of the landscape
- Class IV – Allow for major modification of the existing character of the landscape

Western Oregon BLM-administered lands have experienced population growth and development from 2004 to 2011. These lands have seen increased participation in outdoor recreation and tourism for local communities. Many rural communities rely on tourism to sustain their economies. As a result, the management of the scenic values of public lands has become a much more important aspect of natural resource management to the BLM. Direction for Visual Resource Management needs to be updated and modified to determine the appropriate Visual Resource Management objectives across the landscape, factoring in protection of visual values, other resource management priorities and desired outcomes.

National Landscape Conservation System

The BLM's National Landscape Conservation System (NLCS) encompasses approximately 27 million acres of Bureau lands scattered among 887 congressionally or presidentially designated units. The National Landscape Conservation System is also known as National Conservation Lands. The BLM National Landscape Conservation System was created in 2000 with the mission to "conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations. In western Oregon, the BLM currently manages the following NLCS units:

- The 100-acre Yaquina Head Outstanding Natural Area was the nation's first congressionally designated Outstandingly Natural Area. The site is one of the most accessible wildlife and ocean viewing locations on the Pacific coast. Yaquina Head Outstanding Natural Area extends out from the Oregon coast one mile into the Pacific Ocean and stands 93 feet tall at the westernmost point of the basalt headland. The site includes one of the most active BLM interpretive centers in the country and Oregon's tallest and second oldest continuously operating lighthouses.

- The 54,000-acre Cascade Siskiyou National Monument located at the crossroads of the Cascade, Klamath, and Siskiyou mountain ranges; the area is recognized for the outstanding ecological values of the Cascade-Siskiyou National Monument. The BLM completed a separate Resource Management Plan for this National Monument in 2008, and it is not included within the decision area of the RMPs for Western Oregon.
- Forty-one miles of the Pacific Crest National Scenic Trail, portions of these 41 miles are found in the Medford District and the Klamath Falls Field Office. The National Trails System Act of 1968 (16 U.S.C. §1241) led to the creation of eight long-distance National Scenic Trails dedicated to foot travel, often crossing several states, and highlighting some of the most spectacular scenery in the country.
- Two miles of the California National Historic Trail out of the Medford District.

The NLCS also includes designated Wild and Scenic Rivers, Wilderness, and Wilderness Study and Instant Study Areas.

Wild and Scenic Rivers

The BLM manages nine designated Wild and Scenic Rivers totaling 100 miles in western Oregon (Table 27). Wild and Scenic Rivers include three types of classifications: Wild, Scenic, and Recreational. Wild rivers are primitive with no human development or road access. Scenic rivers are generally undeveloped along the shorelines with little road access. Recreational rivers are known for having regular road access as well as local shoreline development.

In addition to designated Wild and Scenic Rivers, the BLM manages 51 eligible river segments in western Oregon that are carried forward from the 1995 planning effort. That RMP effort did not include evaluation of these eligible river segments for suitability. On all designated Wild and Scenic Rivers and for eligible and suitable river segments, the BLM is responsible for the following:

Managing designated Wild and Scenic Rivers to protect and enhance the free flowing condition, water quality, and identified outstandingly remarkable values.

Managing eligible and suitable Wild and Scenic Rivers to protect their free-flowing condition, water quality, tentative classification, and any outstandingly remarkable values to assure a decision on suitability can be made for eligible rivers or, in the case of suitable rivers, until Congress designates the river or releases it for other uses.

Wilderness

With the passage of the Omnibus Public Land Act in March 2009, the BLM now manages three Wilderness Areas totaling 39,095 acres in the decision area, as well as four Wilderness Study Areas. The three Instant Study Areas identified in (Table 28) were recommended to Congress as not suitable for wilderness designation because they do

Table 27. Designated Wild and Scenic Rivers on BLM-administered lands within the planning area

River	District	Classification	Length (miles)
Upper Klamath	Lakeview	Scenic	11.0
Rogue	Medford	Wild/Recreational	47.0
North Umpqua	Roseburg	Recreational	8.4
Clackamas	Salem	Recreational	0.5
Quartzville Creek	Salem	Recreational	9.7
Salmon	Salem	Scenic/Recreational	8.0
Sandy	Salem	Scenic/Recreational	12.5
South Fork Clackamas	Salem	Wild	0.6
Elkhorn Creek	Salem	Wild/Scenic	3.0
		Total	**100.7**

Table 28. Designated wilderness, wilderness study, and instant study areas on BLM-administered lands within the planning area

Name	District	Type	BLM Acres
Table Rock	Salem	Wilderness Area	5,784
Wild Rogue	Medford	Wilderness Area	8,604
Soda Mountain	Medford	Wilderness Area	24,707
Cherry Creek	Coos Bay	Instant Study Area	570
Little Sink	Salem	Instant Study Area	80
Brewer Spruce	Medford	Instant Study Area	429
Mountain Lakes	Lakeview	Wilderness Study Area	330
		Total	**40,504**

not meet the 5,000-acre minimum size requirement. However, the BLM is required to manage them as Wilderness Study Areas unless Congress releases them from wilderness consideration via legislation.

Trends And Forecasts

Visitors to BLM-administered lands primarily come from the local communities within the individual regions. An increasing number of people are living near or seeking local public lands for diverse recreational opportunities. Recreationists visit BLM-administered lands year-round, resulting in increased recreational demands. Local residents use many of the areas that the BLM manages as community-based recreation assets. Due to the proximity of these lands to local communities and the heavy use by their residents, these public lands experience the greatest use on a daily basis. In local communities where populations are increasing rapidly, recreation demands on BLM-administered lands are also intensifying.

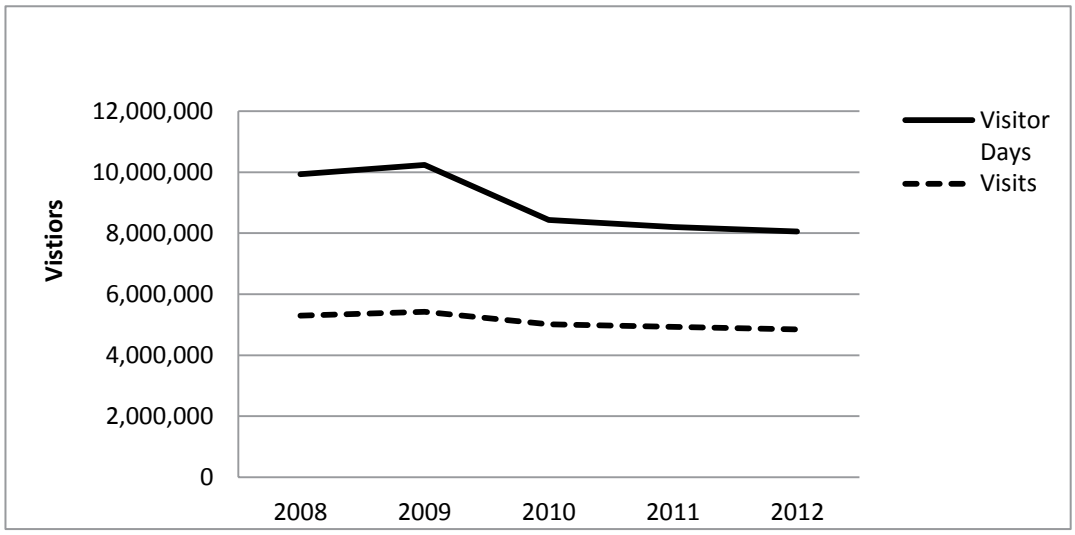
Visitors from outside the state of Oregon, including international visitors, are attracted to some of the outdoor recreation destinations that the BLM manages in the decision area (e.g., Rogue River and the Yaquina Head Outstanding Natural Area). Visitors outside of the state are attracted because of the first-class recreation opportunities being provided. The range of year-round recreation opportunities includes mountain biking, horseback riding, off-highway vehicle use, hiking, rock climbing, and water-sports, such as kayaking, fishing, and rafting.

Most public land use and activity participation estimates depend on a mix of computerized trail counter data, field observations, and professional judgment of the recreation staff and as a result, are not scientifically based. The general trend across BLM-administered lands in western Oregon has fluctuated. From 2008 to 2012, there has been a downward trend in overall outdoor recreation participation on these lands. The Recreation Management Information System, a BLM recreation information database, derives these estimates. While Recreation Management Information System numbers indicated that there was a downward trend in recreation participation as a whole, several areas saw an increase in demand. These areas are predominantly located within close driving distance of major population centers throughout the region. As populations continue to grow throughout these urban interface areas, outdoor recreation use is expected to increase.

Figure 11 illustrates total visitation to the decision area over a five-year period (2008-2012) by visits and visitor days. A visit is one person's trip to an individual location on BLM-administered lands; a visitor day is one person engaging in an activity for any part of one day.

BLM-administered lands in western Oregon are often located within an hour of urban areas and larger rural communities. BLM-administered lands in these areas are often intermixed with private lands. This creates a variety of challenges. The demand for undeveloped recreation (e.g., target shooting, hunting, off-highway vehicle use, and camping) on BLM-administered lands in these areas is growing. The supply for these recreation activities is

Figure 11. Trends in recreation visitation of western Oregon BLM-administered lands from 2008-2012



often static or declining as private forest and rangelands are increasingly closed to public motorized access due to problems with dumping, vandalism, and long-term occupancy.

In the near future, recreation demand will rise and anticipated visitor use will continue to increase in these urban interface areas, as they have done in recent years. The driving force behind these increases beyond overall population growth is the increasing economic pressures, such as the cost of living increases, that result in people seeking opportunities that meet their recreational needs, achieve their budgets, and are close to home.

The demand for motorized recreation activities continues to grow, while environmental concerns and conflict with other recreational groups makes providing for these activities more difficult on BLM-administered lands. This is especially true for off-highway motorized use. A growing number of new recreational activities associated with new technologies continue to add management challenges to meeting recreational demand while minimizing resource concerns and visitor-use conflicts.

The demand for non-motorized recreation activities (hiking, mountain biking and equestrian use) continues to increase. The benefits associated with these activities (enjoying needed physical fitness, enjoying the ability to frequently participate in desired activities in preferred settings), are commonly identified by the public as important quality of life components throughout western Oregon.

In preparation for the 2013 Oregon Statewide Comprehensive Outdoor Recreation Plan, the Oregon Parks and Recreation Department conducted a statewide survey of Oregon residents regarding their 2011 outdoor recreation participation across planning regions. The key findings of the survey provide a general trend for activities, user participation, recreation priorities for agencies to invest in, and the delivery of recreation benefits by region. The summary of this information is intended to provide a community level overview of the recreation needs, values and subsequent benefits that residents have identified in each planning region.

Top Recreation Priorities for the Future:

1. Dirt/other soft surface walking trails and paths
2. Public access sites to waterways
3. Playgrounds with Natural materials (natural play areas)

4. Off-street bicycle trails
5. Nature and wildlife viewing areas

Highest Rated Recreation Benefits:

1. Improve physical health and fitness
2. Preserve open space and the environment
3. Make the community a more desirable place to live
4. Improve mental health and reduce stress
5. Help reduce crime

As the BLM implements new outcomes-focused management frameworks for recreation planning, this community level information will be helpful in evaluating the role that the BLM can play towards providing community identified recreation priorities and benefits. For a more detailed review of regional survey results, see the full survey report, online at http://www.oregon.gov/oprd/PLANS/docs/scorp/2013-2018_SCORP/Demand_Analysis.pdf.

Management Opportunities

The RMP process will provide the opportunity for the establishment of Recreation Management Areas (RMAs) based on new guidance identified in BLM Manual 8320 (Planning for Recreation and Visitor Services, 2011), including the designation of Recreation Management Area type; establishment of recreation and visitor services objectives for each RMA; and establishment of management actions, allowable use decisions and special recreation permit requirements for each RMA.

The SRMA land use allocation provides opportunities to make a long-term commitment that protects or enhances a set of activities, outcomes, and recreation settings. The ERMA allocation provides opportunities to support and sustain recreation activities and address other recreation issues. Management of recreation outside either an SRMA or ERMA provides opportunities to manage areas without a recreation focus. Managing BLM-administered lands as lands with no recreation management designation provides opportunities to establish areas where recreation will not be emphasized.

The RMP process will provide the opportunity to use an outcomes-focused management framework to address public demand for recreation across BLM-administered lands in western Oregon.

The RMP process provides the BLM with an opportunity to establish land use allocations for off-highway vehicle areas in order to improve off-highway vehicle management across the region.

Through the planning effort, the BLM will reestablish a link between Recreation and Transportation Management Areas. This link will be generated by including recreation goals, objectives, and direction for both motorized and non-motorized trails in the RMP revisions. Management direction will focus on areas that are shared between different types of users; areas, or facilities, that currently provided management direction for a particular type of uses; and areas that have been designated through project level planning analysis and contain routes that have not been formally designated through a RMP process. This direction will be included with the Recreation Management Area frameworks as appropriate.

The RMP process provides an opportunity to perform an updated Visual Resource Inventory on the decision area. The results of this inventory, and subsequent establishment of Visual Resource Management classes, will ultimately establish the level of protections that visual resources the BLM will provide during project level planning.

The BLM has been providing interim protection of identified outstandingly remarkable values and free flowing characteristics for 51 rivers/river segments in western Oregon. In the RMP revision process, the BLM has the opportunity to determine whether to recommend a river/river segment as part of the National System of Wild and Scenic Rivers and establish permanent protection and enhancement of these characteristics. Rivers/river segments found not suitable for designation will be released from interim protection.

The RMP process provides an opportunity to determine the presence or absence of wilderness characteristics in the decision area through wilderness characteristics inventories and to determine if the BLM will manage these areas to protect their wilderness character.

Roads

Key Points

- Reciprocal right-of-way agreements secure access for BLM forest management activities. Reciprocal right-of-way agreements do not grant rights for public access and recreational use. For this reason, a significant portion of BLM-managed roads and BLM-administered lands lack legal public access.
- The overall replacement value of the BLM's transportation system exceeds $10 billion. Approximately 30 percent of the road mileage is in fair or poor condition, primarily due to depleted surfacing aggregate and worn-out minor culverts. Currently, the deferred maintenance backlog exceeds $300 million.
- For the first time, the BLM is a core partner in the recently enacted federal transportation legislation (Moving Ahead for Progress in the 21st Century Act, P.L. 112-21, 2012), providing an opportunity to secure funding for safety improvements, design upgrades and deferred maintenance on some of BLM's most important high-use roads.
- The 2010 Transportation Management Plan provides guidance to districts for closing the annual maintenance gap.

Current Conditions And Context

The BLM owns and manages approximately 15,000 miles of road within the boundaries of its western Oregon districts. The primary purpose for development and use of the BLM road system is access for forest management activities and the transportation of forest products. Given BLM's checkerboard land ownership pattern, the road network has developed in concert with neighboring private timberland owners. The result is a joint-use BLM/private road network.

Long-term or perpetual reciprocal right-of-way agreements provide legal access to federal and private timberlands between the United States and private timberland owners as authorized by the Federal Land and Policy Management Act of 1976 (FLPMA; P.L. 94-579) and other federal regulations. A reciprocal right-of-way agreement provides both the United States and the private landowner with a non-exclusive right to use, construct and maintain logging roads on each other's property for forest management and harvest of forest products.

Nearly 85 percent of the public lands in western Oregon are available for road construction and commercial timber use under reciprocal right-of-way agreements. These reciprocal right-of-way agreements do not grant rights for public access and recreational use of roads constructed under these agreements. For this reason, a significant portion of BLM-managed roads and BLM-administered lands lack legal public access. Current commercial use of BLM's portion of the joint-use network consists predominantly of private landowner log hauling.

Nationally, the BLM has established the following terms for managing transportation assets, providing clarity, and a consistent understanding across all BLM administrative units:

Transportation Linear Features – Linear features represent the broadest category of physical disturbance (planned and unplanned) on BLM-administered land. Transportation-related linear features include engineered roads and trails, as well as user-defined, non-engineered roads and trails created because of the public use of BLM-administered land. Linear features may include roads and trails identified for closure or removal as well as those that make up the BLM's defined transportation system.

Transportation System – The transportation system represents the sum of the BLM's recognized inventory of linear features (roads, primitive roads, and trails) formally recognized, designated, and approved as part of the BLM's transportation system.

Roads, Primitive Roads, and Trails – Terms are utilized to describe specific categories of transportation linear features and represent sub-sets of the BLM's transportation system.

- Road: A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.
- Primitive Road: A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards. The primitive road classification is not based on the current state of disrepair or accumulated deferred maintenance on a transportation route, but rather on the general and intended condition of the route. Roads historically utilized for low-clearance passenger vehicles, but consciously allowed to degrade to roads requiring high-clearance vehicles, meet the "primitive road" definition.
- Trail: A linear route managed for human-powered, stock, or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Transportation Linear Disturbances – Term utilized to identify man-made linear features that are not part of the BLM's transportation system. Linear disturbances may include engineered (planned) as well as unplanned single and two-track linear features that are not part of the BLM's transportation system.

Virtually the entire inventoried western Oregon transportation system (exclusive of trails) is placed in the "road" category (14,330 miles). Very few linear routes are found in the "primitive road" category since roads in western Oregon have historically been designed, built, and regularly and continuously used and maintained for low-clearance two-wheel drive vehicles. Only the Klamath Falls Field Office has inventoried any primitive roads (9 miles).

The BLM's western Oregon transportation system, accessed by federal, state, county, and private roads, can be described by the following functional classifications:

- Collector roads – Roads that primarily provide access to large blocks of public land, accommodate multiple uses, have BLM's highest traffic volumes, and connect with state and county road systems
- Local roads – Roads that normally serve smaller areas than collectors, accommodate fewer uses, have lower traffic volumes, and connect with collectors or State and County road systems
- Resource roads – Roads that provide point access to public lands, typically exist for a single use, carry very low traffic volumes, and connect with local or collector roads

Functional classification, which is the grouping of roads by the character of service they provide, establishes a systematic approach to road planning, design, and maintenance. Stratifying the BLM's road network by functional classifications provides a rational and cost-effective basis for 1) the selection and application of geometric design criteria and standards (e.g., maximum road grades, roadway width, and design speed); and 2) the assignment of appropriate road maintenance intensity levels (e.g., from basic custodial care to annual scheduled and preventative maintenance programs).

The distribution of functional classifications is shown in Table 29. Slightly less than 5 percent of the transportation system is classified as "collector," while about 21 percent of the system is "local," and nearly 75 percent is classified as "resource."

Total inventoried transportation system mileage has remained steady since 2007: 14,330 miles currently compared to 14,394 miles in 2007. Approximately 11,630 miles (81 percent) of the BLM transportation system has some form of surfacing (e.g., aggregate or bituminous surface treatment). It is predominantly constructed to a single-lane width, with only about 3.5 percent of the road mileage built to a double-lane standard. Approximately 85 percent of the BLM transportation system is found on BLM-administered lands, with virtually all of the rest located on private lands. There are approximately 13,000 miles of inventoried roads on BLM-administered lands comprised of the following ownerships: six percent private, one percent U.S. Forest Service/Oregon Department of Forestry/county, and 93 percent BLM.

TABLE 29. BLM ROAD FUNCTIONAL CLASSIFICATION BY MILES

District/Field Office	Collector	Local	Resource	Total
Coos Bay	186	408	1,302	**1,896**
Eugene	71	422	1,524	**2,017**
Klamath Falls	47	154	323	**524**
Medford	156	981	3,452	**4,589**
Roseburg	94	581	2,193	**2,868**
Salem	101	546	1,789	**2,436**
Total	**655**	**3,092**	**10,583**	**14,330**

The BLM owns approximately 600 miles of non-inventoried linear disturbances within the boundaries of the western Oregon districts. These linear disturbances are typically short (less than 500 feet) logging spurs that districts have chosen not to add to the inventory. Similar to inventoried roads, roughly 85 percent of this road mileage is found on BLM-administered lands, with virtually all of the rest located on private lands. There are approximately 1,900 miles of non-inventoried linear disturbances on BLM-administered lands comprised of the following ownerships: seven percent private, 52 percent unknown, two percent U.S. Forest Service, 12 percent county, and 27 percent BLM. The BLM has little information on these roads: ownership, surface type, and closure status attribute data are not well-populated in the non-inventoried portion of the GIS ground transportation theme.

Road Network Condition

Executive Order 13327 – Federal Real Property Asset Management (2004), mandates the Department of Interior achieve efficiencies and better manage the federal real property infrastructure. In response to this mandate, the BLM must maintain a backlog of deferred maintenance that is supported by condition assessments. Condition assessments determine the overall condition of the transportation system and help in evaluating the performance of the maintenance program. They are essential in maintaining an accurate inventory, prioritizing annual and deferred maintenance, load ratings for bridges and major culverts, and capital improvement activities. The BLM completed its baseline road condition assessment effort in 2012. Western Oregon road, bridge, and major culvert condition assessment data is summarized in Tables 30, 31, and 32, respectively.

The overall replacement value of the BLM transportation system exceeds $10 billion. Approximately 30 percent of the road mileage is in fair or poor condition, primarily due to depleted surfacing aggregate and worn-out minor culverts. Currently the deferred maintenance backlog exceeds $300 million. As of 2012, 85 percent of bridges and 97 percent of major culverts are in good condition.

Federal Lands Transportation Program

The Moving Ahead for Progress in the 21st Century Act was signed into law in July 2012. The legislation established the BLM as a core partner with two other federal land-managing agencies in the Federal Lands Transportation Program, a program administered by the Federal Highway Administration. The program purpose is improving access to federal public lands. The program can be used to fund needed safety improvements and design upgrades and can be used to address backlogged deferred maintenance projects. Initial selection criteria for the Federal Lands Transportation Program roads focused on:

- BLM-owned and maintained roads having full and continuous legal public access
- BLM roads open to public travel, except during extreme weather or emergency conditions, without restrictive gates, prohibitive signs, or regulation other than restrictions based on size, weight, or class of registration
- BLM roads providing access to high-use recreation sites, access to important economic generators (timber/minerals), or serving as access routes connecting major state and county roads

The BLM in western Oregon has nominated approximately 490 miles of collector or local roads, meeting the above criteria, for inclusion in the Federal Lands Transportation Program.

Table 30. Road condition, replacement values, and deferred maintenance costs in 2012

District/Field Office	Road Condition	Miles	Replacement Value	Deferred Maintenance
Coos Bay	Fair/Poor	397	$314 million	$20 million
	Good	1,499	$1.216 billion	$1 million
	Total	**1,896**	$1.530 billion	$21 million
Eugene	Fair/Poor	537	$361 million	$23 million
	Good	1,480	$1.267 billion	$2 million
	Total	**2,017**	**$1.628 billion**	**$25 million**
Klamath Falls	Fair/Poor	66	$47 million	$6 million
	Good	458	$241 million	$1 million
	Total	**524**	**$288 million**	**$7 million**
Medford	Fair/Poor	1,540	$1.061 billion	$123 million
	Good	3,049	$2.016 billion	$4 million
	Total	**4,589**	**$3.077 billion**	**$127 million**
Roseburg	Fair/Poor	1,176	$730 million	$85 million
	Good	1,692	$934 million	$5 million
	Total	**2,868**	$1.664 billion	$90 million
Salem	Fair/Poor	575	$408 million	$46 million
	Good	1,861	$1.347 billion	$1 million
	Total	**2,436**	**$1.755 billion**	**$47 million**
Total	Fair/Poor	4,291	$2.921 billion	$303 million
	Good	10,039	$7.021 billion	$14 million
	Grand Total	**14,330**	**$9.942 billion**	**$317 million**

Table 31. Bridge conditions, replacement values and deferred maintenance costs for BLM-administered lands within the planning area

Bridge Condition	Number	Replacement Value	Deferred Maintenance
Fair/Poor	53	$34.5 million	$7.1 million
Good	306	$249.9 million	$1.5 million
Total	359	$284.4 million	$8.6 million

Table 32. Major culvert condition, replacement value, and deferred maintenance costs on BLM-administered lands within the planning area

Major Culvert Condition	Number	Replacement Value	Deferred Maintenance
Fair/Poor	18	$1.8 million	$1.2 million
Good	526	$57.3 million	$0
Total	544	$59.1 million	$1.2 million

Road Maintenance

The BLM is responsible for maintaining roads under its ownership. Maintenance provides for resource protection, safe accommodation of users, and protection of the government's investment. Road maintenance on BLM roads is primarily for timber management/extraction, recreation, and fire management activities.

Maintenance is divided into four intensity levels. The intensity levels provide a progressive system of maintenance with even the lowest intensity level ensuring resource protection by controlling surface erosion and sedimentation. Maintenance intensities (MIs) provide objectives and standards for the care and maintenance of BLM roads based on identified management objectives. They also provide operational guidance to field personnel on the appropriate activities that should be undertaken to keep a road in acceptable condition and provide guidance for the minimum standards of care for the maintenance of a road.

- Maintenance Intensity "0" is reserved for road segments currently closed to vehicles that may be used again in the future. Decommissioned roads are assigned this MI.
- Maintenance Intensity "1" routes include road segments where minimum (low intensity) maintenance is required to protect adjacent lands and resource values.
- Maintenance Intensity "3" routes include road segments requiring moderate maintenance and are generally maintained for year-round traffic.
- Maintenance Intensity "5" routes include road segments requiring high (maximum) maintenance due to year-round needs, high volume of traffic, or significant use.

Each year districts prepare a maintenance operation plan in which annual maintenance work is identified and prioritized. Currently only about 16 percent of the western Oregon transportation system mileage is placed on the annual maintenance operation plan. Annual maintenance operation plan mileage has been trending down in recent years. From 2007 to 2012, the annual mileage maintained declined about 41 percent, from 3,926 miles in 2007 to 2,297 miles in 2012. Annual maintenance work ranges from aggregate surface blading and roadside brush removal to pothole repair and culvert replacement.

Annual maintenance is funded with both appropriated accounts and collected accounts. While appropriated funding has remained flat over the last two decades, the BLM's collected account has declined dramatically. In the late 1980s through early 1990s, maintenance fee collections averaged $8 million annually, while currently they average about $2 million annually, due to BLMs' declining timber sale offerings. The resulting gap between need and actual expenditure has created a large deferred maintenance backlog, exceeding $300 million. The deferred maintenance backlog is likely to trend upward in future years given the relatively small size of BLM's deferred maintenance program, $6 million annually in Oregon.

Road Closure

There are times the BLM determines that a road closure or travel restriction may be warranted. The objectives of road closure are typically for safety or resource protection, such as to reduce sedimentation, restore hydrological processes, reduce total road maintenance cost, and reduce impacts to fish or wildlife habitat, botanical resources, or special areas. The BLM districts coordinate in advance with potentially affected reciprocal right-of-way permittees on decisions to close roads for protecting permittee rights to use BLM-owned roads. Should permittees not concur on BLM proposed long-term or permanent closures, these proposals must be dropped, thus limiting the BLM's opportunities to reduce road densities.

There are four categories of road closures:

- **Temporary/Seasonal/Limited Access** – These are typically resource roads, closed with a gate or barrier. The roads are closed to public vehicular traffic but may be open for BLM/permittee commercial activities. The road may or may not be closed to BLM administrative uses on a seasonal basis depending upon impacts to the resources. Drainage structures are left in place.

- **Decommission (long-term)** – These are based on resource protection needs. Road segments are closed to vehicles on a long-term basis, but may be used again in the future. Prior to closure roads are left in an erosion-resistant condition by establishing cross drains, eliminating diversion potential at stream channels, and stabilizing or removing fills on unstable areas. Exposed soils are treated to reduce sediment delivery to streams. The roads are closed with an earthen barrier or its equivalent. This category can include roads that have been or will be closed due to a natural process (abandonment) and may be opened and maintained for future use.
- **Full Decommission (permanent)** – Roads determined to have no future need may be subsoiled (or tilled), seeded, mulched, and planted to reestablish vegetation. Cross drains, fills in stream channels, and unstable areas are removed, if necessary, to restore natural hydrologic flow. Roads are closed with an earthen barrier or its equivalent and do not require future maintenance. This category includes roads that have been closed due to a natural process (abandonment) and where hydrologic flow has been naturally restored.
- **Obliteration (full site restoration/permanent)** – Roads receiving this level of treatment have no future need. All drainage structures are removed. Fill material used in the original road construction is excavated and placed on the subgrade in an attempt to reestablish the original ground line. Exposed soil is vegetated with native trees or other native vegetation.

The BLM currently has approximately 2600 miles (18 percent) of the transportation system in 'storage' (i.e., in a decommissioned status). Nearly half of these miles have a natural surface type. These decommissioned miles are closed to vehicles and left in an erosion-resistant condition. They are subject to reopening in the future as needed.

Management Opportunities

The Western Oregon Transportation Management Plan (revised 2002, 2010), which the BLM originally developed in 1996 as directed by the 1995 RMPs, describes the BLM's maintenance strategy for managing the annual maintenance shortfall. The Transportation Management Plan provides guidance to districts for closing the annual maintenance gap:

- Implement Maintenance Intensities (standards of care) for all roads based on functional classification. This drives most of the BLM road network to the lowest possible standard of care, which is the single most important thing BLM can do to reduce annual maintenance need.
    - Collector – Maintenance Intensity 5 (5 percent of network)
    - Local – Maintenance Intensity 3 (21 percent of network); Maintenance Intensity 3 is 70 percent of annual maintenance need of Maintenance Intensity 5
    - Resource – Maintenance Intensity 1 (74 percent of network); Maintenance Intensity 1 is 15 percent of annual maintenance need of Maintenance Intensity 5
- Maintain resource roads to a higher standard of care (Maintenance Intensity 3) during periods of commercial use only.
- Set priorities for annual maintenance expenditures based on functional classification and spend scarce maintenance funding on most important roads.
- Storm-proof open resource roads in riparian areas or on steep, unstable slopes to minimize environmental damage and reduce annual maintenance cost.
- Decommission resource roads whenever possible, though opportunities are limited due to reciprocal right-of-way agreements. Abandon maintenance of resource roads when environmentally feasible.
- Build an annual maintenance operation plan based on scheduling annual maintenance work on the collector/local network on an every second or third year cycle rather than an annual cycle.

The Transportation Management Plan promotes a greater emphasis, given current and future annual maintenance funding shortages, on the importance of the BLM 5-year deferred maintenance program, despite its relatively small size ($6 million annually), as a critical source of funding for drainage and surface replacement maintenance.

Silviculture

Key Points

- A wide range of silvicultural systems and practices are needed to meet commodity production, habitat development, and riparian management objectives.
- Silvicultural systems and practices will need to vary within and between districts to accommodate diverse forest conditions and management objectives.
- The types of silvicultural systems applied across the landscape have substantial effects on the attainment of management objectives (i.e., forest growth, habitat development, commodity yield, fire resiliency, and economic return).
- There is an opportunity to evaluate an expanded range of regeneration harvest and thinning treatments based on the lessons learned from the Density Management Studies, the Mature Forest Study, "Secretarial Pilots" and other "ecological forestry" projects, as well as the nearly 20 years of experience implementing the 1995 RMPs. These opportunities include changes to variable-density thinning, variable-retention regeneration harvest, dry forest selection harvest, and hybrid approaches.

Current Conditions And Context

Silvicultural Systems

A silvicultural system is a planned set of silvicultural practices by which forest vegetation is regenerated, manipulated, and often harvested – a cycle of treatments that could be repeated in perpetuity (Figure 12). Silvicultural systems describe a series of treatments, if needed, to ensure that a forest stand will produce the desired result in terms of species composition, density, growth rates, and stand structural characteristics. They consist of a regeneration timber harvest method to foster new seedling establishment (variable-retention, clearcut, shelterwood, and selection), a natural or artificial (planting or seeding) regeneration method, and the subsequent intermediate treatments (maintenance, protection, and thinnings) necessary to meet management objectives.

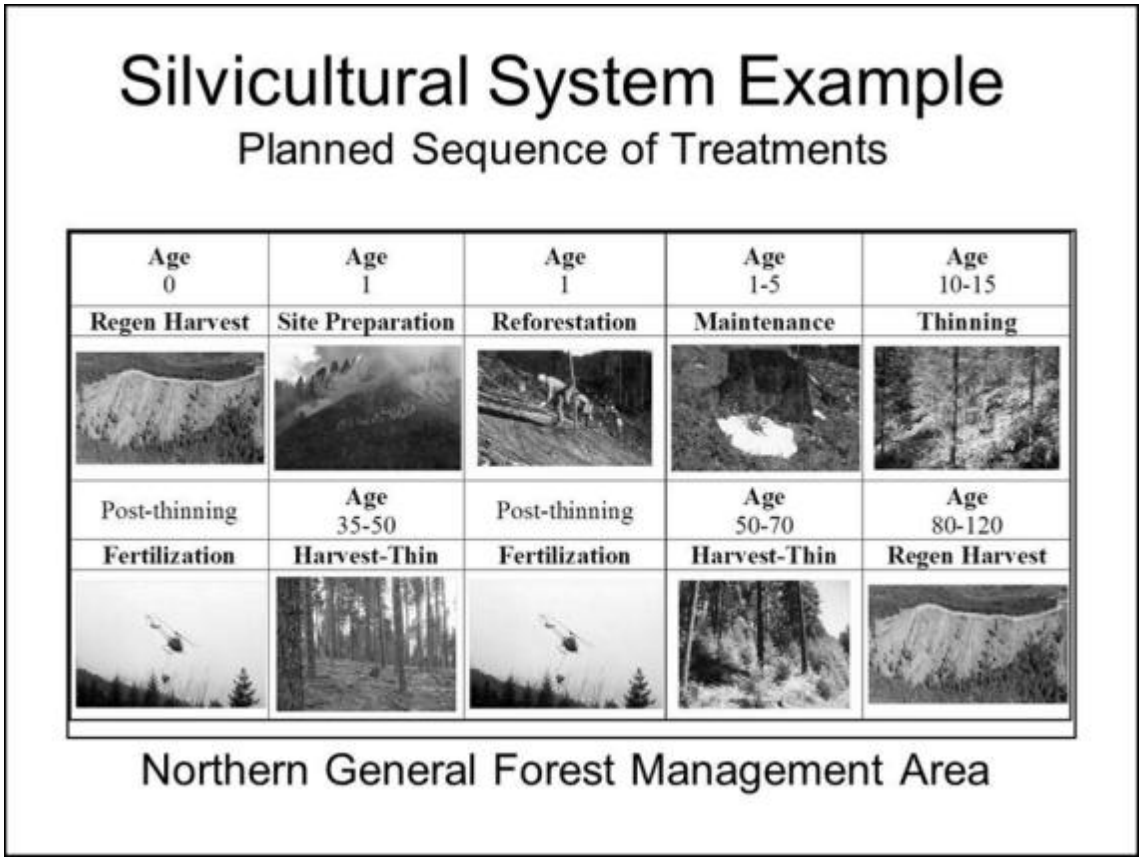
Silvicultural systems may be tailored to meet multiple management objectives that include wildlife and fish habitat, commodity production, fire resiliency, soil productivity, and water yields. The choice and amount of each silvicultural system applied to the land base has substantial effects on forest growth, commodity harvest, economic return, wildlife/fish habitat development, resource protection and BLM workforce requirements. The timing of the application of individual silvicultural practices within a silvicultural system is important to meet management objectives for timber, wildlife habitat, and economic returns.

Silvicultural Practices

Silvicultural practices are the individual management actions implemented to meet specific land use objectives within the context of a silvicultural system. Silvicultural practices in the 1995 RMPs fall into three major categories and several subcategories:

- Harvest
    - Regeneration Harvest
        - Variable-retention regeneration harvest
        - Selection harvest (uneven-aged management)
    - Intermediate Harvest
        - Commercial Thinning
        - Density Management

FIGURE 12. SILVICULTURE SYSTEM EXAMPLE SHOWING THE PLANNED SEQUENCE OF TREATMENTS



- Reforestation
  - Site preparation
  - Tree planting or natural regeneration
  - Maintenance and protection
- Growth & Value Enhancement
  - Pre-commercial thinning and release
  - Pruning
  - Fertilization
  - Brush field and hardwood conversion

Allowable Sale Quantities are based on the assumption that necessary silvicultural practices contributing to reforestation and growth enhancement are implemented on Matrix and Adaptive Management Area land use allocations within specific time periods of forest stand development under the current management plans.

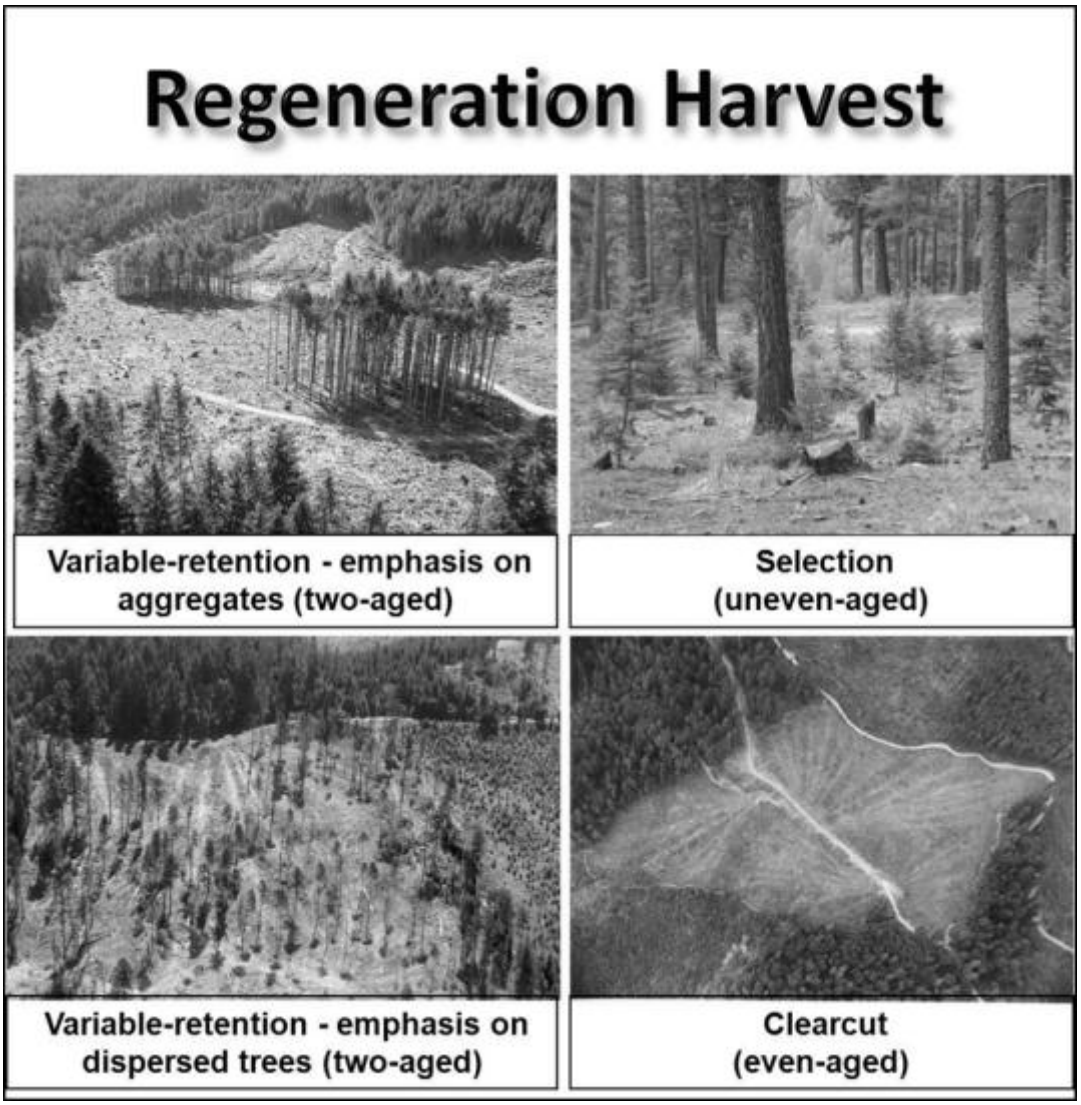
Harvest Types

The major harvest types under the 1995 plans include various forms of regeneration harvest and intermediate commercial harvest.

Regeneration harvest entails the harvest of merchantable trees within an area in order to promote the establishment of tree regeneration (seedlings) through planting, natural, or artificial seeding (Figure 13). The regeneration timber harvest method used has a strong influence on the subsequent stand structure. The type of regeneration harvest varies by land use allocation under the 1995 RMPs. Historically, traditional silvicultural terminology for the tree regeneration method (e.g., clearcut[5], clearcut with reserves, seed tree, shelterwood, and selection harvest) has defined the types. In the 1995 RMPs, these traditional definitions were adapted with modification to describe the proposed regeneration harvests with long-term green-tree retention. Subsequently, the 1995 RMPs introduced new definitions that describe better the majority of regeneration harvest types (e.g., variable-retention regeneration harvest).

Under the 1995 RMPs, planned regeneration harvests in the Northern General Forest Management Area and the Connectivity/Diversity Blocks were envisioned as containing a mix of retention but primarily with an emphasis on dispersed retention. Regeneration harvests in the Southern General Forest Management Area of the Medford District

Figure 13. Regeneration harvest methods



[5]Clearcutting is a timber harvest method that removes all merchantable material in a stand. Clearcutting was not included in the 1995 RMPs as a timber harvest method.

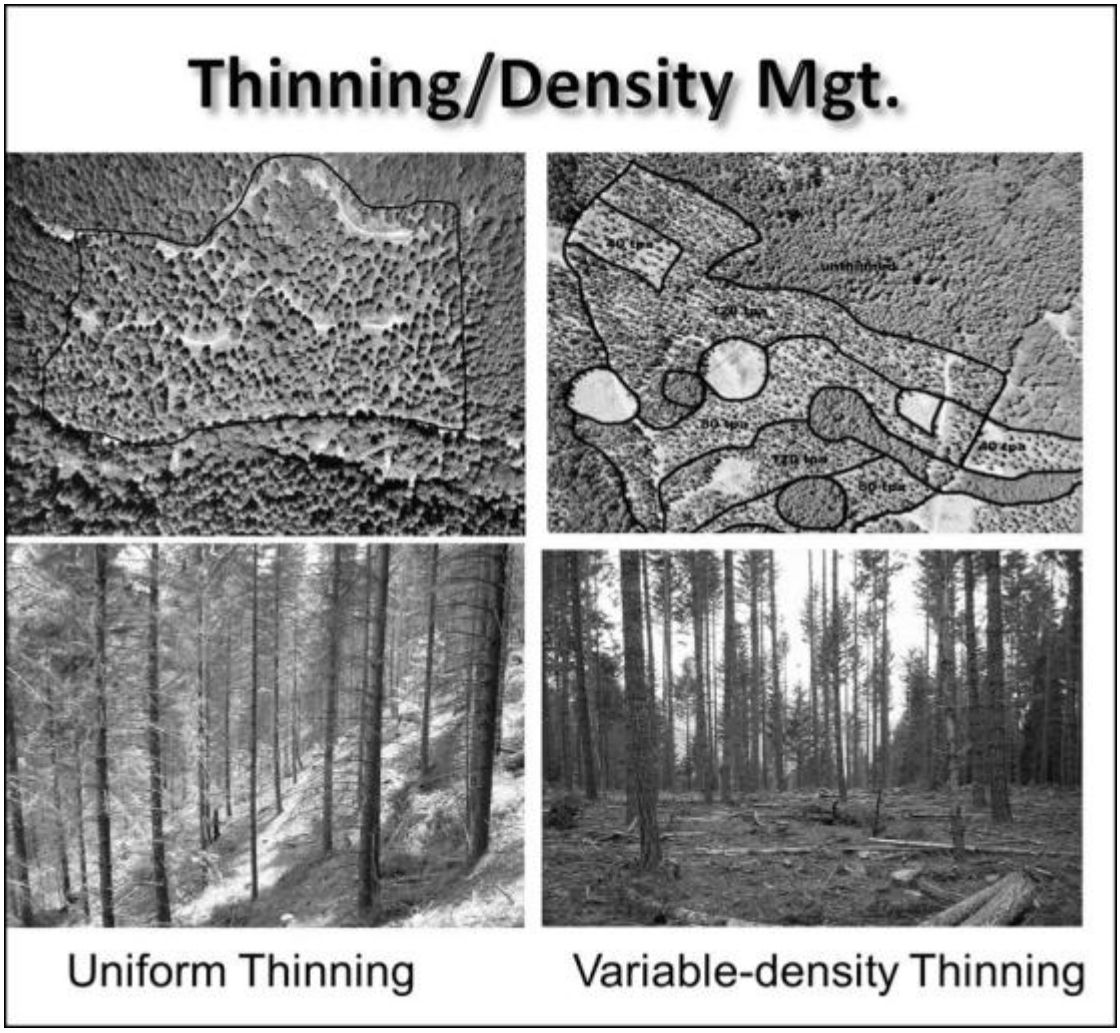
and the General Forest Management Area land allocation of the Klamath Falls Field Office can best be described as incorporating aspects of variable-retention regeneration harvest and selection harvest (uneven-aged management).

Selection harvests occur at scheduled intervals. A range of treatments may be applied within a stand in discreet areas and may include commercial and non-commercial activities. Selection harvests create and maintain uneven-aged stands (i.e., stands with three or more age classes).

Based on analysis and operational experience since 1995, variable-retention regeneration harvests and uneven-aged management regimes could have the potential to produce both complex diverse early-successional habitat, and in the long-term, accelerate the development of late-successional forest conditions.

The BLM generally uses the terms commercial thinning and density management to distinguish between harvest of merchantable trees in the General Forest Management Area (commercial thinning) and harvest in the Connectivity Diversity Blocks, Riparian Reserves, and Late-Successional Reserves (density management). Intensity of treatment generally varies by land use allocation goals, with higher densities and more uniform spatial arrangements of retained trees generally being the target in the Matrix land use allocations, and more variable-density thinning including areas of low density in the reserve land use allocations (Figure 14). The variability of thinning prescriptions in Late-Successional Reserves is constrained by the process of applying for Regional Ecosystem Office (REO) exemption criteria, or REO "approved" Late-Successional Reserve Assessments.

FIGURE 14. THINNING AND VARIABLE-DENSITY THINNING METHODS



Subsequent to the completion of the 1995 RMPs, the term "variable-density thinning" has superseded the term "density management." Variable-density thinning is a harvest method where the stand contains at least two densities of retentions for the objective of promoting stand heterogeneity. Provision of conditions conducive to the initiation and growth of tree regeneration is usually an objective of variable-density thinning to encourage understory development for the development of two-storied or multi-layered stands. Variable-density thinning is a hybrid of thinning and regeneration harvest. Variable-density thinning often incorporates skips (unharvested areas) and gaps (group selection cuts) in the prescription.

The Klamath Falls Field Office has defined density management in their recent annual program summaries and monitoring reports as "Density Management treatments are designed to improve or maintain forest health and are proactive efforts to improve stand resiliency by reducing stand densities and fuel loads…" This definition for the most part incorporates components of what was described separately in the Klamath Falls ROD/RMP as restoration thinning, understory reduction and restoration under burning (FY 2011 Klamath Falls Annual Program Summary and Monitoring Reports).

Commercial thinning/variable-density thinning provides for the following:

- Accelerated diameter growth to produce larger trees at a given age
- Enhanced stand stability and vigor
- Reduced potential for future mortality and the opportunity for salvage of recent mortality
- Establishment of younger tree cohorts and stand structural diversification
- Replacement intermediate timber volume when regeneration harvest is not feasible

These Late-Successional Reserve Assessments define silvicultural approaches to meeting late successional objectives. These defined approaches generally contain rigid rule sets regarding subjects like age limits, heavy thinning limits, gap size constraints, canopy cover limits, and diameter limits. The 1995 RMPs defined a process for developing and revising these Late-Successional Reserve Assessments, which the Regional Ecosystem Office would review for approval. However, the lengthy and laborious process of applying for an exemption or revising these rigid rules sets on a site-specific basis has reduced the BLM's ability to adapt to changing science and increased understanding about how forest stands respond to silvicultural treatments.

Reforestation consists of an interrelated series of activities following a regeneration harvest or variable-density thinning harvest, usually beginning with site preparation, followed by tree planting, and then maintenance and protection of the planted tree seedlings. The objective of reforestation is the reestablishment of desirable tree species following a regeneration harvest or a natural disturbance event, such as wildfire. Reforestation practices include site preparation, tree planting/artificial seeding, natural regeneration from seed, and stand maintenance and protection.

Site preparation reduces logging slash and post-harvest residual vegetation through prescribed fire or mechanical, manual, and chemical means to provide physical access for tree planting to prepare a soil bed for seeding.

Tree planting is usually conducted to reestablish trees on a site, although natural regeneration is also utilized, augmented by planting where necessary to meet management objectives. Planting of tree seedlings developed through genetic breeding programs for improvement of tree growth and resistance to disease is an assumed component of the 1995 RMPs allowable sale quantity calculations. Genetic breeding programs had been developed for Douglas-fir, sugar pine, western white pine, western hemlock and noble fir prior to the 1995 RMPs. A seed orchard consolidation effort is currently underway that reflects the reevaluation of potential seed needs.

Maintenance and protection treatments occur after tree planting or natural regeneration to promote the survival of desirable trees, or protect trees from adverse elements such as weather, animals, insects, and disease. Treatments may include using biological, mechanical, manual, chemical methods, or any combination of these. Examples include mulching, brush/hardwood cutting, leader protection (tubing), pruning, and herbicide application in special cases (e.g., noxious weed control within forest stands). The use of herbicides has been generally unavailable for

timber production purposes since a court ruling in 1984. Reforestation success has not been substantially affected, but the ban has resulted in relatively high reforestation costs compared to those incurred by private and state forest managers.

Growth and Value Enhancement

BLM's level of growth and value enhancement activities have traditionally fluctuated due to swings in available funding. The objectives of growth and value enhancement treatments are the regulation of individual tree and stand growth to increase wood production and quality for commodity outputs, increased economic return, or production of desired habitat features. Growth and value enhancement practices include pre-commercial thinning, fertilization, pruning, and brush field conversion.

Pre-commercial thinning is designed to reduce density of non-commercial size trees or other vegetation through manual, mechanical or chemical means. Tree vigor and stand stability are improved through density reduction of both trees and other competing vegetation, which contributes to the maintenance of a wider range of future management options. Treatments are done in mostly young even-aged stands after the period of high potential of juvenile mortality has passed, and are undertaken to modify stand composition and structure to promote the growth and maintenance of desirable vegetation to meet short- and long-term management objectives. Intensity of treatment varies by land use allocation goals, with higher densities and more uniform spatial arrangements of retained trees being the target in the Matrix, and more variable-density thinning in the reserves.

Fertilization is the application of nutrients, most often nitrogen, to stands in which the majority of trees generally have average diameters greater than three inches which are at target tree density. Fertilization can reduce "thinning shock" and increase wood volume production. The BLM has not implemented fertilization since the issuance of a court order in 1999[6]. The Order defined fertilization as a ground-disturbing activity subject to Survey and Manage protocols. The anticipated cost and workload impact to conduct such surveys resulted in the cessation of work on fertilization project development on all districts.

Brush field and hardwood conversion requires the full range of reforestation treatments described previously to convert brush or hardwood-dominated sites to conifer-dominated sites. Lack of expeditious site treatment and reforestation following disturbance from natural disturbance or regeneration harvest can result in stands that are occupied by shrubs or species that prevent attainment of management objectives.

Pruning removes live and dead branches from the lower bole of preferred trees to enhance future wood quality for commodity purposes and for disease prevention or control. Pruning is also being used as a fuels treatment to reduce ladder fuels and provide improve ingress and egress for firefighters to forest roads. Pruning is not an assumed component of allowable sale quantity calculations since it does not affect timber growth and yield if implemented properly.

Accomplishments

The underlying assumptions from the 1995 RMPs' determination of the allowable sale quantity are used as the standard to measure plan conformance. These assumptions include the levels of regeneration and thinning harvest volume and the associated treated acres. The volume and acres associated with sold timber sales are used as the evaluation standard for implementation. The RMPs provided estimated levels of silvicultural treatments that would occur because of implementation of the ASQ. These were estimated levels but not management decisions.

The 2012 Plan Evaluation contains the conclusion that implementation of the timber management program was departing substantially from the outcomes predicted in the 1995 RMPs. On average, regeneration harvests were 26 percent of planned levels with a range of nine percent to 36 percent between districts. Overall, commercial thinning and variable-density thinning averaged 137 percent of planned thinning; this varies by district, with a range of 95

[6]Oregon Natural Resources Council Action *et al.* v. U. S. Forest Service and Bureau of Land Management, 59 F. Supp. 2d 1085, 1095 (W.D. Wash. 1999)

percent to 569 percent. With the exception of commercial thinning and variable-density thinning, the statewide levels of silvicultural activities have been less than estimated in the 1995 RMPs on a statewide summary basis (Table 33). Timber harvest activities that are implemented under the RMPs and natural disturbances directly affect the levels of reforestation treatments.

Lack of planned regeneration harvest levels and shift to commercial thinning and variable-density thinning has substantially affected the level of reforestation activities, which the RMPs predicated on regeneration harvests during the plan period on most districts. For example, following a regeneration harvest, site preparation, tree planting, and stand maintenance are usually necessary. Levels accomplished are linked directly to the amount of regeneration harvest successfully implemented. Despite low levels of regeneration harvest, the Medford District has had substantial acres affected by wildfire that required reforestation treatments above planned levels.

Trends And Forecasts

Regeneration harvest has generally been avoided for most of the current plan period, especially regeneration harvest of older forest, threatened and endangered species habitat, survey and manage sites, and other various overlying constraints.

The trend of thinning harvests at rates above the 1995 plan levels and lack of substantial regeneration harvests to create new young stands means that the BLM will eventually exhaust opportunities for thinning. The acceleration of thinning from both the harvest and reserve land base has been a long-term trend since 1999 so as to offset the reduced volume from the lower level of regeneration harvests compared to planned levels.

Research and operational experience since the adoption of the 1995 RMPs suggests that the current REO Exemption Criteria standards and guides for Late-Successional Reserve thinning may be too conservative an approach for meeting reserve objectives.

Future reforestation accomplishments will depend greatly on the level of regeneration harvest successfully implemented and the amount of area affected by stand-replacing natural disturbances like wildfires.

TABLE 33. WESTERN OREGON BLM SILVICULTURAL ACCOMPLISHMENTS AS A PERCENTAGE OF PLANNED ACCOMPLISHMENTS

Description	Total	Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem
Regeneration Harvest	26%	23%	36%	9%	30%	20%	31%
Commercial Thinning/VDT[1]	137%	367%	201%	108%	95%	569%	147%
Brush Field/ Hardwood Conversion	60%	133%	58%	0%	0%	0%	13%
Tree Planting (Total)	86%	58%	55%	32%	161%	20%	47%
Tree Planting (Improved)[2]	27%	50%	21%	0%	43%	8%	27%
Pre-commercial Thinning	72%	76%	326%	378%	26%	128%	83%
Pruning	66%	151%	52%	142%	31%	66%	0%
Fertilization	22%	163%	9%	0%	2%	27%	46%

[1]VDT = VARIABLE-DENSITY THINNING

[2] IMPROVED = PLANTING WITH GENETICALLY IMPROVED SEEDLINGS

SOURCE DATA:
SALEM: 1994 FEIS; TABLE 1, PAGE 2; FY 2011 ANNUAL PROGRAM SUMMARY
EUGENE: 1994 FEIS; TABLE 1, PAGE 2; FY 2011 ANNUAL PROGRAM SUMMARY
ROSEBURG: 1994 FEIS; TABLE II-5, PAGE APPENDICES 252; FY 2011 ANNUAL PROGRAM SUMMARIES, TABLE 1
COOS BAY: 1994 FEIS; TABLE CC-7, PAGE 264; FY 2004 AND FY 2011 ANNUAL PROGRAM SUMMARIES, TABLE S-1
MEDFORD: FY 2004 AND FY 2011 ANNUAL PROGRAM SUMMARIES, TABLE S-1
KLAMATH FALLS: 1995 ROD.RMP; TABLE R-1, PAGE R-11; FY 2011 ANNUAL PROGRAM SUMMARIES, TABLE 2-1

Future treatment opportunities for pre-commercial thinning and pruning will depend greatly on the level of "new" regeneration harvest successfully implemented and the amount of area affected by stand replacing natural disturbances.

Survey and manage requirements will continue to hamper the feasibility of fertilization projects under the 1995 RMPs.

Management Opportunities

The recent direction to implement regeneration harvests ("Secretarial Pilots") based on the "ecological forestry" concepts of Franklin and Johnson has encouraged managers to experiment with a range of possible regeneration harvest practices. There is an opportunity to evaluate an expanded range of regeneration harvests based on the lessons learned from the "Secretarial Pilots," experience implementing the 1995 RMPs and analysis from the 2008 RMP/EIS. These opportunities include changes in variable-retention regeneration harvest, dry forest selection harvest, and hybrid approaches compared to the current practices.

The Johnson and Franklin moist forest prescriptions generally recommend a higher overall level of green-tree retention than 1995 RMP requirements (Johnson and Franklin 2013). However, the Franklin and Johnson concept considers the contribution of some riparian areas as retention blocks, recognizing their ecological contribution to the stand's immediate post-harvest condition and future stand development. Considering the contribution of riparian retention may allow for reduced retention levels on lands with a timber emphasis while still meeting non-timber objectives. Neither the 1995 or the 2008 RMP/EIS considered the synergism between upland and riparian portions of the same stand in characterizing structural stages or habitat condition.

The BLM could consider lowering minimum harvest ages for existing young-growth stands to substitute for regeneration harvest of late-successional stands.

The BLM could consider variable-retention regeneration harvest of stands that are currently designated as critical habitat or within late-successional reserves.

Johnson and Franklin have also suggested minimal or no artificial reforestation actions be done, to prolong early-successional conditions (Johnson and Franklin 2013). The BLM could contrast that strategy with the 1995 RMPs' prompt reforestation standards for impacts on timber volume, revenue, or habitat outcomes.

The 2008 RMP/EIS evaluated the potential for managing portions of the Medford District and the Klamath Falls Field Office under an uneven age management (selection harvest) regime. The main objectives of this management strategy were sustainable timber production and the promotion of fire resilient forests. The 2008 RMP/EIS silvicultural prescriptions are very similar to the Franklin and Johnson "dry forest" management concepts. However, the Franklin and Johnson dry forest management concept has been proposed for a broader geographic area than that used in the 2008 RMP/EIS. Reevaluation of the 2008 RMP/EIS prescriptions and application of uneven-aged management to the wider area identified by Franklin and Johnson could be considered for the plan revisions.

There is an opportunity to encourage the experimentation and implementation of an expanded range of thinning options in late-successional emphasis areas. The elimination of the requirements for REO review and approval would likely further experimentation of a broader range of silvicultural prescriptions to meet late-successional habitat development objectives. The REO process is redundant since the interdisciplinary team approach to project design, public review through the NEPA process, and regulatory consultation serves as a vetting process for alternative thinning approaches.

Reconsideration of herbicides as a forest management tool could reduce operational costs for stand maintenance following harvest or natural disturbances. Recent completion of the Vegetation Management Using Herbicides on Bureau of Land Management Lands in Oregon EIS (2010) excluded consideration of herbicide use for timber management. However, it could provide considerable information for development of a timber management specific program for the future.

Pre-commercial thinning and pruning in opportunities in young even-aged stands created prior to the 1995 RMPs are essentially depleted. Reforested stands created during the 1995 RMP period are becoming available for treatment. However, the total potential treatment acreage is only about one-quarter of the amount treated during the 1996-2011. New regeneration harvests or stand-replacing disturbances would need to occur for the creation of new opportunities.

The BLM could consider modification or removal of survey and manage requirements, which might allow for a restart of the fertilization program.

Socioeconomics

Key Points

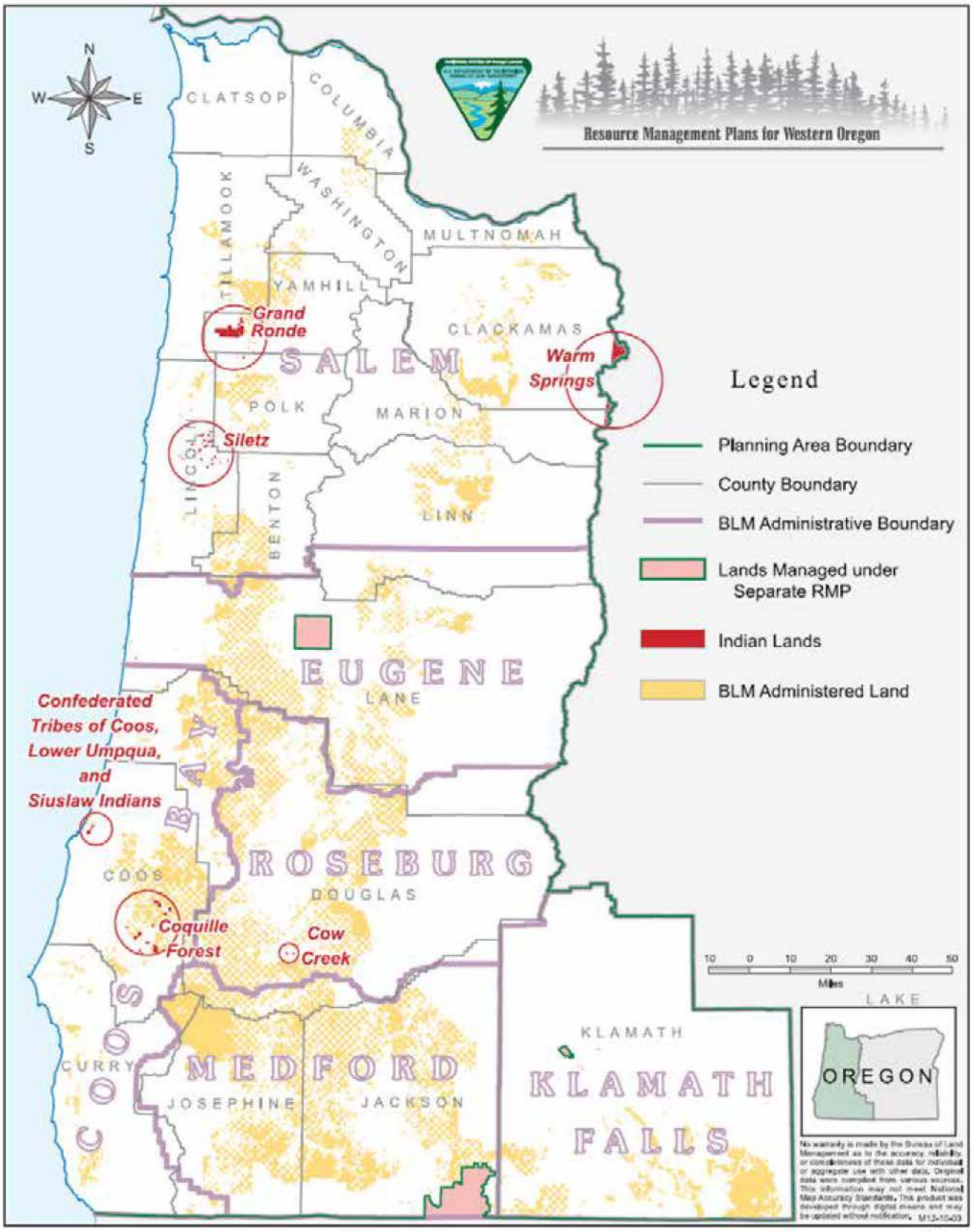
- Management of BLM-administered lands in western Oregon provides a variety of market and non-market goods and services to the region and communities.
- The Portland Metropolitan Statistical Area has fared much better since 2001 and 2007 than other parts of the planning area. Based on unemployment rates in 2012, fifteen of the planning area counties are distressed areas.
- In 2011, 82 percent of all wood products manufacturing employment in the planning area were located outside the Portland Metropolitan Statistical Area, with 61 percent in the central and southern districts.
- Since 2001, jobs in wood products manufacturing in western Oregon – some of the highest-paying jobs in the planning area – declined by over 40 percent. In the Medford District, these jobs have declined by nearly 50 percent.
- Western Oregon's timber market conditions are largely driven by national and international market demand and supply trends. Competition of low-cost sources and declining demand with recessionary conditions has depressed market prices even though Oregon's supply has declined.
- Visitor services and government have fared well compared with other industry groups since 2001 and 2007, but visitor services pay the lowest wages of industry groups primarily affected by management of BLM-administered lands.
- When adjusted for 2011 dollars, historical O&C Payments (including the Secure Rural Schools program) averaged $134 million from 1960-2011. With each successive extension of the Secure Rural Schools (SRS) program (FY 2009 forward), the total payment (in 2011 dollars) declined from $136 million in 2001 to $40 million in 2011. Without the SRS extension, the O&C Counties would have received a total of $9 million in 2011 (based on 50 percent of timber receipts) (Tuchmann and Davis 2013).
- In ten of the planning area counties, federal payments account for more than 20 percent of the counties' discretionary spending. In Coos, Curry, Josephine, and Douglas counties, this percentage ranges from 56 to 81 percent.
- Many of the wood products and coastal counties in the planning area (the historical source of much of the region's timber production) are among the lowest-ranked counties in Oregon for "poor mental health days" and other health factors.
- Social and economic conditions vary depending on the scale of analysis used; differences among individual communities can be masked by analysis at the county or regional scale.

Current Conditions And Context

The planning area contains 19 counties in western Oregon. As shown on Map 6, the BLM district boundaries are generally consistent with county boundaries, with most of the area of each county in one BLM district.

This discussion of socioeconomic resources has two broad emphases: economic growth and stability; and social capacity and resiliency. These terms generally refer to the following:

- Growth – An economy that is getting larger and expanding
- Stability – An economy that is not highly volatile



Map 6: County and BLM Administrative Boundaries and Indian Lands

- Capacity – The resources or types of capital (including environmental, financial, infrastructure, human, social, and cultural) available to a community

Resiliency – A community's ability to deal with changes, respond to external and internal stresses, create and take advantage of opportunities, and meet its needs

This discussion uses the term "community" broadly to include different types of communities including communities of place, that tend to be defined by geography, as well as communities of interest, whose interests may cross geographic boundaries. All four attributes are needed to foster sustainable communities in Western Oregon. For example, economic stability and growth are both needed; one without the other leads to an unbalanced situation such as the current situation in western Oregon where some of the planning area counties are struggling in a stable, but low growth situation. Similarly, growth without stability can result in unsustainable booms and busts.

Goods and Services

BLM-administered lands in western Oregon generate a diverse variety of goods and services for local communities, the region and beyond. These include goods and services bought and sold in markets as well as several kinds that are not. Some of these goods and services are directly used or "consumed" while others indirectly provide benefits as inputs to other goods and services or supporting other industries (Table 34).

Goods and services (with market forces driving their prices and those prices directly translating into revenue to the BLM) are the most widely reported. A limited subset of BLM's goods and services, dominated by timber, are bought and sold in markets. Other goods and services, such as recreation and non-timber forest products, have a small share of direct revenue for the BLM but can have associated indirect economic effects. For example, recreation can generate direct user fees, but the travel and equipment expenditures can be much greater and the fee may be a very small portion of the overall cost and value. For other services, such as water quality and water quantity, the BLM might not collect any revenue at all, but the broad public benefits may be substantial.

Of the goods and services not commonly bought and sold in markets, new programs in market development such as for water supply protection, habitat provision, and carbon sequestration are demonstrating their importance to society. However, markets for these goods and services on federal lands do not currently exist.

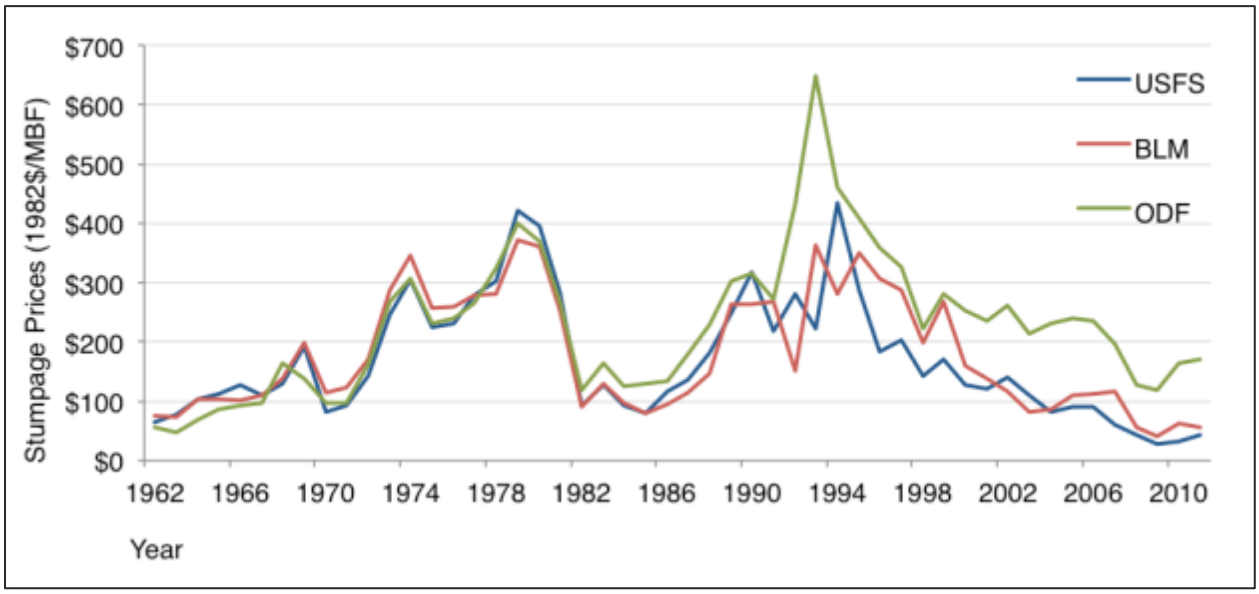
From a market standpoint, timber products are the best-documented market good derived from BLM-administered lands. While both public and private land timber harvests have declined over the past 50 years, federal harvests have dropped the most precipitously, starting in the 1980s and with the decline on U.S. Forest Service land greater than on BLM-administered land (see Figure 17 - Timber).

Even though harvests have dropped, prices have also declined. This demonstrates that national and international market conditions are driving market prices more than local supply. All things being equal, a decrease in harvest would otherwise lead to increasing market prices. Figure 15 shows western Oregon stumpage prices over the past 50 years; stumpage is the price paid for the right to harvest timber from a given land base.

TABLE 34. GOODS AND SERVICES EXAMPLES WITHIN THE PLANNING AREA

Market Examples	Non-Market Examples
Timber	Biodiversity
Other forest products	Recreation (non-market)
Recreation	Carbon sequestration
Tourism	Protecting watersheds, water quality
Hunting, Fishing	Water supply and regulating streamflows
Grazing	Tribal cultural and spiritual resources
Minerals	Non-tribal cultural and spiritual resources
Research	Scenic resources
	Education and research
	Subsistence uses

FIGURE 15. WESTERN OREGON STUMPAGE PRICES 1962-2011



Source Data: (Zhou and Warren 2012)

The BLM permits harvest of non-timber forest products (or special forest products) such as mushrooms, salal, ferns, floral greens, and medicinal plants. While BLM collects data on the number and value of licenses for such products, data on harvest quantities and values for these products are much less available than for timber, in part because of the lower overall market volume and corresponding low market value. References to values and volumes of non-timber forest products tend to rely on studies from the 1990s that estimate annual permitted harvest values across these markets up to $400 million for the Pacific Northwest annually (Schlosser and Blatner 1992). The same research also suggests high levels of unpermitted use, and corresponding greater actual value harvested. The studies also find a relatively higher subsistence and cultural value of these resources compared to timber products for certain rural and tribal communities. There is increasing interest in the potential value and cultural importance of non-timber forest products (McLain and Jones 2005). However, this research has not advanced sufficiently to provide specific guidance for managing BLM-administered lands to support non-timber forest products or, potentially, increased commercial use.

The Oregon Department of Fish and Wildlife (ODFW) regulates and licenses fishing and hunting activity throughout the state, including on BLM-administered lands. ODFW collects and reports species-specific harvest data from hunters and trappers, and monitors fish populations. The U.S. Fish and Wildlife Service conducts national fishing and hunting surveys, and publishes state-level reports every five years. The most recent Oregon data are from 2006 and report numbers of hunters, anglers, and wildlife viewers; numbers of trips by group; estimated expenditures by group; and time spent by group (U.S. Fish and Wildlife Service. 2008). Participation statewide across these categories was approximately 1.8 million people, with expenditures of $2 billion. Results for 1996 compared to 2006 suggest a decline across categories. Survey results for 2011 are expected in mid-2013.

In addition to wildlife-based recreation, BLM-administered lands provide an array of high-amenity recreation opportunities and developed facilities for hiking, biking, horseback-riding, fishing, boating, and other outdoor activities. Some of these have potentially high economic value such that they contribute to economic growth in local communities. The BLM has revenue data from permit sales and estimates of use levels. Lotteries for access for boating on the Rogue River in southwest Oregon demonstrate a high level of demand relative to resource availability. Increasing use levels and investment from international organizations and companies, such as at the Sandy Ridge bike trails, also indicate the value and scarcity of these resources.

Not all of the goods and services provided by the natural resources on BLM-administered lands that benefit society do so through, or can be measured by, market transactions. This does not mean that these goods and services are not economically important; rather it means that measuring their value or describing their economic importance is more challenging. Little specific information exists on values of the non-market goods and services available from the lands in the planning area. When the available data will not allow quantification, changes can be described qualitatively. Examples of non-market goods and services that BLM land-management decisions could affect include sequestering carbon, protecting water quality, providing habitat to endangered species such as the northern spotted owl, providing scenic resources, and supporting spiritual and cultural activities. Nascent markets exist that provide prices per ton of carbon sequestered. The best known locally is California's carbon cap-and-trade program that began in 2012. However, markets do not exist for carbon sequestered on federal lands.

Demographic conditions

Table 35 presents the population of each of the 19 counties and seven Native American reservations in the planning area. Western Oregon contains nearly 89 percent of the state's total population. All the counties have experienced some level of population growth since 2000. However, only six counties' growth rates outpaced that of the State of Oregon (Columbia, Jackson, Linn, Polk, Washington, and Yamhill). Of these, all except Jackson are in BLM's Salem District, which includes Portland. Jackson County includes the cities of Medford and Ashland.

Table 36 shows population, race, and ethnicity in the planning area as of 2010. Overall, the planning area's racial and ethnic (Hispanic or non-Hispanic origin) composition is similar to the state's as a whole. Nonwhite populations were highest in Multnomah/Washington and Marion Counties, which include Portland and Salem, respectively. No county had a population that was less than 76 percent white.

Native American population shares tend to be higher than the state share in counties that contain the reservations listed in Table 35, including Coos (Coos and Coquille Reservations), Douglas (Cow Creek), Lincoln and Polk (Siletz), Klamath (Klamath) and Yamhill (Grand Ronde) Counties. Reservations range in size from a few dozen acres (e.g., the reservation and off-reservation lands for the Coos/Lower Umpqua/Siuslaw Tribes) to more than 18,000 acres (the Warm Springs reservation is nearly 650,000 acres; of which approximately 18,000 acres are within the planning area).

Some of the tribal lands had large population increases between 2000 and 2010. The Confederated Tribes of Grand Ronde increased from 55 to 434. This increase resulted in part from development of housing near the Spirit Mountain Casino located on the tribal land. The Cow Creek Band of Umpqua Indians of Oregon increased from 22 to 104. This increase resulted from the acquisition and development of housing on their tribal lands. Prior to 2000, the tribe had almost no housing. Some of the tribes showed large population increases on a percentage change basis, but their actual numerical change was small. An example is the Klamath Tribes whose population increased from nine to 26, an increase of almost 200 percent.

Economic Conditions

The planning area covers all of western Oregon from north to south. This geography encompasses urban, suburban, and rural areas with diverse and distinct economies. In general, urbanization and greater economic diversity go hand-in-hand. That is, more intensively developed areas typically also have economies that are more diverse relative to less developed areas. Among the counties in the planning area, Benton, Clackamas, Marion, Multnomah, Washington, and Yamhill counties have more diverse economies that include a mix of industrial and commercial, manufacturing including high tech, retail sales, education and health care services, and agricultural and related production. County economies with relatively less diverse economies that rely more heavily on agricultural and natural resource-based activities include Coos, Curry, Douglas, Jackson, and Josephine counties (OED 2013).

TABLE 35. POPULATION CHANGE WITHIN THE PLANNING AREA FROM 2000-2010 BY COUNTY (U.S. CENSUS BUREAU 2012)

Geography	2010 Population	2000 Population	Population Change, 2000-2010	
			Number	Percent
Oregon	3,831,074	3,421,399	409,675	12%
Benton County	85,579	78,153	7,426	10%
Clackamas County	375,992	338,391	37,601	11%
Clatsop County	37,039	35,630	1,409	4%
Columbia County	49,351	43,560	5,791	13%
Coos County	63,043	62,779	264	0%
Curry County	22,364	21,137	1,227	6%
Douglas County	107,667	100,399	7,268	7%
Jackson County	203,206	181,269	21,937	12%
Josephine County	82,713	75,726	6,987	9%
Klamath County	66,380	63,775	2,605	4%
Lane County	351,715	322,959	28,756	9%
Lincoln County	46,034	44,479	1,555	3%
Linn County	116,672	103,069	13,603	13%
Marion County	315,335	284,834	30,501	11%
Multnomah County	735,334	660,486	74,848	11%
Polk County	75,403	62,380	13,023	21%
Tillamook County	25,250	24,262	988	4%
Washington County	529,710	445,342	84,368	19%
Yamhill County	99,193	84,992	14,201	17%
Planning Area Total	3,387,980	3,033,622	354,358	12%
Lands of Federally Recognized Tribes Within the Planning Area[1]				
Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians of Oregon (Coos County)	47	25	22	88%
Coquille Tribe of Oregon (Coos County)	323	258	65	25%
Cow Creek Band of Umpqua Indians of Oregon (Douglas County)	104	22	82	373%
Confederated Tribes of Grand Ronde Community of Oregon (Yamhill County)	434	55	379	689%
Confederated Tribes of Warm Springs Reservation of Oregon[2]	34,012	3,314	698	21%
Klamath Tribes, Oregon (Klamath County)	26	29	17	189%
Confederated Tribes of the Siletz Reservation (Lincoln and Polk Counties)	506	308	198	64%

[1]Reservations are included in County totals, but are reported separately here for clarification. See Table 1-4 of BLM 2008, which includes two tribes outside Oregon with interest in the planning area: the Modoc Tribe of Oklahoma and the Quartz Valley Indian Community of the Quartz Valley Reservation of California

[2]The Warm Springs reservation is primarily in Wasco and Jefferson Counties, but includes small portions of Clackamas and Marion Counties.

TABLE 36. POPULATION, RACE, AND ETHNICITY WITHIN THE PLANNING AREA BY COUNTY (U.S. CENSUS BUREAU 2010)

Geography	Total Population	White		African American		Native American/ Alaskan Native		Asian		Native Hawaiian/ Pacific Islander		Some Other Race		Multiple Races		Hispanic[1]	
		Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Oregon	3,831,074	3,204,614	84%	69,206	2%	53,203	1%	141,263	4%	13,404	<1%	204,625	5%	144,759	4%	450,062	12%
Benton County	85,579	74,506	87%	759	1%	627	1%	4,429	5%	213	<1%	1,985	2%	3,060	4%	5,467	6%
Clackamas County	375,992	331,571	88%	3,082	1%	3,122	1%	13,729	4%	867	<1%	11,756	3%	11,865	3%	29,138	8%
Clatsop County	37,039	33,680	91%	195	1%	362	1%	457	1%	86	<1%	1,208	3%	1,051	3%	2,838	8%
Columbia County	49,351	45,651	93%	207	<1%	656	1%	457	1%	95	<1%	590	1%	1,695	3%	1,987	4%
Coos County	63,043	56,618	90%	258	<1%	1,589	3%	660	1%	117	<1%	1,072	2%	2,729	4%	3,391	5%
Curry County	22,364	20,574	92%	67	<1%	426	2%	160	1%	21	<1%	294	1%	822	4%	1,201	5%
Douglas County	107,667	99,471	92%	317	<1%	1,953	2%	1,040	1%	122	<1%	1,279	1%	3,485	3%	5,055	5%
Jackson County	203,206	180,172	89%	1,372	1%	2,386	1%	2,364	1%	595	<1%	9,200	5%	7,117	4%	21,745	11%
Josephine County	82,713	76,449	92%	347	<1%	1,133	1%	681	1%	145	<1%	1,282	2%	2,676	3%	5,251	6%
Klamath County	66,380	57,019	86%	432	1%	2,734	4%	621	1%	75	<1%	2,751	4%	2,748	4%	6,915	10%
Lane County	351,715	310,685	88%	3,369	1%	4,070	1%	8,322	2%	769	<1%	9,837	3%	14,663	4%	26,167	7%
Lincoln County	46,034	40,393	88%	193	<1%	1,590	4%	492	1%	59	<1%	1,586	3%	1,721	4%	3,655	8%
Linn County	116,672	105,669	91%	534	1%	1,488	1%	1,111	1%	162	<1%	3,888	3%	3,820	3%	9,127	8%
Marion County	315,335	246,656	78%	3,371	1%	4,959	2%	5,995	2%	2,329	1%	39,819	13%	12,206	4%	76,594	24%
Multnomah County	735,334	562,421	76%	41,401	6%	7,825	1%	47,950	7%	4,029	1%	37,865	5%	33,843	5%	80,138	11%
Polk County	75,403	64,808	86%	424	1%	1,616	2%	1,435	2%	210	<1%	4,041	5%	2,869	4%	9,088	12%
Tillamook County	25,250	23,102	91%	85	<1%	260	1%	227	1%	59	<1%	904	4%	613	2%	2,284	9%
Washington County	529,710	405,642	77%	9,616	2%	3,937	1%	45,755	9%	2,433	<1%	39,797	8%	22,530	4%	83,270	16%
Yamhill County	99,193	84,758	85%	872	1%	1,520	2%	1,474	2%	172	<1%	7,137	7%	3,260	3%	14,592	15%
Planning Area	3,387,980	2,819,845	83%	66,901	2%	42,253	2%	137,359	4%	12,558	<1%	176,291	5%	132,773	4%	387,903	11%

[1]The U.S. Census collects ethnicity (Hispanic or non-Hispanic) data separately from race. Thus, a person may be both Hispanic and a member of one or more races.

Table 37. Property taxes, O&C payments and budget impacts by counties within the planning area

	Tax Rate per $1,000 Assessed Value	Payment of Total O&C Funds	O&C Payment as Proportion of County Budget	O&C Payment of 2007- Proportion of General Fund Discretionary Revenue
Douglas (distressed)	$1.1124	25.0%	15%	81%
Jackson (distressed)	$2.0099	15.7%	6%	39%
Lane (distressed)	$1.2793	15.3%	3%	33%
Josephine (distressed)	$0.5867	12.1%	13%	75%
Coos (distressed)	$1.0799	5.9%	6%	56%
Clackamas	$2.9766	5.5%	1%	7%
Curry (distressed)	$0.5996	3.7%	7%	69%
Benton	$2.2052	2.8%	4%	17%
Linn (distressed)	$1.2736	2.6%	2%	11%
Klamath (distressed)	$1.7326	2.3%	1%	22%
Polk (distressed)	$1.7160	2.2%	3%	23%
Columbia (distressed)	$1.3956	2.1%	5%	28%
Marion (distressed)	$3.0252	1.5%	1%	3%
Multnomah	$4.3434	1.1%	<1%	1%
Yamhill (distressed)	$2.5775	0.7%	1%	5%
Washington	$2.2484	0.6%	<1%	1%
Tillamook (distressed)	$1.4986	0.6%	1%	5%
Lincoln (distressed)	$2.8202	0.4%	1%	27%
Total		**100%**		

In 2010, the Western Oregon Task Force (2010) summarized the historic, socioeconomic context in western Oregon:

> Western Oregon is facing significant social and economic issues. Since the mid-1990s and the development of the Northwest Forest Plan, timber production has steadily declined in western Oregon which has caused loss of jobs and economic hardship in many communities. Timber-related job losses have resulted from both the decline in timber production on Federal lands and technological changes in the forest industry. Some communities have been more resilient than others and have had opportunities to further diversify their economies, but many still rely to a great degree on timber production.

Oregon's 18 O&C counties currently receive payments from the Secure Rural Schools program, and receive Payments in Lieu of Taxes with the amounts based primarily on the number of acres under federal management. Clatsop County is the only county in the planning area that is not an O&C County. Funding for the Secure Rural Schools program comes from direct federal appropriations and is not based on timber harvests. Were Congress to allow the Secure Rural Schools program to expire, payments to counties would come from payments based on timber harvests and the Payments in Lieu of Taxes. However, the current combination of Payments in Lieu of Taxes plus Secure Rural Schools payments yields an amount significantly greater than a payment based on timber harvests and Payments in Lieu of Taxes. For example, using data for 2007, the timber payment plus Payments in Lieu of Taxes would have been less than 14 percent of the Payments in Lieu of Taxes plus Secure Rural Schools payment (Tuchmann and Davis 2013).

When adjusted for 2011 dollars, historical O&C Payments (including the Secure Rural Schools program) averaged $134 million from 1960-2011. With each successive extension of the Secure Rural Schools (SRS) program (FY 2009

forward), the total payment (in 2011 dollars) declined from $136 million in 2001 to $40 million in 2011. Without the SRS extension, the O&C Counties would have received a total of $9 million in 2011, based on 50 percent of timber receipts (Tuchmann and Davis 2013).

Counties use the federal payments to support discretionary spending (i.e., spending that is not mandatory) on services such as public safety, libraries, and animal control. Counties have dealt with declining federal payments in different ways. Some have tried funding vital services such as public safety by passing tax levies. Others have explored sales taxes or attracting new businesses. Some have considered outsourcing services such as libraries and public health. Staff reductions and limiting or ending services have also happened.

Of the counties in the planning area, Douglas and Josephine Counties rely most heavily on federal payments as measured by percentage of their total county budget (Table 37). In ten out of the eighteen counties, federal payments account for more than 20 percent of the counties' discretionary spending. Coos, Curry, Josephine, and Douglas counties rely especially heavily on federal payments in this regard, with the percentage of their discretionary funds coming from federal payments ranging from 56 to 81 percent (Tuchmann and Davis 2013).

The Oregon Secretary of State's office recently conducted an analysis of the financial conditions of Oregon's counties (Brown and Blackmer 2012). Analysts ranked the counties using ten indicators of financial wellbeing: debt burden, liquidity, retirement benefit obligation, population trends, unemployment, and the relative dependence on timber payments. Based on this assessment, analysts identified eight counties with a higher risk of financial distress: Coos, Curry, Douglas, Jackson, Josephine, Klamath, Lane, and Polk counties. All of these counties are O&C counties.

The western Oregon planning area contains the largest economic centers in the state. In 2011, the planning area hosted 1.97 million jobs – or nearly 89 percent of all jobs statewide (Table 38). Counties included in the BLM's Salem District accounted for approximately 75 percent of western Oregon jobs. Over 1.15 million jobs were located in the Portland-Vancouver-Beaverton Metropolitan Statistical Area (Portland MSA) with another 364,000 jobs in non-MSA parts of the District. To the south, 458,000 jobs – or 23 percent of the planning area employment – occurred in all other counties located within the planning area.

\Table 38 shows employment trends since 2001 and 2007. The change since 2001 represents a long-term look at employment changes in the planning area that indicates structural changes in the economy. Since 2001, western Oregon employment increased by 6.1 percent. In the Portland MSA, employment rose 7.6 percent, but in every other portion of the planning area job counts changed less than the planning area average. In two Districts – Roseburg (Douglas County) and Lakeview (Klamath County) – total jobs contracted rather than increased.

The change since 2007 offers a short-term view, reflecting a slow recovery from the 2007-2009 recession. Statewide employment in Oregon peaked in 2007, just as it did throughout the United States (U.S. Department of Commerce 2013). Throughout the planning area, total employment in 2011 remained short of the peak in 2007. Districts with the greatest job reductions were Roseburg (Douglas County) and Medford (Jackson and Josephine Counties). In both cases, 2011 employment is below pre-recession levels

Bold entries in Table 38 indicate where changes in either the long- or short-term lag behind statewide averages. The bolded entries reveal that many trends outside the Portland MSA show less positive or more negative changes than those found statewide. This suggests that many communities in the planning area are still struggling not only in the wake of the national recession, but also since 2001.

Table 39 shows unemployment for the civilian labor force in 2012 and 2000. Unemployment rose in all planning area counties (as well as the state) over this period. Unemployment in 2012, and unemployment growth between 2000 and 2012 was generally higher in the counties in the southern part of the planning area (e.g., Coos, Curry, Douglas, Josephine, Klamath). Business Oregon (2013) identified 15 of the planning area counties as distressed areas, as measured by their unemployment rate in 2012.

TABLE 38. EMPLOYMENT IN WESTERN OREGON BY BLM DISTRICT IN 2011 AS WELL AS THE CHANGE COMPARED TO 2001 AND 2007[1]

		Total			Wood Products Manufacturing3			Visitor Services Industry4			Government (Federal, state, and local)			All Other Industries		
		2011 Jobs	Percent Change From		2011 Jobs	Percent Change From		2011 Jobs	Percent Change From		2011 Jobs	Percent Change From		2011 Jobs (1,000)	Percent Change From	
District2	Counties2	(1,000)	2007	2001	(1,000)	2007	2001	(1,000)	2007	2001	(1,000)	2007	2001	2007	2001	
Portland MSA	Clackamas, Columbia, Multnomah, Washington, Yamhill	1,152.7	-1.9	7.6	2.8	**-39.5**	**-43.5**	108.2	2.8	21.1	121.2	2.5	9.1	920.5	-2.8	**6.2**
Other	Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook	364.1	**-4.8**	**5.6**	3.2	**-42.6**	**-43.5**	33.8	**-3.2**	**10.0**	71.3	1.6	4.9	255.7	**-5.9**	**6.4**
Salem	Subtotal	1,516.7	-2.6	7.1	6.0	**-41.2**	**-43.5**	142.1	1.3	18.3	192.5	2.2	7.5	1,176.2	-3.5	**6.3**
Eugene	Lane	190.5	**-7.6**	**3.8**	3.4	-25.4	-34.8	18.6	**-2.8**	**10.0**	30.6	6.1	14.3	137.9	**-10.2**	**2.5**
Roseburg	Douglas	49.6	**-10.2**	**-3.6**	2.6	-26.1	-40.4	4.0	**-9.8**	**-1.7**	8.0	**-3.9**	**-5.6**	34.9	**-10.2**	**1.4**
Coos Bay	Coos, Curry	40.9	**-8.5**	**2.6**	0.6	-21.6	-22.1	4.4	**-8.2**	**7.1**	7.1	**-4.6**	**-4.4**	28.8	**-9.1**	**4.5**
Medford	Jackson, Josephine	145.9	**-8.9**	**4.8**	1.9	-31.9	**-48.9**	15.0	**-7.8**	**8.9**	15.2	-0.7	**-4.4**	113.8	**-9.5**	7.5
Lakeview	Klamath	31.6	**-8.8**	**-1.2**	1.0	-32.6	-33.7	2.8	**-15.5**	**-4.7**	5.4	**-1.1**	**-3.0**	22.4	**-8.2**	**1.8**
Western Oregon - Total		1,975.2	-4.1	**6.1**	15.5	-33.5	-40.8	186.8	-0.7	15.4	258.8	2.0	6.4	1,514.0	**-5.0**	**5.8**
Oregon State - Total		2,221.8	-4.1	6.4	19.3	-35.1	-42.1	211.0	-1.1	15.4	286.6	-0.9	3.0	1,704.9	-4.5	6.9
Supported by BLM		14.6	-	-	0.4	-	-	4.2	-	-	0.8	-	-	9.2	-	-
Percent of State Total		0.7%	-	-	1.4%	-	-	2.0%	-	-	0.3%	-	-	0.5%	-	-

SOURCES: U.S. BUREAU OF ECONOMIC ANALYSIS, TABLE CA25N; WOOD PRODUCTS MANUFACTURING FROM U.S. BUREAU OF LABOR STATISTICS, QUARTERLY CENSUS OF EMPLOYMENT AND WAGES; BLM ESTIMATES FROM JOSH SIDON, BLM NATIONAL OPERATIONS CENTER, ANALYTICAL TABLES USED IN PREPARATION OF BLM ANNUAL REPORT AND DOI ECONOMIC CONTRIBUTIONS REPORT, FY 2011.

BOLD PERCENTAGES INDICATE A CHANGE THAT IS SMALLER (LESS POSITIVE OR MORE NEGATIVE) THAN THE STATE AVERAGE.

[1] TRENDS FROM 2007 PROVIDE A LOOK AT HOW INDUSTRIES HAVE CHANGED SINCE THE RECESSION. TRENDS FROM 2001 PROVIDE A LONG-TERM VIEW OF STRUCTURAL INDUSTRY CHANGES THAT IS LESS AFFECTED BY THE RECESSION.

[2] PORTIONS OF SOME COUNTIES LIE WITHIN MULTIPLE BLM DISTRICTS. PORTLAND MSA IS THE PORTLAND-VANCOUVER-BEAVERTON METROPOLITAN STATISTICAL AREA.

[3] INCLUDES SAWMILLS, WOOD PRESERVATION, VENEER, PLYWOOD, ENGINEERED PRODUCTS, MILLWORK, AND OTHER. EXCLUDES SELF-EMPLOYMENT. DATA FOR LOGGING, PULP MILLS, AND PAPER MILLS NOT AVAILABLE.

[4] INCLUDES ARTS, ENTERTAINMENT, RECREATION, ACCOMMODATION, AND FOOD SERVICE SECTORS.

Table 39. Unemployment in December 2012 and 2000, not seasonally adjusted (BLS 2012) by county within the planning area

Geography	Unemployment		
	2012	2000	Change 2000-12
Oregon	8.2%	4.8%	+3.4%
Benton County	5.6%	3.4%	+2.2%
Clackamas County	7.4%	3.6%	+3.8%
Clatsop County	7.9%	5.1%	+2.8%
Columbia County	9.0%	4.9%	+4.1%
Coos County	10.3%	7.1%	+3.2%
Curry County	11.6%	7.1%	+4.5%
Douglas County	11.4%	7.3%	+4.1%
Jackson County	9.5%	4.6%	+4.9%
Josephine County	11.4%	6.4%	+5.0%
Klamath County	11.6%	7.9%	+3.7%
Lane County	7.9%	5.1%	+2.8%
Lincoln County	9.1%	6.6%	+2.5%
Linn County	10.7%	6.3%	+4.4%
Marion County	9.2%	5.1%	+4.1%
Multnomah County	7.3%	4.2%	+3.1%
Polk County	7.9%	4.6%	+3.3%
Tillamook County	8.4%	5.4%	+3.0%
Washington County	6.7%	3.4%	+3.3%
Yamhill County	7.9%	4.3%	+3.6%
Planning Area Total	**8.2%**	**4.8%**	**+3.4%**

The BLM is a small, but important, contributor of jobs in Oregon. In 2011, BLM programs accounted for 14,600 jobs statewide (Sidon 2012). This estimate includes the contribution from all resource programs as well as agency expenditures and federal payments from all sources (including but not limited to Secure Rural Schools and Payments in Lieu of Taxes), and represents about 0.7 percent of all Oregon employment. The timber sale program alone supported 2,900 jobs, the recreation program supported 7,300 jobs, and all other programs plus federal payments supported 4,400 jobs. While jobs supported by grazing, recreation, minerals, and other programs could be found across Oregon, nearly all jobs supported by the timber program occurred within the planning area.

BLM programs affect nearly all industries in Oregon, but in western Oregon, they primarily affect three: forest products, visitor services, and government. Across western Oregon, these industries account for over a quarter of all employment. Table 38 provides a detailed look at these industries both statewide and in the planning area. Visitor services and government employment data were obtained from the U.S. Bureau of Economic Analysis. Complete employment data for the forest products industry is not available from public sources. The industry is generally regarded as a mix of detailed sectors found in a variety of standard industry groupings used by the Bureau of Economic Analysis. Using data available from the U.S. Bureau of Labor Statistics, the forest products industry (in Table 38) is represented by wood products manufacturing. This includes sawmills, wood preservation, veneer, plywood, engineered products, millwork, and other; data for logging, pulp mills, and paper mills is not available. Wood products manufacturing is a large portion of the forest products industry, but important pieces are missing. Pulp and paper manufacturing is a large employer in the planning area, but employment data are generally unavailable at the county level because of federal confidentiality rules. Logging is another very important part of

the larger industry, but a large number of jobs are held by the self-employed who are not captured in Bureau of Labor Statistics estimates. Consequently, wood products manufacturing offers a proxy for the larger forest products industry in Table 38, but understates the actual number of jobs.

The OFRI (2012) estimates the forest products industry in Oregon employs over 76,000. This estimate includes all those employed in the woods and in the mills. Wood products manufacturing, as a proxy for the entire industry, included 19,000 jobs statewide. This sector stands out as one that is not trending like the average in Oregon. While most industries in Oregon show a negative short-term trend coupled with a positive long-term trend, wood products manufacturing has been declining in both the short- and long-term. Since 2001, jobs in wood products manufacturing in western Oregon declined by over 40 percent. In the Medford District, these jobs have declined by nearly 50 percent. Reason for the long-term decline is generally credited to sizeable reductions in Federal timber harvest as shown in Figure 17 - Timber. Thus, an industry that was already in decline during the last decade took a serious hit during the last recession, accelerating industry contraction.

In 2011, 82 percent of all wood products manufacturing employment in the planning area were located outside the Portland MSA, with 61 percent in the central and southern districts. Half of all industry workers statewide are located in these districts. The decline of wood products manufacturing presents a serious challenge to many communities outside the Portland MSA not only because of reduced numbers, but also because this industry pays much better than average. Table 40 shows earnings per job for the same industry groups displayed in Table 38. Earnings per worker in the wood products industry generally exceed all other groups except government, averaging $52,700 in the planning area in 2011. Bolded entries in the table indicate where earnings per worker fall short of statewide averages for the group. Areas outside the Portland MSA have earnings that fall short of the state average, with the notable exception of wood products manufacturing. This industry, though declining, typically offers jobs that pay substantially higher than other local industries. In 2011, BLM programs accounted for 1.4 percent of all woods products manufacturing jobs in Oregon – nearly all of it generated from timber on O&C and CBWR lands administered by the BLM.

Table 40. Earnings per job in western Oregon by BLM District in 2011 (thousands of dollars)

District[1]	Counties[1]	All Industries	Wood Products Manufacturing[2]	Visitor Services	Government	All Other Industries
Portland MSA	Clackamas, Columbia, Multnomah, Washington, Yamhill	$53.9	$51.6	$21.8	$68.7	$55.8
Other	Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook	**$41.7**	**$51.0**	**$18.7**	**$57.2**	**$40.5**
Salem	Subtotal	$51.0	**$51.3**	$21.1	$64.4	$52.4
Eugene	Lane	**$40.5**	$54.5	**$17.4**	**$52.3**	**$40.8**
Roseburg	Douglas	**$37.3**	$54.0	**$17.4**	**$57.4**	**$34.4**
Coos Bay	Coos, Curry	**$35.5**	$57.6	**$18.4**	**$58.0**	**$32.3**
Medford	Jackson, Josephine	**$37.5**	**$49.2**	**$19.2**	**$57.6**	**$37.2**
Lakeview[1]	Klamath	**$36.4**	$55.6	**$18.0**	**$54.8**	**$33.9**
Western Oregon		$48.1	$52.7	$20.4	$62.0	$49.2
State		$47.0	$51.6	$20.2	$61.5	$47.6

Sources: U.S. Bureau of Economic Analysis, Tables CA25N and CA 05N; Wood Products Manufacturing from U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, adjusted for total earnings.

[1] Portions of some counties lie within multiple BLM districts. Portland MSA is the Portland-Vancouver-Beaverton Metropolitan Statistical Area. Only the Klamath Field Office of the Lakeview District is part of the planning area.

[2] Includes sawmills, wood preservation, veneer, plywood, engineered products, millwork, and other excludes self-employment. Data for logging, pulp mills, and paper mills not available.

[3] Includes arts, entertainment, recreation, accommodation, and food service sectors.

Wood products manufacturing, as a proxy for the entire forest products industry, offers some of the highest paying jobs in the central and southern districts. In addition, the multiplier (economic ripple) effects for wood products manufacturing – as well as pulp and paper mills – are some of the highest in the state (MIG, Inc. 2011). Every job in these wood processing industries generates anywhere from 2.7 to 6.8 jobs throughout Oregon. This may be compared with employment multipliers for visitor services that range from 1.2 to 2 or for state and local government employment, which ranges from 1.5 to 4. Because of multiplier effects, the forest products industry is a very effective vehicle to strengthen local economies. However, like all agricultural commodities, the timber industry is sensitive to business cycles both nationally and internationally.

Less traditional uses of BLM-administered lands also provide employment contributions to local economies. Gathering non-timber forest products, such as mushrooms and greenery, is known to engage many individuals, but these business activities occur in less structured markets and therefore are missed in conventional data sources. While many of these uses are not traditional from an economic perspective, they may be principally traditional from a tribal cultural perspective.

Oregon has a vibrant tourism industry and a population that values outdoor recreation. Statewide, tourism is the third largest exporting industry in rural areas, behind forest products and agriculture/food processing (Dean Runyan Associates 2012). In this discussion, we use visitor services as a good indicator for all visitor spending. Visitor services include the arts, entertainment, recreation, accommodation, and food service sectors. While firms in these sectors are front-line recipients of tourism spending, locals also frequent these businesses. In the western Oregon planning area, visitor services accounted for nearly 187,000 jobs in 2011 – over nine percent of all jobs. In both the short and long-term, the visitor services industry across Oregon has fared much better than other industries. In the Portland MSA, this industry has already surpassed previous highs in 2007. However, those areas outside the Portland MSA have lagged behind. Even in the long term, visitor services in Roseburg (Douglas County) and Lakeview (Klamath County) have not reached 2001 employment levels.

Recreation spending on BLM-administered lands accounted for 4,200 visitor-service jobs statewide – two percent of Oregon employment in this industry. Nearly all of these jobs occurred in areas outside the Portland MSA.

Earnings in the visitor services industry are the lowest of the industry groups directly affected by BLM programs. Average annual earnings per job in western Oregon for the visitor services industry was $20,400 in 2011 (Table 40). This is only 42 percent of the average for all jobs in the planning area. In a recent report, the Oregon Employment Department recognized a pattern of solid growth for industries with low wages (Peniston 2013). The Oregon Employment Department analysis showed low-wage job growth in Oregon rebounding from the recession much better than either mid-wage or high-wage jobs. Information in Tables 37 and 38 aligns well with these Oregon Employment Department observations. While visitor service jobs characteristically pay low wages, they are an important piece to local economies. The visitor services industry offers entry-level employment for many and seasonal employment for youth. In addition, jobs in this industry provide important supplemental income to many households. Recreation activity on BLM-administered lands by local residents generates important employment and earnings in any community, but it is tourist spending that genuinely drives a portion of the local economy. Like the forest products industry, tourism is subject to swings in the business cycle.

Federal, state, and local governments in western Oregon provided nearly 259,000 jobs – or 13 percent of all employment – in 2011. Throughout the entire planning area, government jobs increased by two percent since 2007 and 6.4 percent since 2001. The largest increases occurred in the Salem District. In contrast, most districts in southern Oregon saw reductions in government employment in both the short- and long-term. Long-term reductions up to 5.6 percent were recorded in Roseburg (Douglas County) District and 4.4 percent in both Coos Bay (Coos and Curry Counties) and Medford (Jackson and Josephine Counties) Districts. In 2011, BLM programs accounted for just over half a percent of government employment statewide. Government jobs are among the best paying throughout western Oregon. In 2011, earnings for government workers averaged $62,000 in the planning area, exceeding the average for all workers by almost 30 percent. This average includes employees of all federal, state, and local governments.

Social Conditions

Social conditions describe the social organization, values, and sense of place in an area including the attitudes, preferences, and values that characterize a community or communities. The planning area is large, populous, and geographically diverse, and there are large differences in social conditions among the communities in the area. The term "community" can mean different things to different people because there are many different types and scales of community – including communities of place, such as neighborhoods, towns, or counties, and communities of interest, such as recreation user groups, environmental organizations, or the Association of O&C Counties. Communities of interest can be defined as "groups of like-minded people who gain strength from their relations and associations" (Donoghue *et al.* 2006). Native American populations may constitute communities of place and/or interest.

The 2008 RMP/EIS (Chapter 3) classified the planning area counties into four groups based on shared economic characteristics, noting that each type would react to changes differently:

- Coastal – Coastal Counties that derive a relatively small share of income derived from wage and salary employment, and instead are characterized by seasonal homes and retirees (Coos, Curry, Lincoln, and Tillamook Counties).
- Wood Products – Counties whose economies are based on wood products and that have a high incidence of wage and salary income and lower property incomes (Douglas, Jackson, Josephine, Klamath, Lane, and Linn Counties).
- Central – Counties where residents tend to commute to jobs in cities, and where retirees comprise a relatively low proportion of the population (Benton, Marian, Polk, and Yamhill Counties).
- Portland Metro – Counties surrounding the Portland metropolitan area that are employment centers, or are close to those centers (Clackamas, Columbia, Multnomah, and Washington).

This type of classification broadly links geographic communities with communities of interest, and could be used to help evaluate alternatives. The classifications in the 2008 RMP/EIS may have changed. For example, the Portland Metro area may have grown, or might be better characterized as a Willamette Valley Metro area, combining Portland, Salem, and Eugene.

The U.S. Department of Agriculture has developed Rural-Urban Continuum Codes comprising a nine-part classification scheme that distinguishes metropolitan counties by the population size of their metro area, and nonmetropolitan counties by degree of urbanization and adjacency to a metro area or areas (ERS 2012). Under this scheme, ten of the 19 planning area counties are in metro areas at the urban end of the scale. While the other nine counties are at the rural end of the scale, none is classified as "completely rural."

The term "timber-dependent" (BLM 2008, WOTF 2010, OFRI 2012) and "timber-based" (OFRI 2012) are frequently used to describe Western Oregon communities where the forest sector "makes up a significant portion of employment relative to other industries," (OFRI 2012). Most of the Wood Products and Coastal Counties listed above all derive more than 10 percent of their economic bases from timber, with Klamath and Douglas Counties deriving more than 20 percent of their bases from timber (OFRI 2012). Dependence on timber may have social as well as economic consequences. Pursuant to OAR 123-024-0031, the state defines "Distressed" counties (and all geographic areas within a designated county) based on indicators such as education, unemployment, poverty level, and per capita personal income. Counties are considered distressed based on an index that takes into account the unemployment rates, per capita personal income, change in average covered payroll per worker over three years and change in the county's weighted average employment change over two years. As of early 2013, of the 19 planning area counties, only Benton, Clackamas, Multnomah, and Washington Counties were considered not distressed. Note that the 2013 listings are based on a temporary methodology used when the statewide unemployment rate is over 8 percent.

Indicators of community distress cited by other sources include:

- Student participation in the state's Free or Reduced Price Meal program at school. "Regardless of status (open or closed), there was a general increase of students participating in the Free or Reduced Price Meal program in schools within three miles of a [wood products] mill" (Sierra Institute 2012).
- "The higher the population in a rural community, the greater the infrastructure and the higher the socioeconomic resilience" (Donoghue *et al.* 2006).
- Many of the Wood Products and Coastal counties listed above (the historical source of much of the region's timber production) are among the lowest-ranked counties in Oregon for "poor mental health days" and other health factors (County Health Rankings 2012).
- Communities in western Oregon (place and interest communities) derive much of their identity from the region's natural surroundings and resources, though the specific sources of that identity vary considerably. Through their communications (print, speech, electronic) various communities demonstrate the following as being important to them and, and, by inference to their identity and values: timber; non-timber forest products; recreational amenities; forest, agricultural, and riparian landscapes – especially old growth; cultural, spiritual, and scenic resources (including tribal resources); and wildlife habitat –including habitat for rare, threatened, or endangered species.

Trends And Forecasts

The Oregon Office of Economic Analysis (OOEA 2013) forecasts a generally improving economy and identifies the following economic trends anticipated to affect the planning area.

- Economic growth in many of Oregon's major international trading partners is expected to rebound during the 2014-2017 period. Canada, Mexico, South America, Asia (minus Japan), and China are projected to have stronger growth economies during this time. This growth will improve the outlook for Oregon's exports.
- At the national level, the forecast is mixed. The loss of the Social Security tax cut, and increased taxes on high earners, is expected to reduce economic growth by approximately 0.6 percent this year. The recent sequester cuts in federal spending will negatively affect local and regional economies that rely more heavily on this spending. The upcoming debt-ceiling negotiations are expected to further reduce federal spending.
- In spite of the weak near-term forecast, growth prospects improve over the longer term. Household net worth is growing, home prices are increasing again, the stock market has regained its recession losses, and businesses hold significant amounts of capital that they are expected to invest.
- In the western U.S., segments of the economy most strongly depending on the housing sector should see some improvements over the mid- to long-term. Multi-family and single family housing starts are growing and are expected to continue improving.

In addition to the above, until details on federal spending have been decided, especially federal timber-related payments to O&C counties, area economies that depend more heavily on these payments will face continued uncertainties. Uncertainty regarding future amounts of federal spending will likely affect private investment decisions that could negatively affect communities that depend on this federal spending and private investment.

State and national trends indicate increasing demand for different types of outdoor recreation (OPRD 2003; USFS 2011; USFS 2012).

Management Opportunities

The RMPs present opportunities to manage BLM-administered lands to contribute to sustainable communities. The management opportunities lie in understanding the economic and social consequences of individual BLM programs and their contributions to local stability and economic growth and stability and to social capacity and resiliency. The key economic question is "What mix of BLM programs offers local communities and counties stability and growth

potential by generating the production of goods and services with consequences in the private sector and in Federal payments to the public sector?"

Management opportunities include:

- Adjusting the level and type of timber harvest
- Increasing opportunities for harvest of non-timber forest products
- Enhancing ecosystem services (such as restoring watersheds)
- Investing in recreation, including cultural and wildlife-based activities, for both non-locals (tourists) and locals
- Managing to increase economic activity resulting from saleable minerals, grazing, and other resources
- Prioritizing projects or opportunities (including fuel treatments) that would benefit communities in need
- Increasing collaboration with local community leaders to design alternatives responsive to community needs and monitor the implementation of the RMPs

Historically, county fiscal conditions have been associated with and based on expectations of shared revenues generated by the sale of timber and other goods and services from federal lands. Management options that provide more certainty in the amounts of market goods and services available from the planning area would help offset some of the negative effects of the uncertainty around federal payments. Where employment and earnings are generated (e.g., ecosystem service contracts, recreation spending, timber processing), state and local taxes revenues are also generated that support the public sector.

As BLM considers various program mixes, it is important to recognize that some industries are susceptible to strong market forces outside of Oregon or even the United States. Therefore, one mix of BLM programs may be subject to greater disruption compared with a different mix. These disruptions could affect the ability of certain program mixes to support economic stability and growth in the planning area. To address this type of risk and uncertainty requires a description of industries that both BLM programs and volatile market forces may substantially affect.

Soil Resources

Key Points

- Soil productivity is best defined as a functional process rather than a single measure of tree growth. Defining the physical, measurable, and important soil functions that relate to productivity could provide a better means to assess, manage, and monitor soils on BLM-administered lands.
- Developing a set of "Best Management Practices" similar to those for water quality, to protect soil resources would demonstrate the BLM's commitment to managing soil resources to prevent negative impacts.
- Determining the estimated amount of sediment delivered from our transportation network may assist the BLM in directing annual maintenance, planning for short- and long-term road closure programs and reducing the contribution of sediment to streams and ditches
- Soils in the southern portion of the planning area are generally more sensitive to ground disturbance activities than in the northern portion. Protection measures specific to erosion, compaction, and nutrient status during implementation of timber harvesting and fuel reduction actions are necessary to preserve site productivity.
- The current prohibition against fertilization of managed forest stands has likely had an impact on soil productivity.

Current Conditions And Context

The 1995 RMPs state that soil productivity would be maintained or improved, but included no definition of what constitutes soil productivity. Therefore, no basis exists for determining if site productivity conditions have improved,

degraded, or maintained since implementation of these RMPs. Several attempts at defining suitable soil quality measures have been attempted for agriculture lands and the forests of the U.S. Forest Service. The BLM has no similar standards at this time.

For forests to be sustainable, soil quality (the inherent capability of soil to support vegetative growth) must be maintained (Power and Meyers 1989). However, it is difficult to evaluate soil quality because of the diverse soil properties to be measured, the different appraisal techniques, and the soil uses. There are methods to measure physical properties such as infiltration rates, available water holding capacity, and soil depth as well as the chemical and biological activity.

The Pacific Northwest region is a nitrogen-limited system. One of the methods used to maintain productivity during intensive forest management is to fertilize a given stand of trees with nitrogen. However, most districts have failed to meet their decadal commitment for fertilization under the 1995 RMPs (see Silvicultural section). Any nitrogen the BLM applied prior to the court-ordered injunction in 1999, has since been used by plants, animals, and soil organic matter, or lost to the air and water.

Based on available site index measures (standard measure of tree growth) across the planning area, the north area generally rates as Class 3 or above (more productive) whereas the south tends to be Classes 4 or below (less productive). This difference is due to the parent materials, the precipitation amounts, and the weathering across the two areas.

The BLM has recently become active in removal of biomass following timber harvests to provide renewable energy or to reduce fire risk; this may affect maintaining soil productivity. On soils already low in nutrient stores, the removal of the tree needles, twigs, and small branches limits future production and health of the future stand because the nutrients in those items could replenish the soil. This relocation of nutrients, and a lack of fertilization, reflects in the reduced growth and vigor of the remaining trees.

Road Construction, Timber Harvest, and Fuels Reduction

When new roads are constructed across BLM-administered lands, the purpose of the land upon which the road is built changes. The land no longer supports vegetation; it supports the infrastructure needed to manage those timbered lands. Generally, roads constitute one to four percent of the surface area on BLM-administered lands. The 1995 RMPs contained an assumption of the number of road miles that would be built to conduct land-management activities. There was a level estimated for both regeneration and thinning harvests. Regeneration harvesting has not occurred at the expected rate resulting in an increased number of thinning compared to the 1995 RMPs (see Timber section) to achieve ASQs. Because thinning harvests require more acreage to meet volume targets, and cover larger geographic areas, they have an associated increase for roads to accomplish the harvest compared to regeneration harvests.

Many of the thinning harvests have had some component of decommissioning of roads after use for harvest activities, particularly one-time use spur roads used for summer haul. While most roads have been identified through the project planning process, there are always short, unplanned spurs. There is no mechanism to account for these roads, but the amount is expected to be small. Generally, roads in thinning projects have a future administrative use and are not fully decommissioned and replanted.

Thinning harvests also have an increased number of skid trails and yarding corridors. All of these disturbance areas potentially compact the soil and reduce site productivity. Skyline cable operations generally have a greater number of yarding corridors; however, one-end suspension of logs and the slash covering the ground reduces the yarding impact, resulting in little to no compaction in yarding corridors.

Where ground-based harvest systems have been employed, the overall number of skid trails remaining after harvest also increased. The 1995 RMPs encouraged skid trail removal at an appropriate time, generally at final harvest, not during thinning operations. By increasing the number of acres harvested with these systems, more compacted surfaces have remained after thinning operations than expected under the plan. The extent that these skid trails reduce growth is unknown, as the remaining trees are not within the trail system but to the side of it.

For fuels reduction projects that use heavy machinery to access areas where the fuels are converted to a mulch-like layer, there are two impacts to soil productivity. The mulch-like layer prevents nutrients and water from entering the soil and becomes a thick mat, insulating the soil. This available water is particularly important in the southern portion of the planning area, as shallow soils become moisture-stressed in the summer months. Covering the soil with a thick layer of materials also prevents native seeds from gaining the needed bare ground and sunlight to allow them to germinate and grow. In addition, these areas do not usually have a thick slash layer for the heavy machinery to drive over, which then compact the soil. Compaction limits infiltration of water, a necessary component to all soil processes.

Compaction and disturbance levels were discussed briefly in the 1995 RMPs. The extent of the harvested areas left in a compacted state was to be approximately 10–12 percent of the treated areas, depending on the district RMP. The Roseburg District had a level of productivity loss of less than one percent, which was from implementing the practice of sub-soiling all compacted surfaces, including one-time skid trails. The practice of tilling all ground-based trails was abandoned when the damage to the stands became evident (the tilling was damaging roots of the remaining trees, killing many), and the RMP was updated through plan maintenance to align with the other districts.

Sediment Delivery and Landslides

Landslides and woody debris delivery to streams is largely driven by soil strength and slope. Removal of vegetation exposes the soil and erosion ensues when precipitation or runoff crosses the unprotected soil. Most of the planning area has a high capacity to deliver sediment when more than 40 to 50 percent of the surface is exposed. In the southern portion of the planning area, this percentage may only need to be as high as 20 to 30 percent to encourage erosional losses. When the percent slope becomes greater than 35 percent and compaction or surface displacement occurs there is a high likelihood that erosion will occur.

Since the 1995 RMP implementation, sediment delivery from timber harvesting has been drastically reduced as the principle source of timber has come from thinning harvests. In the 1995 RMPs, the expectation was that sediment delivery would be greatest on the regeneration harvests that would have an associated broadcast burn to prepare for planting. This mechanism for erosion does not occur where a closed canopy exists after a thinning harvest. Only those areas where surface disturbance and displacement occurred would potentially contribute to sediment delivery and only at the levels cited above. Currently, these areas are largely confined to the road prism and landings. Implementation of the Best Management Practices contained in the 1995 RMPs has reduced this delivery to roads, particularly in areas with poor rock quality, lack of road maintenance, and winter haul on gravel roads. Other BMP road building requirements reduced the contribution of sedimentation such as from sidecast construction and decommissioning of dirt spurs. In addition, adding rock surfacing to dirt spurs reduced sediment erosion from road surfaces as well.

Landslides are a natural part of the forested landscape. Certain processes depend on the infrequent delivery of woody material and a mix of large and fine soil particles. Landslides can be attributed to several different processes but most have a common set of conditions that need to be met that allow the slide to occur. There is generally a given force in a downward direction for the mass of soil and vegetation on any hillslope. When enough water infiltrates the soil in a short period, it reduces the friction that holds that mass in place. Thus, the force of gravity pulls the mass downhill. This is best noticed in areas where all the trees are removed from a hillside or where soil has been piled on the outside of a road and not properly compacted. Most often, for landslides to occur, the hillslope has to be 65 percent or greater in the Coast Range and somewhat less in the Roseburg and Medford as those soils have greater instability.

Under the 1995 RMPs, a Riparian Reserve network was established adjacent to all intermittent and perennial streams. Two of the benefits from this protective zone were the reduction of landslides adjacent to the streams and reduced sediment from entering streams from upslope areas. Leaving trees for distances up to 400 feet either side of the stream reduced the occurrence of landslides developing in that zone. Tree roots provided the anchoring mechanism the soil needed to prevent the soil strength from being reduced and giving way to the force of gravity.

These Riparian Reserve buffers also reduce sedimentation from timber harvest because their width exceeded the distance needed to capture sediment from the upslope area. Native soil has an extremely high rate of infiltration and is capable of capturing most sediment with in the distances of the buffers provided. Thus, overall sediment delivery and landslides have been reduced since implementation of the 1995 RMP.

Best Management Practices

Best Management Practices as defined in the 1995 RMP currently do not address some operational activities that have become standard within the timber industry. For example, heavy machines focused on harvesting and removal of timber employ a few specialized operators that must be cognizant of how and when they operate or they may cause compaction. In addition, they disturb vegetation and open up land surfaces to erosional processes. Without some means to control and address current operational practices, the districts have been developing their own specific measures, which may have been too restrictive or not implemented due to lack of suitable levels of slash during operations. Thus, operators working across different districts or between private and federal lands have not been fully able to mitigate the impacts during harvesting and removal operations. This potentially leaves lands in a compacted or erosion-prone state and less productive.

Best Management Practices for the 1995 RMPs were updated in 2012 by all western Oregon districts to include a set of BMPs that would reduce the delivery of sediment from the BLM-controlled roads during the location, use, and decommissioning activities. These Best Management Practices were aligned with the current Forest Practices Rules used by the state. Reduced erosion from construction, haul, and decommissioning will aid in preserving soil productivity in many cases.

Similarly, the BLM Oregon State Office also released the report "A Synopsis and Updated Guide of the Standard Operational Practices for Upland Soil Productivity in Western Oregon" in March of 2010. However, the 1995 RMP did not incorporate these suggested practices.

Soil Resource Data Availability

County soil surveys produced by the Natural Resources Conservation Service contain all the necessary data and a suite of soil interpretations for most of the BLM's forest management, recreation, and rangeland actions. Specific limitations and interpretations have been developed and are beneficial for planning purposes. One of the most meaningful interpretations to describe the soil productive capacity is the vegetative production of the individual soil map units. This interpretation provides site index numbers of a desired tree species and can be used as a means to define the expected site productivity.

For the planning area, Douglas-fir is predominately the tree species cultured on an even management rotation. For the purposes of determining soil productivity in a narrow sense, the Site Index class is a means by which the long-term production of a soil type can be measured. Other interpretations for erosion, compaction, soil resiliency, infiltration rates, and many others can be used to define the capacity of the soil to perform under different management actions.

Timber Production Capability Classification

Timber Production Capability Classification partitions are based on the physical and biological capability of the site to support and produce forest products on a sustained yield basis, using operational management practices that were current at the time of evaluation (BLM Handbook Supplement 5251-1 – Timber Production Capability Classification, 1986). The initial review done in the 1970s was revised in the mid to late 1980s. No large-scale updates have been conducted to this inventory since, but minor revisions are conducted at the site level during project planning.

Riparian Reserves under the 1995 RMPs incorporate unstable land features present on our land base. Modeling landforms, where a high probability rating for failure to occur can be incorporated or mapping using LiDAR products may protect these areas and preserve site productivity.

Trends And Forecasts

Reduction of fuel loads through potential burning or vegetation removal will still likely need to occur as it will take decades to reduce the fire risk of current conditions. Should a wildfire occur, this increased fuel load could potentially damage the soil resources. To address fire risk in these communities, the removal of timber and vegetation will address the build-up of fuels. With more emphasis placed on soil functions during these activities, soil productivity should remain intact. The current trend is to use machinery (small to large in size and weight) to process these built-up fuels. A reduced level of material extraction and changing the use of this equipment will mitigate soil impacts, if soil risks are considered on par with fire risk.

The trend for cutting and harvesting timber over the last decade has been to employ smaller crews and use more expensive and mobile machinery for those harvest areas. The machinery no longer depends on four wheels or two tracks to distribute the weight of the machine. Operators may use machinery with six to eight wheels with the addition of tracks or very wide tracks. All these engineered designs spread the increased weight of the empty machine across a wider footprint. This does manage the impact to soil resources and reduces compaction forces. However, with multiple passes on the same skid trail, or loaded machines in use, compaction still occurs and will need to be mitigated or restrained.

This trend is expected to continue into the future. The economics of single operator harvest methods will not replace the traditional chainsaw and cable skyline methods on steeper slopes. However, industry has expressed their preference to use ground-based methods whenever possible. Thus, the issues of compaction, disturbance, and seasonal use based on soil moisture contents will continue in the future.

The current trend of focusing harvest on younger stands is likely to continue as large blocks of older timber are set aside for species habitat needs. Harvest from the younger stands may occur as either thinning or regeneration cuts. The reliance on broadcast burning as a site preparation tool may also be reduced if more thinning is employed. Using pile and burn techniques to reduce slash and vegetative competition may become standard and reduce the impacts to the soil in comparison to broadcast burns. Implementing practices that limit the size of material piled, the height and base area, and the timing of burning to a moist season would help to preserve soil productivity (Busse *et al.* 2013).

More thinning may mean more entries closely spaced in time. This could increase the level of compaction within the harvest unit (more trails and roads) or reduce the recovery of compacted areas. The trend has been that the new equipment cannot use the existing older skid trails effectively. The new equipment has a given length of boom reach and is single-operator focused rather than employing a second individual to pull a cable to a harvestable product while the machine stays on a designated trail. Thus, higher levels of compaction may be incurred each time an entry is made. Reducing the extent of compacted trails to provide infiltration and aeration of the residual stand may become a standard if thinning reduces residual stands to a low number of trees per acre that will remain over a longer period. In the past, this was expected to occur at final regeneration harvest.

Management Opportunities

In the dry forests of southern Oregon, an uneven–aged forest management strategy could help retain organic matter, microbial communities, water storage, and vegetation at levels that can be supported long term by the soil.

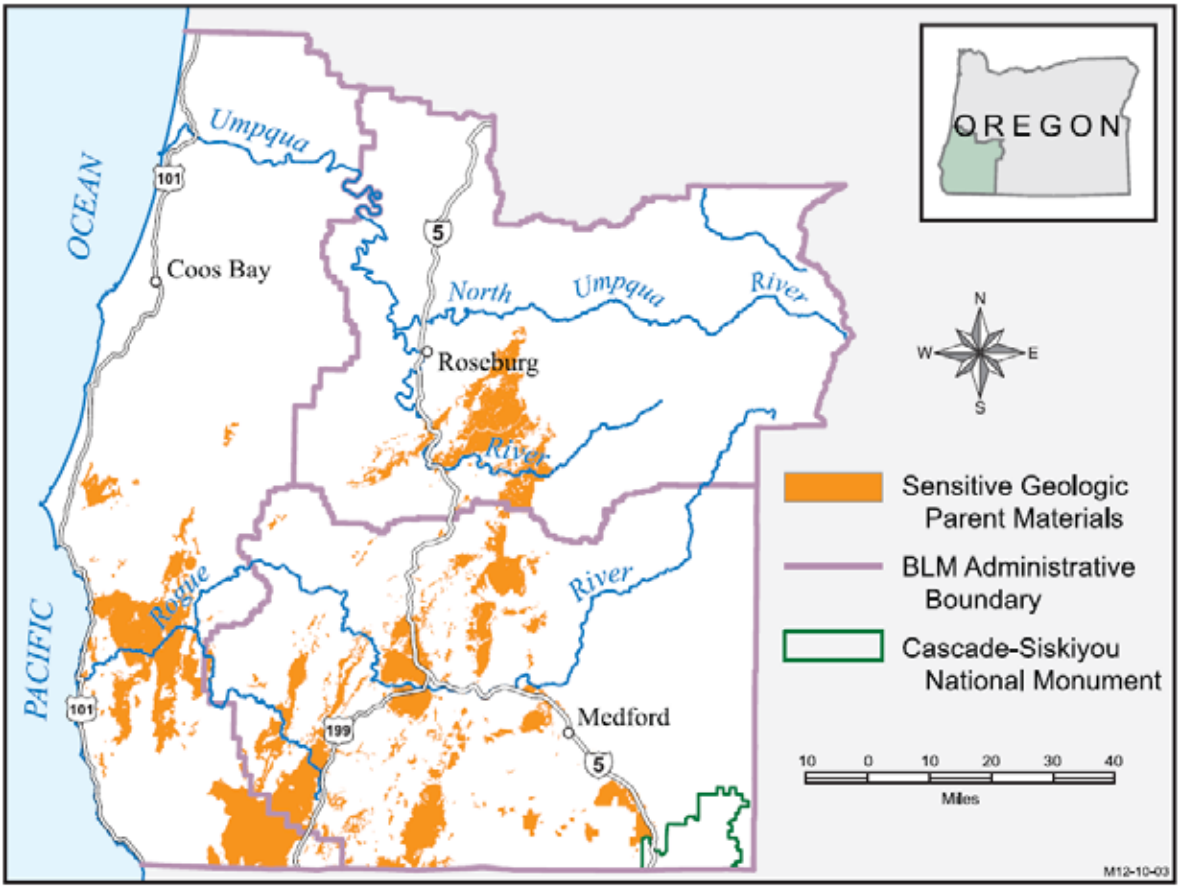
Adopting Soil Quality Standards for a forested environment could provide a better means for addressing the impacts to long-term site-productivity. Defining soil productivity in terms of soil functions that apply to a forested environment could allow managers a better understanding of the soil resources. As soil functions change under the influence of management actions, so does the capacity of the soil to store nutrients, water, and provide the needed microorganism functions that make a healthy soil. The Natural Resources Conservation Service has a set of standards that protect various soil functions, such as the capacity to buffer impacts, store and process nutrients, provide water, air and a microbial community to sustain the soil and what uses it. The soil properties that produce these processes could be incorporated in the plan as soil quality objectives or direction.

Recently, the Rocky Mountain Research Station published a research paper (Amacher *et al.* 2007) that developed a new index of forest health, called the Soil Quality Index. They integrated 19 physical and chemical properties of forest soils into a single number that serves as the soil quality. They presented regional and soil depth differences, and proposed that land-management agencies use the Soil Quality Index to establish baselines and detecting forest health trends across the landscape. The BLM could incorporate this index to define impacts in this RMP revision process.

Most importantly, The RMPs could include designing a set of practices or standard operating procedures to protect soil productivity that address current methods of harvesting timber, building roads and reducing fuel buildups. The 2013 BMPs and 2010 Standard Operational Practices could be incorporated into the current planning effort. This will consolidate practices that provide compliance with the Clean Water Act with those that ensure continued site productivity. These soil practices could be treated equally as are the MBPs for water quality. Providing the necessary implementation and effectiveness monitoring could help determine if these practices are meeting their intended purposes.

There could also be a differentiation in this set of practices to account for the soil differences between the northern and southern portions of the planning area. Mapping soils derived from granitic, schist, or pyroclastic parent materials defines a broader area of concern across the planning area (Figure 16) than was identified in just the 1995 Medford RMP. There are unique soil limitations, vegetation species, and water regimes for these soils. The same soils are also located on the Roseburg and Coos Bay Districts. This RMP revision would allow for standardized management of these soils across the three affected Districts.

FIGURE 16. SENSITIVE GEOLOGIC PARENT MAERIALS



Developing a set of soil monitoring questions that soil scientists, hydrologists, foresters, and engineers can easily answer to determine if soil function is being maintained, could assist in retaining and improving soil productivity.

The recent addition of LiDAR datasets to BLM's GIS capabilities has allowed us to refine our estimate of landslide-prone areas. The ability to locate unstable areas can provide stable road locations and delineate Riparian Reserves.

The GRAIP road sediment model is now available and may provide landscape-scale road-sediment analysis. Simulating the current and future delivery after roads were renovated or decommissioned may guide our maintenance level needs.

Sustainable Energy

Key Points

- The current RMPs do not adequately address the management of sustainable energy resources.
- There are minimal opportunities for the development of solar energy in the decision area using current technology.
- There are opportunities for the development of wind energy in the decision area, specifically two sites, Mary's Peak and Grants Pass. However, the BLM could designate portions of these areas as wind development avoidance/exclusion zones because of potential wildlife impacts.
- There are opportunities for the development of geothermal energy in the Klamath Falls Field Office, because current technology is mature and development is actively taking place proximate to BLM-administered land.
- There are opportunities for the development of biomass energy in the decision area, because the resource is widespread and harvesting for biomass energy conversion is currently being applied to a limited degree. The most significant detriments to biomass utilization are beyond the control of the BLM and include the lack of a collection/delivery infrastructure, the distance of populated areas from sites that could lend themselves to thermal conversion, and the lack of mature technology for conversion to liquid fuels.
- The most immediate impact that the BLM could have upon sustainable energy development in the planning area would be to support the establishment of rights-of-way (ROWs) for transporting/transmitting energy across federal land, including transmission from off-shore developments.

Current Conditions And Context

Currently, the term "renewable energy" refers to energy that issues from non-depletory resources. This type of energy is more accurately described as "sustainable" in that the source of the energy does not "renew" itself as much as it can "sustain" energy availability. There are five major sources of sustainable energy: 1) biological organisms (biomass), 2) tectonic/aquifer interface (geothermal), 3) oceanic instability (marine), 4) solar irradiation (photovoltaic or irradiant concentration) and 5) meteorological instability (wind). Transforming the sustainable energy resources endemic to the planning area requires plentitude of the resource, available technology, and the establishment of transportation corridors to facilitate gathering this energy for conversion, transformation, and distribution.

Although the non-depletory and minimal pollution aspects of sustainable energy makes it attractive to the public, these types of resources display other characteristics pertinent to RMP purposes which the BLM must consider. With the exception of geothermal energy, sustainable energy resources are dispersed. In addition, exploitation of sustainable energy is highly land-use exclusive. That is, if the decision is made to designate BLM-managed lands in the decision area as a "Renewable Energy Zone," or otherwise open to harvesting any form of renewable energy, the use of the land for any other resource production may be severely, if not completely, curtailed. "Harvest," as applied to sustainable energy, means to collectively gather or convert into a useful form of energy. This land-use exclusivity can affect biological, energy, and visual resources.

Utility-scale sustainable energy projects proposed for siting within the planning area are regulated at the state level by the Oregon Energy Facility Siting Council, which has regulatory and siting responsibility for large electric generating facilities of all types, including those powered by sustainable sources of energy:

1. Wind or solar ≥ 3.0 megawatts
2. Geothermal ≥ 1.11 megawatts
3. All others ≥ 1.0 megawatts (ODOE 2013)

Sustainable energy is generally located far from areas of significant energy consumption such as urban areas or industrial parks. They are also typically far from existing high-capacity transportation systems such as railroads, major highways, pipelines, and high-voltage transmissions lines. This necessitates the construction of high-capacity transportation connectors over long distances to delivery networks. The capital costs and rights-of-way costs for these transportation connectors coupled with the significant capital expenditures for energy conversion equipment represent a significant up-front investment. This level of investment is not easily supported economically by the relatively dilute concentrations characteristic of sustainable energy, especially with respect to its competing with the energy-dense character of fossil fuels.

Biomass

Currently, almost 85,000 green tons of woody biomass is produced from about 21,100 acres BLM-administered lands, equivalent to about 600,000 gallons of gasoline. Biomass is defined as, "all vegetative materials grown in forest, woodland, or rangeland environments that are the byproducts of management, restoration, or fuel reduction treatments (historically non-utilized or under-utilized material)" (WO IM 2004-227 – Bureau of Land Management's Biomass Utilization Strategy). The availability of biomass as a sustainable energy resource in the planning area is directly proportional to timber harvest volume. When timber is harvested, large amounts of biomass become available as a byproduct in the form of slash. The energy density of this material can be as much as five million BTUs per acre (BLM 2005a), enough to meet the residential heating needs of over four people for a month (USEIA 2011).

A joint assessment by the BLM and the U.S. Department of Energy National Renewable Energy Laboratory of sustainable energy potential of public lands identified that the optimum locations for generating useful energy from biomass fuels within the decision area are the Klamath Falls Field Office, McKenzie Field Office in the Eugene District, and the Swiftwater Field Office in the Roseburg District. The Coquille Indian Tribe has expressed interest in pursuing biomass development with the BLM.

Geothermal

There are neither existing developments nor any active plans for geothermal energy developments in the decision area. However, there are non-federal geothermal projects with the planning area, such as the pilot projects at Oregon Institute of Technology in Klamath Falls. Geothermal energy as defined for this AMS is "that part of the heat contained within the Earth that generates geological phenomena that can be recovered and exploited by man" (IGA 2004). Most geothermal energy conversion takes place using electric power generation industry terminology. However, current technology limits economic exploitation of this energy source to those unique geological structures in the Earth's crust that allow this internal heat to exist near the surface. A 2009 Instruction Memorandum (BLM IM 2009-022 – Geothermal Leasing under the Energy Policy Act of 2005) provides the process by which the BLM conducts competitive lease sales under the revised geothermal regulations, including the nomination process. Geothermal leasing regulations are described in 43 CFR §3200 – Geothermal Leasing Regulations.

Marine

Marine energy takes advantage of the kinetic energy present in ocean waves, tidal movement, and sea breezes. The BLM does not have jurisdiction over marine energy projects. The state of Oregon has jurisdiction over marine energy projects three miles or less offshore; the Bureau of Ocean Energy Management has jurisdiction over marine energy projects more than three miles offshore. Although the BLM is not involved with the development

of sustainable marine energy, there is a possibility that the BLM will be involved in the review, approval and administration of ROWs for energy corridors necessitated by marine energy development, depending upon where this energy (usually in the form of electric power) is brought to land for connection to the grid.

Over the past few years, the Department of the Interior, through the Bureau of Ocean Energy Management (BOEM) and its predecessor agencies, have made substantial progress working with the Atlantic states through the Atlantic Offshore Wind Energy Consortium to promote a regional approach to offshore wind development and through the state task forces, which are provided for in the renewable regulatory regulations the BOEM finalized in 2009, to identify areas that appear best suited for potential development. There are indications that success along the East Coast of the nation will be echoed by similar efforts on the West Coast, including the coast along the planning area.

Evidence of this mounting interest in developing marine energy resources along the coast of the planning area include collaboration among the BOEM, the Department of Energy, the Federal Energy and Regulatory Commission, the National Oceanographic and Atmospheric Administration and the West Coast Governors' Alliance to evaluate the potential benefits and impacts of renewable ocean energy projects off the West Coast and to develop the long-term regulatory structure for removal or expansion of activities. In addition, the BOEM and the state of Oregon have formed an intergovernmental task force involving federal, state, local and tribal governments to facilitate coordination and communication as proposals for developing marine energy are received (BOEM 2013). Finally, the state of Oregon has completed and adopted its Territorial Sea Plan, which identifies preferred development areas and processes for permitting. Private industry is proposing numerous research and pilot projects off the Oregon Coast.

Solar

There are no existing solar energy developments nor are there any active plans for solar energy developments in the decision area. Solar energy is that sustainable form of energy resulting from the impingement of solar radiation on the earth. The energy from solar radiation at a particular location on the earth is a function of the angle of impingement on the land, altitude of the land surface, and atmospheric clarity. The planning area is suboptimal in all three aspects of solar radiation: the northerly latitude does not allow for a near-vertical impingement angle; most of the land is near sea level maximizing the amount of atmospheric absorption of solar energy; and the high relative humidity and cooler climate result in an elevated likelihood for cloud development.

Wind

There are no existing wind energy developments nor are there any active plans for wind energy developments in the decision area. Wind as a sustainable resource is the kinetic energy in atmosphere movement due to changes in air pressure and temperature caused by the uneven heating of the earth's surface by solar radiation. Electric power generation uses virtually all harvested wind energy. The National Energy Policy Act of 2005 (P.L. 109-58) and the Energy Independence and Security Act of 2007 (P.L.110-140) empower federal government agencies to encourage the development of wind energy as part of America's sustainable energy mix. In Oregon, any wind energy facility with a power generation capacity of ≥ 3.0 megawatts falls under the jurisdiction of the Oregon Energy Facility Siting Council (ODOE 2013). Besides the significant monetary costs associated with permitting, ROWs, transmission lines, construction costs, capital costs and maintenance costs, wind machines have been found to exert an adverse effect on populations of migrating birds and bats (USFS 2013).

In 2005, the BLM completed the Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. This programmatic EIS contains analysis of proposed actions to establish a comprehensive Wind Energy Development Program to address wind energy development including the compiling of "best management practices."[7] The policies and best management practices developed under the proposed Wind Energy Development Program would establish minimum requirements for management of individual wind energy projects. The proposed policies identify management objectives and address the administration of wind energy development activities. The 2005 programmatic EIS noted that migratory patterns

[7]These are not to be confused with water quality Best Management Practices.

of birds would be an important parameter for identifying site-specific concerns of wind energy facilities being proposed for siting on BLM-administered lands (BLM 2005b). The Record of Decision for this EIS (Wind ROD; BLM 2005) included special provisions regarding the protection of birds and bats that would need to be incorporated into specific wind project plans and stipulations.

Energy Corridors

Most sustainable energy resources are present relatively far from areas of significant energy consumption such as urban areas or industrial parks. These resources are also usually far from existing high-capacity transportation systems such as railroads, major highways, pipelines, and high-voltage transmissions lines. This necessitates the construction of high-capacity transportation connectors over long distances to delivery networks. The capital costs and ROW costs for these transportation connectors represent a significant up-front investment.

The 2005 Energy Policy Act required that energy transport corridors be designated on public land for natural gas, oil, electric power, and hydrogen. The BLM prepared the 2008 Final Programmatic Environmental Impact Statement for the Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States and a subsequent 2009 Record of Decision. The 2009 Record of Decision directs the designation of a comprehensive, coordinated network of preferred locations as future energy transport corridors that support projects that help satisfy national energy demand.

Management Opportunities

The BLM could identify biomass energy harvesting processes that could be incorporated into the active timber-sale program in the decision area. These revisions could also afford opportunities to identify areas conducive to siting biomass conversion plants within the decision area.

The BLM could identify wind energy opportunity zones within the decision area which were identified in the 2005 Wind ROD as well as opportunities to identify wind energy avoidance or exclusion zones within the decision area until the impact of utility-scale wind energy devices upon migratory birds and bats becomes more thoroughly understood (BLM 2005c).

The BLM could designate areas in the planning area as open or closed to geothermal developments, which were identified in the 2008 ROD for the Resource Management Plan Amendments for Geothermal Leasing in the Western United States (BLM 2008).

The BLM could establish energy corridors within the decision area in support of sustainable energy development, both onshore and marine.

Timber

Key Points

Implementation of the timber program has departed substantially from assumed harvest levels in the 1995 RMPs. Regeneration harvest volume offered has been substantially below assumed levels, while thinning volume offered has been substantially above assumed levels.

The current approach to a forest management regime that deviates so considerably from the RMP assumptions used in determination of the ASQ is not sustainable at the declared ASQ level.

Northern spotted owl home ranges, northern spotted owl critical habitat, Survey and Manage sites, marbled murrelet sites, and avoidance of regeneration harvest has substantially influenced the attainment of the types of commercial harvest anticipated under the current RMPs, particularly regeneration harvest, harvest of older timber, and fire salvage.

As stands that previously underwent regeneration harvest reach the age of economic harvest feasibility, new opportunities are emerging for management through commercial thinning or modified rotations. Opportunities may vary substantially from district to district.

The broad scale effects of harvest and stand management concepts recently demonstrated in the Secretarial Pilots could be analyzed in the context of an alternative(s) through the current plan revision process.

More aggressive approaches to variable-density thinning, reducing minimum harvest age restrictions on regeneration harvest, as well as dry forest restoration in older stands, have the potential to increase both ASQ and non-ASQ harvest over current levels.

Current Conditions And Context

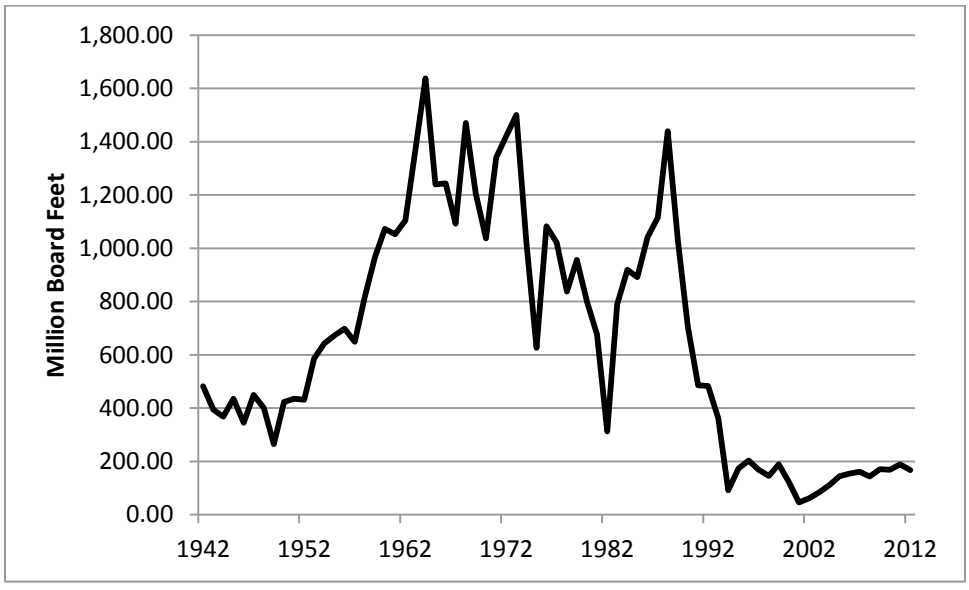
A wide variety of forest conditions exist upon the landscape, both in types of timber, ages, and productive capacity for timber production. Considerable differences exist between regions, the "coastal north" areas (Salem, Coos Bay, Eugene, and the northern portion of the Roseburg District) compared to the "interior south" areas (southern portion of the Roseburg District, Medford, and the Klamath Falls Field Office). While past fires and other natural disturbances have occurred, there are a variety of management activities and timber harvest that have also altered the landscape. Shown below in Figure 17 is the harvest level from BLM-administered lands since the 1940s.

This has resulted in young managed stands, stands modified by partial harvest, as well as a large number of acres of older unmanaged stands (Figure 18).

The interior south areas contain a higher proportion of both lower productivity/fire-prone dry forests, and older age classes of timber when compared to the northern coastal areas (Table 41).

Between 1962 and 1994, BLM timber harvest was 16 percent of western Oregon state totals and averaged 980 million board feet per year. Since the 1995 RMPs, the BLM contribution has been less than 5 percent and has averaged 144 million board feet per year (Figure 19).

FIGURE 17. BLM SALES FROM 1942-2012



(Note: 1942-1961 data represents volume sold, 1962-2012 data represents volume harvested)

FIGURE 18. AGE CLASS DISTRIBUTION BETWEEN THE RESERVES AND THE HARVEST LAND BASE ON ALL BLM-ADMINISTERED LANDS IN THE PLANNING AREA

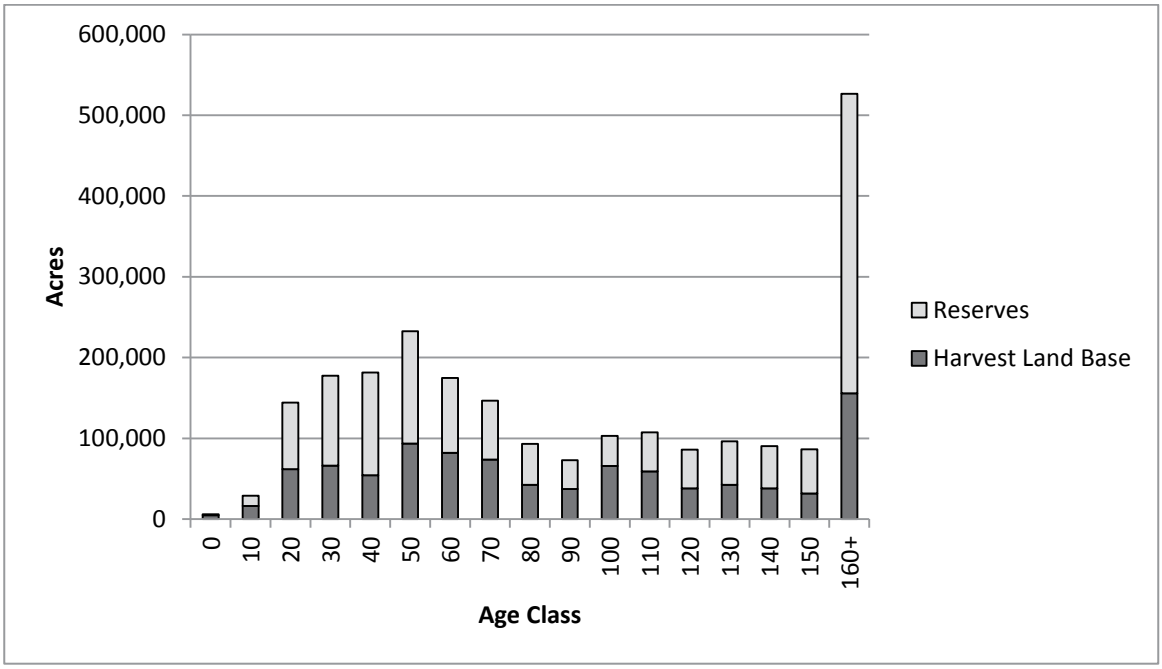


TABLE 41. AGE CLASS DISTRIBUTION OF RESERVES AND THE HARVEST LAND BASE (HLB) BY BLM DISTRICT IN THE PLANNING AREA

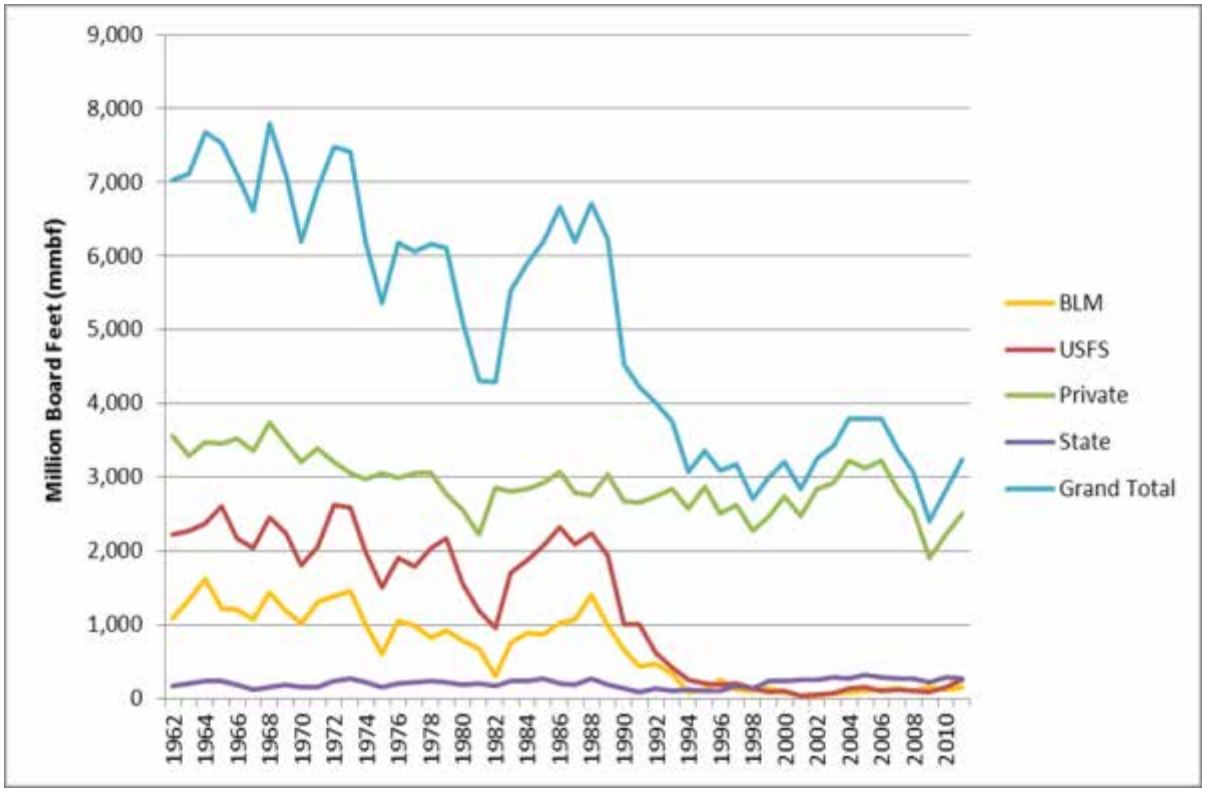
	0-10 years	20-40 years	50-70 years	80-150 years	160+ years
Coos Bay					
HLB	2,260	29,280	31,730	19,690	12,830
Reserve	1,250	68,930	52,710	38,870	62,740
Eugene					
HLB	2,110	26,720	47,150	18,950	4,600
Reserve	680	55,790	69,390	41,030	40,790
Klamath Falls					
HLB	4,170	3,950	45,950	69,730	7,610
Reserve	640	350	2,750	6,730	1,480
Medford					
HLB	8,740	64,410	54,130	192,880	88,780
Reserve	9,570	47,090	42,290	130,390	138,560
Roseburg					
HLB	2,050	40,180	31,630	31,890	38,520
Reserve	1,290	72,420	46,560	57,160	94,340
Salem					
HLB	1,690	17,700	38,890	22,290	3,530
Reserve	710	76,400	90,570	106,180	32,800

The O&C Act requires that the annual productive capacity be determined and declared. The allowable sale quantity (ASQ) is based on the capacity of the lands allocated to sustained yield objectives to produce timber at a level that will remain constant over time. The General Forest Management Area, Adaptive Management Areas, and Connectivity/Diversity Blocks (i.e., the harvest land base) are the lands allocated for this purpose under the 1995 RMPs. The assumptions for the cycle, intensity, and harvest methods determine the sustainable harvest level from these lands. In simplistic terms, the sustained yield reflects a harvest rate that is in balance with forest growth on the harvest land base (2012 Plan Evaluation)

Implementation of the timber management program has departed substantially from the outcomes predicted in the 1995 RMPs. Changed circumstances and new information have caused these departures such as:

- The 2013 northern spotted owl critical habitat designation has been overlaid on the harvest land base. This critical habitat designation includes many managed stands in the current harvest land base that are younger than 80 years old, as well as older unmanaged stands. Although it is not clear how much the critical habitat designation restricts sustained-yield timber production, the designation is not reflected in the assumptions that went into the calculation of ASQ for the 1995 RMPs.
- Management of survey and manage sites in the harvest land base was not considered in the determinations of ASQ. Many survey and manage species are more common than they were originally thought to be. Survey and manage protections restrict timber production, effectively reducing the harvest land base.
- Marbled murrelet sites continue to be identified in the harvest land base, which results in re-designation of harvest land base acres to Late-Successional Reserves.

FIGURE 19. WESTERN OREGON TIMBER HARVEST BY LAND OWNER 1962-2011



Source: copied from Tuchman and Davis 2013

- Areas in the harvest land base, which are likely to have marbled murrelet sites or occurrences of certain survey and manage species, have been avoided due to survey workload and anticipated effects of species occurrence on sale viability. Species surveys are very expensive, and it is not unusual for survey results to severely reduce available harvest acres or eliminate entire projects. The elevated risk and uncertainty associated with areas subject to surveys tends to promote an avoidance strategy, which essentially results in a reduction in available harvest acres.
- Avoiding timber harvest in northern spotted owl home ranges reduces available harvest acres.
- Regeneration harvest has generally not been implemented, especially regeneration harvest of older forests. This has implications for timber harvest sustainability as it has reduced the amount of land available for harvest.

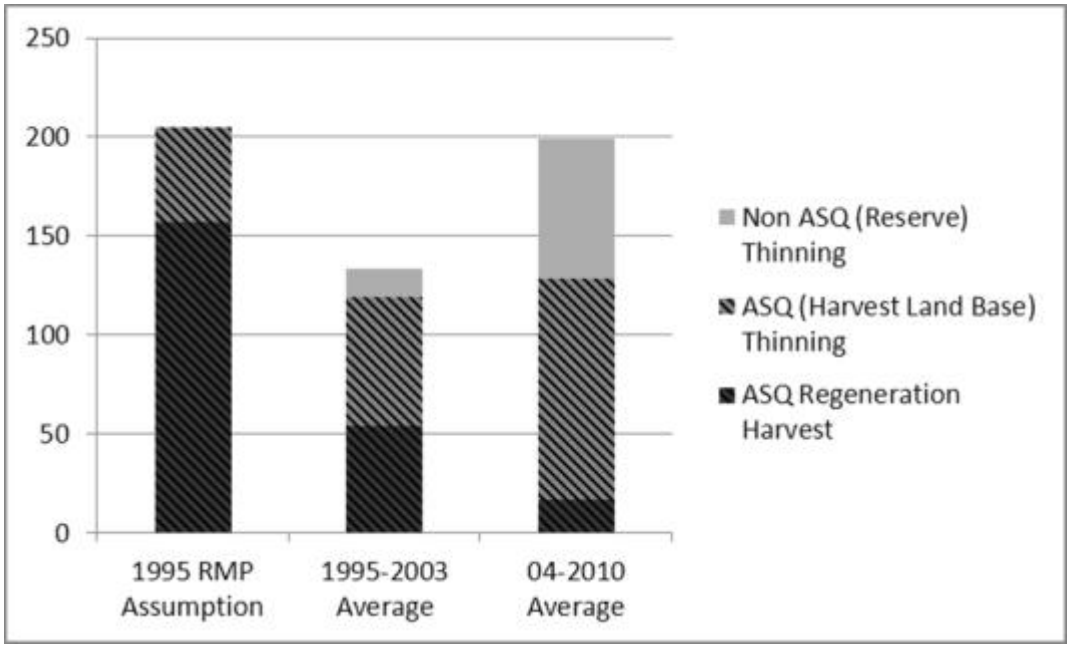
Harvest levels and mix of harvest types have differed from those anticipated in the 1995 RMPs. There has been less regeneration harvest in older stands and more commercial thinning in younger stands, as shown in Figure 20.

Continuation of the long-term implementation trend described above is not sustainable at the declared ASQ level due to the reasons described below (2012 Plan Evaluation).

- Determination of the ASQ is based upon an assumed mix, intensity, and cycle of regeneration and thinning harvest.
- Reduction of levels of regeneration harvest sales and acceleration of thinning from the harvest land base has been a long-term trend since 1999. Regeneration harvest of mature forest is the primary source of volume for the declared ASQ.
- Regeneration harvest conducted today provides the stands available for thinning in the future. Inability to implement regeneration harvest reduces thinning opportunities in the future.
- Acceleration of thinning rates without replenishment means that opportunities for thinning will become exhausted.

Between 1995 and 2012, total timber volume harvested has equaled 84 percent of timber volume offered. The discrepancy between the volume harvested and volume offered over time reflects plan implementation issues discussed above – survey and manage, threatened and endangered species, as well as traditional market factors,

FIGURE 20. ASSUMED VERSUS IMPLEMENTED SOLD TIMBER VOLUME LEVELS AND MIX



and protests, appeals, and litigation (Figure 21). In addition, there is generally a lag between award and harvest; the BLM usually allows timber sale purchasers three years to harvest timber, and this contract period can be extended if circumstances outside of the purchaser's control cause delays.

FIGURE 21. TIMBER VOLUME OFFERED AND HARVESTED BY YEAR FROM BLM-ADMINISTERED LANDS IN THE PLANNING AREA

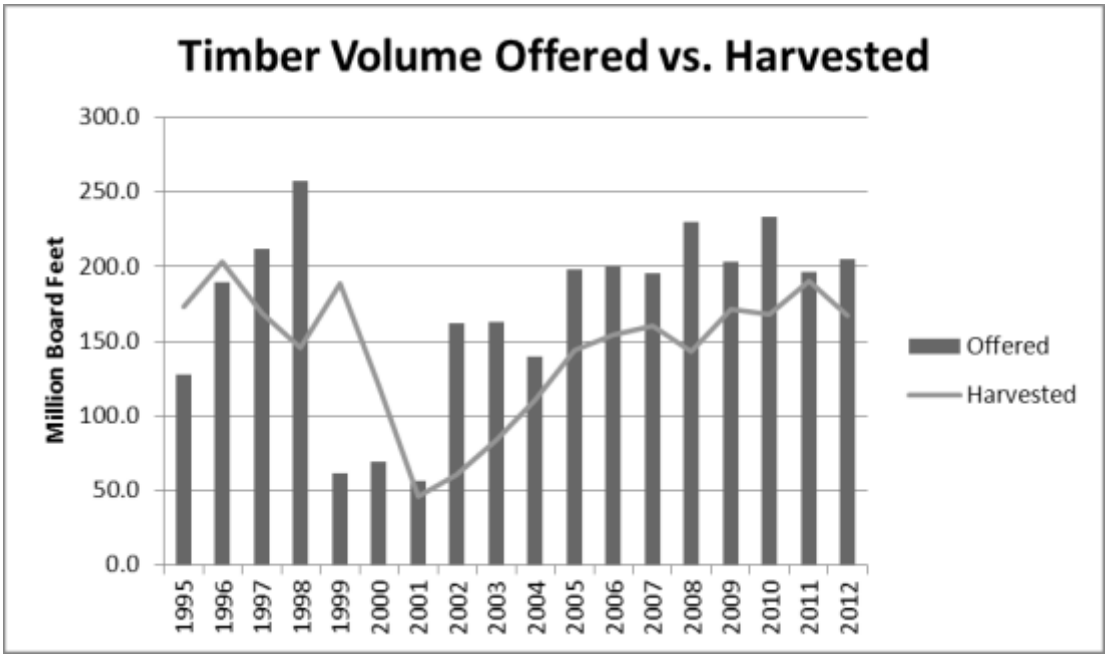
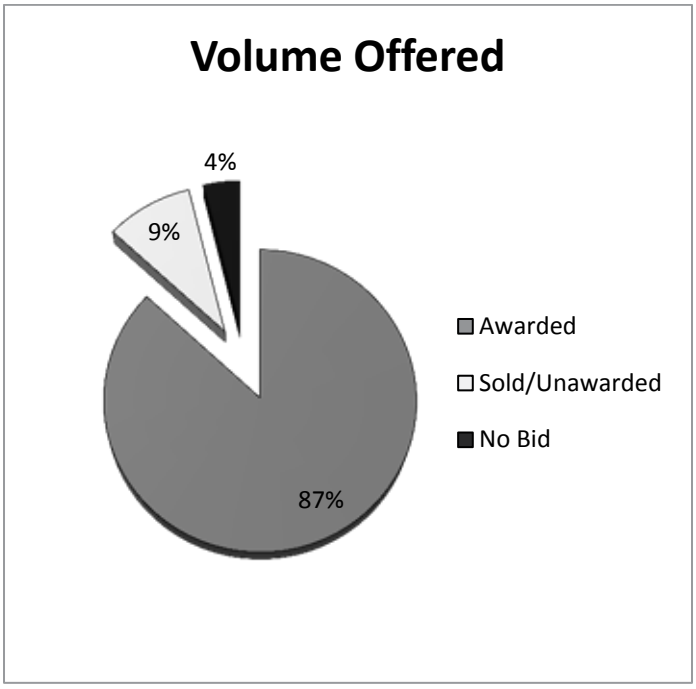


FIGURE 22. PROPORTION OF OFFERED TIMBER VOLUME AWARDED, SOLD BUT UNAWARDED, AND NO-BID 1995-2012



During this same period, approximately 9 percent of timber volume offered was sold, but never awarded (Figure 22). This is largely due to protests, appeals, and litigation.

The 2008 RMP/EIS evaluated the volume potential utilizing current inventory and improved mapped data on land use allocations, particularly lands in Riparian Reserves. The 2008 RMP/EIS analysis of continued implementation of the 1995 RMP (i.e., the No Action alternative in the 2008 RMP/EIS) indicated the sustainable harvest levels are actually higher than described in the 1995 RMPs if the BLM were to implement the mix, intensity and cycle of regeneration and thinning harvest assumed in the 1995 RMPs (Table 42).

Under the 1995 RMPs, timber harvest is allowed to meet certain objectives within Late-Successional and Riparian Reserves. However, the analysis for the 1995 RMPs

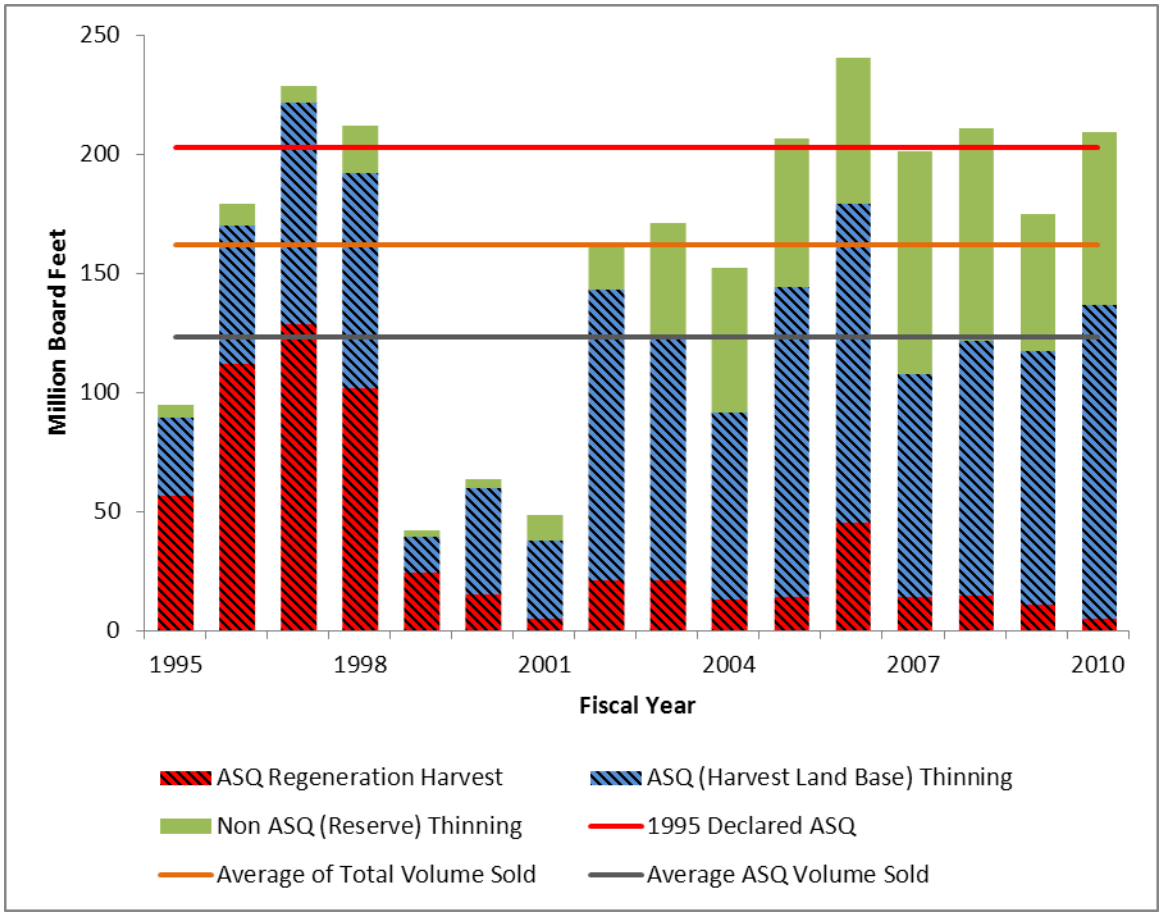
TABLE 42. DECLARED ASQ IN 1995 RMPS AND THE 2008 RMP/EIS ESTIMATED SUSTAINABLE HARVEST LEVEL

	Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem	Total
Current declared ASQ	27	33	6	57	45	35	203
2008 RMP/EIS Sustainable Harvest Level	48	58	6	59	56	41	268

did not include an assessment of the potential harvest volume from the reserve allocations, hardwood conversion, or reserve salvage after stochastic events (2012 Plan Evaluation). This timber sale volume does not contribute to the ASQ because it is not a sustainable harvest source for the long term. Between 2004 and 2010, the non-ASQ sold timber volume for the six districts combined averaged 71 million board feet annually (Figure 23). In 2011 and 2012, 43 percent of timber volume harvested came from reserves.

In the analysis of the No Action alternative (the continued implementation of the 1995 RMPs), the 2008 RMP/EIS analysis estimated a potential of 87 million board feet harvest annually from the reserve land use allocations in the first decade. This potential harvest would then decline to less than 60 million board feet for the next 20 years (2012 Plan Evaluation). Although opportunities will exist for some limited additional thinning, these opportunities would effectively drop to zero after 30 years (2013 O&C Lands Report). Potentially, for the next 30 years, the BLM could harvest reserve (non-ASQ) volume in addition to the ASQ volume from the harvest land base.

FIGURE 23. TOTAL ASQ VERSUS NON-ASQ SOLD TIMBER VOLUME 1995-2012



Management Opportunities

Considerable opportunities exist over the next decade for a commercial thinning program above that anticipated in the 1995 RMPs. Many young stands in reserve land use allocations are a product of intensive management for timber production goals. Hardwoods and structurally complex open-grown trees were managed against, while foresters worked to maintain full site occupancy of high value merchantable species. In order to return these stands in reserve land use allocations to a more natural developmental trajectory, aggressive treatment may be necessary, including substantial timber harvest.

New approaches to variable-retention regeneration harvesting, variable-density thinning and dry forest restoration as demonstrated in the Secretarial Pilots, have potential for increasing harvest levels overall and ASQ levels in particular over recent implementation of the 1995 RMPs. Additionally, the 1995 RMPs generally restrict the application of regeneration harvest prescriptions to stands at or above the culmination of mean annual increment. Culmination of mean annual increment is the age in the growth cycle of a stand at which the volume production per acre per year has reached a maximum. Theoretically, stands allowed to reach this age prior to harvest would produce more volume through time than stands harvested at an earlier age. Stands generally culminate between 80 and 110 years of age. This restriction on minimum harvest age precludes consideration of young stand regeneration harvest, and essentially forces regeneration harvest proposals into suitable northern spotted owl habitat. Possible approaches could include the following:

- Variable-retention regeneration harvesting – A reduction in minimum harvest age from the 1995 RMP would result in many more opportunities for regeneration harvest than currently exist. Hybrid approaches between variable density thinning and variable retention regeneration harvest could be considered in reserve land use allocations to more closely emulate natural disturbance events, while yielding higher timber volumes than more traditional thinning.
- Variable-density thinning – More aggressive and variable approaches to thinning may improve attainment of habitat and species diversity objectives while increasing harvest outputs and efficiency.
- Dry Forest Restoration – Many older stands in dry forest areas are at very high densities when compared to historical conditions. An opportunity exists to enter older stands in the dry forest, improve ecological resistance to disturbance, while removing a substantial amount of timber volume. Young managed stands in these areas may also be considered for variable-retention regeneration harvesting and variable-density thinning (Sensenig *et al.* 2013) in order to increase timber harvest levels while improving ecological resistance to disturbance. These dry forest restoration strategies need not preclude long-term sustained yield. For example, the 2008 RMP/EIS evaluated the potential for managing a portion of the Medford District and the Klamath Falls Field Office under an uneven-aged management approach with a calculated long-term sustained yield (2012 RMP Evaluation).

The 1995 RMP defined the process for developing and revising Late Successional Reserve Assessments subject to Regional Ecosystem Office review, and it has proved to be inefficient and cumbersome. Late-Successional Reserve Assessments currently contain rigid rule sets regarding age limits (e.g., no treatment in stands >80 years), such as for heavy thinning limits, gap size constraints, canopy cover limits, and diameter limits. An opportunity exists to improve if not eliminate this layer of process, which would enhance the BLM's ability to meet ecological objectives, respond to changing science and ecological context, and provide more non-ASQ timber volume in the short-term.

Under the 1995 RMPs, timber harvest opportunities in Riparian Reserves are generally limited to treatments needed to "acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy Objectives" (1995 RMP ROD). The Aquatic Conservation Strategy objectives are so general and vague, that they have resulted in the misconception that Riparian Reserves are meant to be managed in the same way as Late-Successional Reserves. The BLM could change the Aquatic Conservation Strategy to clarify appropriate forest management activities, and perhaps expand the species diversity objectives to include upland and early-successional associated species. These changes would result in opportunities for more creative silvicultural approaches in Riparian Reserves, which could improve the overall ecological contribution of these lands, and provide more opportunities to produce non-ASQ timber volume.

The 1995 RMPs do not provide management direction in Riparian Reserves or Late-Successional Reserves to salvage after disturbance for economic reasons. Since recent science seems to indicate that an ecological rationale for post-disturbance timber salvage is weak, an opportunity exists to add an economic objective related to after-disturbance salvage activities to these reserved land use allocations. The incremental ecological value of the additional dead wood may be less than the economic value of the lost timber volume. Given the stochastic nature and unpredictable size of stand replacing disturbance events, there is a chance that a substantial amount of economically valuable wood could be lost to decay after such a disturbance. An economic rationale would be the strongest justification for salvage after a large-scale disturbance event.

Tribal Interests

Key Points

- Federally recognized tribes have a unique relationship in that they are acknowledged to be sovereign nations and retain inherent powers of self-government.
- The effects of management actions on cultural resources are a commonly known area of tribal interest. BLM management also has impacts on other natural resources that tribes rely upon for the continuity of the tribes' traditional beliefs and practices.
- The BLM may manage areas that are sacred to tribes and hold significance because they are essential to the continuation of cultural traditions, such as places where tribes hold their ceremonial practices and exercise their beliefs.
- The social and economic effects of BLM management are a point of interest for tribes. Both the BLM and many of the western Oregon tribes manage forested lands for timber harvest and for other resource purposes.
- The Coquille Indian Tribe has a unique interest in this RMP. The Coquille Forest, managed by the tribe, is "subject to the standards and guidelines of Federal forest plans on adjacent or nearby Federal lands, now and in the future"(Coquille Forest Act, 1996). Therefore, the land management decisions made in this RMP have direct implications for how the Coquille manage their forest.

Current Conditions And Context

There are nine federally recognized tribes located within, or have interests within, the planning area:

- The Confederated Tribes of Grand Ronde: www.grandronde.org
- The Confederated Tribes of Siletz Indians: www.ctsi.nsn.us
- The Coquille Indian Tribe: www.coquilletribe.org
- The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians: www.ctclusi.org
- The Confederated Tribes of Warm Springs: www.warmsprings.com
- The Cow Creek Band of Umpqua Tribe of Indians: www.cowcreek.com
- The Klamath Tribes: www.klamathtribes.org
- The Quartz Valley Indian Reservation: www.qvir.com
- The Karuk Tribe: www.karuk.us

The ancestors of the people who comprise the tribes listed above have resided within the planning area (or just outside of it) for thousands of years. The archaeological record has informed us that people have lived in Oregon for more than 14,000 years and within the planning area for at least 9,000 years. The tribes listed above have varying levels of interest in the planning area and some comprise multiple tribes, each consisting of various bands. The tribal groups that comprise the tribes listed above are summarized by identifying the broader tribal affiliations or language

groups that make up the confederations that exist today. They are the Clatsop, Chinook, Klickitat, Molala, Kalapuya, Tillamook, Alsea, Siuslaw/Lower Umpqua, Coos, Coquille, Upper Umpqua, Tututni, Chetco, Tolowa, Takelma, Galice/Applegate, Shasta, Cow Creek, Klamath, Modoc, Yahooskins, Karuk, Warm Springs, Wasco, and Paiute.

Tribes in western Oregon did not have regular contact with European settlers until the 1840s. Shortly thereafter began the period of treaty signing in western Oregon whereby tribes ceded millions of acres of land to the federal government and were subsequently removed to reservations beginning in 1855. Disease, hostile interactions with settlers, and the vast reduction of tribal homelands greatly affected the populations and culture of many western Oregon tribes. Multiple tribes were grouped together on reservations, which is how many of the "confederations" of tribes were formed.

In 1954, the federal government passed Public Law 587 –*The Klamath Termination Act* and Public Law 588 – *The Western Oregon Indian Termination Act*. These acts served to terminate the federal trust relationship between the tribes and the government in an attempt to assimilate Indians into American society. The results of the effort were devastating to tribes and their culture. After great efforts on part of each tribe, beginning with the Confederated Tribes of Siletz in 1977, tribes have had their federal status restored and returned to being sovereign nations. The exception to this is the Confederated Tribes of Warm Springs, which adopted a constitution and by-laws for tribal government in 1937 under the Indian Reorganization Act (Wheeler-Howard Act) and was therefore self-governing and not terminated in 1954.

Today, federally recognized tribes have a unique relationship with the federal government in that they are recognized to be sovereign nations and retain inherent powers of self-government. They interact with the United States on a Government-to-Government level. Many tribal reservation lands are held in trust by the federal government specifically for tribal use and management and are retained as the tribes' permanent homelands. The Bureau of Indian Affairs is the designated federal agency that administers the government's trust responsibilities and advocates for tribal interests, but all federal agencies hold trust responsibilities to tribes. Tribes also have interest in lands outside of reservation boundaries, many of these lands were ceded to the federal government through treaties made in the period between 1778 and 1871. Many tribes exercise their "treaty rights" on lands owned and managed by the federal government.

Indian trust resources consist of property (land) and those natural resources and related rights, either on or off Indian lands retained by or reserved for Indian tribes through treaties, statutes, judicial decisions, and Executive Orders, which are protected for those federally recognized tribes by the United States. Some tribes have the right to use trust resources that are transitory or migratory in nature and that move beyond the reach of federal or tribal management such as fish, game, or water. In these cases, tribes have a right to use these trust resources but does not allow them exclusive access to the resource.

Various policies guide the BLM on to how consult with federally recognized tribes regarding federal actions that may have tribal implications. At the highest level are treaties. Additional direction comes from laws, Presidential Executive Orders, Department of Interior policy, and BLM policy, including:

- Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments (6 November 2000). "Establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes."
- Secretarial Order 3317 – Department of the Interior Policy on Consultation with Indian Tribes (6 December 2011). This outlines the consultation framework by which the DOI has committed to fulfill its Tribal consultation obligations as directed by EO 13175 and other administrative actions, statutes and policies. It also mandates that all the Departments' bureaus and offices policies comply with this policy
- Instruction Memorandum No. 2012-062 – Implementation of the Department of the Interior Tribal Consultation Policy (30 January 2012): Directs all BLM State Offices to conduct an assessment of their regional and local policy and procedures related to tribal consultation to determine if they are in conformance with the new policy.

- BLM Manual Handbook H-8120-1 – Guidelines for Conducting Tribal Consultation (3 December 2004): "to help assure that federally recognized tribal governments and native American individuals, whose traditional uses of public land might be affected by a proposed BLM action, will have sufficient opportunity to contribute to the decision, and that the decision maker will give tribal concerns proper consideration.

There are other relevant laws that have been passed that shape or have the potential to shape the BLM's relationships with tribes in western Oregon:

- Tribal Forest Protection Act of 2004 – Authorizes the Secretaries of Agriculture and Interior to give special consideration to tribally-proposed stewardship contracting or other projects on Forest Service or BLM land bordering or adjacent to Indian trust land to protect the Indian trust resources from fires, disease, or other threat coming off of that Forest Service or BLM land.
- The Coquille Forest Act (30 September 1996) – A total of 5,410 acres of former BLM timber lands in Coos County were put into trust by the U.S. Government for the Coquille Indian Tribe. The purpose of this action was to provide the Tribe the opportunity to manage a small part of their ancestral homelands. The Act also specifies that the Tribe must manage The Coquille Forest "subject to the standards and guidelines of Federal Forest Plans on adjacent or nearby Federal Lands, now and in the future." 25 U.S.C. sec. 715c(d)(5). Therefore, this planning effort has direct impacts to the Coquille Tribe and their forest management.

One way that the BLM and tribes are formally able to coordinate regarding projects and resources of mutual interest is by establishing memoranda of understanding (MOU). The purpose of an MOU is to provide a mutually beneficial process for the tribe and the BLM to jointly identify, communicate, and coordinate actions of common concern relating to the management of BLM lands and resources, and to provide a mechanism for continuing tribal involvement in the development and revision of land management plans. Various MOUs and other agreements currently exist between the BLM and tribes.

The Klamath Tribes have 185 acres of former reservation in the Klamath Falls Field Office, which fall under tribal trust lands, known as the Wood River Wetland. According to the Treaty of 1864, the Klamath Tribes retain exclusive rights for fishing the streams and lakes of the old reservation, and gathering of edible roots, seeds, and berries. Tribal members often fish these 185 acres within Klamath Falls Field Office trust lands. However, the Upper Klamath Basin and Wood River Wetland in the Klamath Falls Field Office is not within the decision area for this RMP revision because it has its own RMP.

The Coquille Indian Tribe has a MOU with the Coos Bay District that allows the Tribe to manage and collect beargrass on a plot of BLM-administered land. In addition, the Coquille Indian Tribe has an assistance agreement in place with the Coos Bay District to complete watershed restoration activities within the Coquille Basin.

The Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians have an agreement with the Coos Bay District to collect tule from a specific location on BLM-administered land.

The Confederated Tribes of Grand Ronde and the Cow Creek Band of Umpqua Tribe of Indians have a MOU with the Medford District for the management of Table Rocks, a place of cultural significance to the tribes and is part of a sacred landscape.

Tribal members from the Confederated Tribes of Grand Ronde and the Confederated Tribes of the Siletz Indians have participated on cultural resource surveys on the Medford District. Most recently they have assisted in the background research and surveys aimed at locating the site of a historically documented battle called The Battle of Hungry Hill.

The Confederated Tribes of Grande Ronde, The Confederated Tribes of Siletz, and the Cow Creek Band of Umpqua Indians worked with the Roseburg District to implement a cultural resource management plan for the Susan Creek Mounds area. The plan focuses on the protection of the area and shifting the focus from a tourist locale to one that emphasizes tribal use.

The BLM manages a portion of the ancestral homelands of western Oregon tribes and the resources on them. Tribes have a variety of interests related to the management of BLM-administered lands. The effects of management actions on cultural resources (pre-contact archaeological sites in particular) are a commonly known area of tribal interest. BLM management also has impacts on other natural resources that tribes rely upon for the continuity of the tribes' traditional beliefs and practices. Tribes are primarily concerned with actions that are ground disturbing. These cultural values can be described as the unique manner in which tribal people access, take, prepare, administer, consider, and use in distinct tribal ways. Tribes in western Oregon collect a wide array of plant materials for traditional use. Plants are used in making baskets, hats, or portions of regalia and other objects of tribal culture. Tribal members use a variety of wild plants as traditional foods or in medicines. Similarly, a variety of wild animals is important to tribes as a food source and the act of hunting and fishing is an important cultural practice. BLM actions that effect the populations of species such as salmon (both positively and negatively) or affect access to the plants and animals the tribes identify as important, are of significant interest to tribes.

Additionally, the BLM may manage areas that are sacred to tribes and hold significance because they are essential to the continuation of cultural traditions, such as places where tribes hold their ceremonial practices and exercise their beliefs. As mentioned above, areas where tribal members collect plant materials or where their families have fished for generations can also be considered sacred places, but the presence of these resources is not necessary to make a place sacred. Traditional practices expand beyond the tangible. Many places hold significance to tribes because of their association with a creation story or a part of the tribes' oral history.

A way to ensure these places are properly considered when the BLM proposes management actions is to evaluate them as a Traditional Cultural Property to be listed on the National Register of Historic Places. A "Traditional Cultural Property" is a property, a place, that is eligible for inclusion on the National Register of Historic Places because of its' association with cultural practices and beliefs that are (1) rooted in the history of a community, and (2) are important to maintaining the continuity of that community's traditional beliefs and practices.

Aside from the physical resources that inhabit the landscape that the BLM manages, the social and economic effects of BLM management are a point of interest for tribes. Both the BLM and many of the western Oregon tribes manage forested lands for timber harvest and for other resource purposes. Many of the tribes have the capabilities to participate in restoration activities that are planned for BLM-administered lands within areas of tribal interest. Activities such as prescribed burning, aquatic restoration, forestry operations, archaeological survey, and excavation are some of the ways that the BLM and tribes can foster mutually beneficial partnerships to meet common goals.

Management Opportunities

The BLM could work with local tribes to identify and nominate Traditional Cultural Properties to protect their values better.

The BLM could also actively engage tribes and work towards developing MOU at the district or state level to outline how tribes want to interact with the BLM, with the goal of having meaningful dialog and managing shared resources of concern in mutually beneficial ways. Similarly, the BLM may want to identify opportunities for partnerships where tribes can actively collaborate in the management of BLM-administered lands in areas of their interest, in order to provide tribes with access to resources of interest.

More specifically, the BLM could work with The Coquille Tribe on formulating a range of alternatives for forest management in the areas surrounding the Coquille Forest that meet the needs and goals of both parties.

Wildlife

Key Points

- Northern spotted owl populations are declining throughout the range at an annual rate of three percent.
- A principal cause of this spotted owl population decline is competition from barred owls, which have expanded their range into the Pacific Northwest during the past forty years. Barred owls now occupy the entire range of the spotted owl. Within the range, barred owls utilize all spotted owl habitats and prey species, displace spotted owls from their breeding territories, inhibit spotted owls from establishing new territories, and out breed spotted owls.
- Although BLM-administered lands play a key role in spotted owl conservation in major portions of the planning area, recent research provides no evidence that the BLM can manage individual forest stands in a manner that provides spotted owls with a competitive advantage over barred owls. Instead, research reaffirms the importance of managing for large blocks of contiguous old-forest habitat that are properly spaced.
- The RMP planning process will examine how the BLM might contribute to a western Oregon landscape that slows spotted owl extirpation long enough for the U.S. Fish and Wildlife Service to identify and implement a strategy to mitigate the effects of the barred owl and other threats on the spotted owl.
- There was no statistically significant population trend in the planning area's marbled murrelet population from 2000 to 2012. There has been a seven percent net loss of high quality nesting habitat for marbled murrelets across all ownerships across the species' range over the last decade. The loss of marbled murrelet habitat on federal lands was primarily due to fire.
- There are opportunities to consider alternative marbled murrelet management strategies regarding survey requirements, recruitment habitat, and occupied site protection.
- There are 15 wildlife species currently listed under the Endangered Species Act within the decision area: two endangered species, six threatened species, three species proposed for listing, and four candidate species.
- There are 85 Bureau Sensitive wildlife species and 52 survey and manage wildlife species in the decision area. There is an opportunity to consider alternative management strategies for these species.
- The bald eagle population has increased substantially from 1978 to 2007 (from 65 to 496 breeding areas), so there is an opportunity to consider reducing the extent or number of Bald Eagle Management Areas. Conversely, the golden eagle population appears to be experiencing a 14.2 percent decline from historic levels so there is an opportunity to provide management areas for the species.

Current Conditions And Context

The planning area includes land within the following five physiographic provinces: Coast Range, Willamette Valley, Cascades, Klamath Mountains, and Basin and Range. Habitats on BLM-administered lands range from coastal beaches to montane forests and Great Basin sagebrush. The BLM's role in the management of wildlife is cooperative with the State of Oregon and directed toward the maintenance, improvement, and expansion of habitat in a multiple resource management framework.

This section will specifically address a subset of individual species because of their importance in developing management alternatives or direction in existing BLM policy. Wildlife species within the decision area that could be considered for the RMP include:

- Species on the State Director's Special Status Species List (current list is from 1 December 2011) that are documented or suspected to occur in the decision area
- Species from the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001 Survey & Manage ROD)

- Bald eagles and golden eagles as directed by WO IM 2010-156 – Bald and Golden Eagle Protection Act, Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy (BLM 2010a)
- Landbirds as directed through WO IB 2010-110 – Memorandum of Understanding between the BLM and U.S. Fish and Wildlife Service to promote the conservation of migratory birds (BLM 2010b)

Within the decision area, there are 93 species (48 vertebrate wildlife species and 45 invertebrate species) on the Oregon/Washington State Director's Special Status Species List that are documented or suspected to occur on one or more districts (Table 43). This list includes species that are listed under the Endangered Species Act (ESA) as endangered, threatened or candidate species as well as species listed as Bureau Sensitive under the Bureau's special status species program (i.e., 6840 policy). The listing status and of individual species and taxa groups are summarized below:

Federally Endangered

- Columbian White-Tailed Deer – Columbia River Population (*Odocoileus virginianus leucurus*)
- Fender's Blue Butterfly (*Plebejus icarioides fenderi*)

Federally Threatened
- Marbled Murrelet (*Brachyramphus marmoratus*)
- Northern Spotted Owl (*Strix occidentalis*)
- Oregon Silverspot Butterfly (*Speyeria zerne hippolyta*)
- Steller Sea Lion (*Eumetopias jubatus*)
- Vernal Pool Fairy Shrimp (*Branchnecta lynchi*)
- Western Snowy Plover – Pacific Coast population (*Charadrius alexandrines nivosus*)

Federally Proposed (also included in Bureau Sensitive)
- Streaked Horned Lark (*Eremophila alpestris strigata*) – Proposed threatened as of October 11, 2012
- Taylor's Checkerspot Butterfly (*Euphydras editha taylori*) – Proposed endangered as of October 11, 2012
- Wolverine (*Gulo gulo luscus*) – Proposed threatened as of February 1, 2013
- Federal Candidate (also included in Bureau Sensitive)
- Fisher (*Martes pennanti*)
- Greater Sage-Grouse (*Centrocercus urophasianus*)
- Oregon Red Tree Vole – North Coast Distinct Population Segment (*Arborimus longicaudus*)
- Oregon Spotted Frog (*Rana pretiosa*)

Bureau Sensitive
- 21 Mollusk species
- 21 Arthropod species
- 6 Amphibian species
- 2 Reptile species
- 26 Bird species
- 9 Mammal species

Survey and Manage
- 45 Mollusk species
- 5 Amphibian species
- 1 Bird species
- 1 Mammal species

Bureau Strategic
- 1 Annelid species
- 19 Mollusk species
- 26 Arthropod species
- 4 Bird species
- 3 Mammal species

Additional Species
- Bald Eagle (*Haliaeetus leucocephalis*)
- Golden Eagle *(Aquila chrysaetos canadensis)*
- Landbirds

Federally Endangered

Columbian White-tailed Deer – Columbia River Population

The Columbian white-tailed deer is suspected in the Salem District (Columbia River population) and is documented in the Roseburg District (Douglas County population). The U.S. Fish and Wildlife Service (USFWS) listed the Columbian white-tailed deer under the Endangered Species Act (ESA) as endangered in 1967 (32 FR 4001). The Douglas County population was de-listed in July 2003 (68 FR 43647). At the time of listing, the number of deer remaining was estimated to be less than 1,000 but the Douglas County population has now increased to over 5,000 animals (USFWS 2013a). In 1996, the Lower Columbia River population suffered heavy losses due to extensive flooding of its habitat; however, it is expected to recover to pre-flood numbers within a few years.

TABLE 43. WILDLIFE SPECIES WITHIN THE DECISION AREA (NOTE: ROWS AND COLUMNS ARE NOT ADDITIVE)

	Federally Listed (Dec. 2011)			OR/WA State Director's List (Dec. 2011)	
District	**Endangered**	**Threatened**	**Candidate***	**Bureau Sensitive***	**Bureau Strategic**
Coos Bay	0	4	2	40	8
Eugene	1	2	5	34	27
Klamath Falls	0	1	4	42	15
Medford	0	3	3	34	11
Roseburg	0	2	1	23	4
Salem	2	3	2	32	20
Total	2	6	6†	84†	53

*CANDIDATE SPECIES ARE ALSO BUREAU SENSITIVE SPECIES AND ARE INCLUDED IN THAT COUNT AS WELL.
† CONFLICTING INFORMATION EXISTS WHETHER OR NOT THE WOLVERINE IS DOCUMENTED OR SUSPECTED IN THE DECISION AREA – WHICH WOULD BRING CANDIDATE SPECIES TO 7 AND BUREAU SENSITIVE SPECIES TO 85.

Fender's Blue Butterfly

Fender's blue butterfly is documented in the Eugene District and suspected in the Salem District. There is a population of Fender's blue butterfly within the decision area on land managed by the Eugene District (Oak Basin population; BLM 2011). Critical habitat for Fender's blue butterfly was designated in 2006 (71 FR 63862). There are 2,180 acres of critical habitat for Fender's blue butterfly within the planning area, none of which is within the decision area. The West Eugene population, which is not within the decision area, includes almost all of the current BLM-administered Fender's blue butterfly sites and critical habitat (BLM 2012a).

Fender's blue butterfly was listed under the ESA as endangered in 2000 (65 FR 3875). Fender's blue butterfly is found exclusively in prairie habitats containing its larval food plants, primarily Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), but also spur lupine (*L. arbustus*) and occasionally sicklekeeled lupine (*L. albicaulis*) (USFWS 2010a; BLM 2012a). These butterflies have limited dispersal ability and remain close to their natal lupine patches when foraging; more than 95 percent of Fender's blue butterflies are found within 33 feet of lupine patches (BLM 2012a).

Historically, this species was believed to be extinct from 1937 until it was rediscovered in 1989 (USFWS 2010a). Recent surveys have determined that Fender's blue butterfly is endemic to the Willamette Valley and persists in about 17 populations on remnant prairies in Yamhill, Polk, Benton, and Lane Counties. There are currently 3,000 – 5,000 butterflies in 16 isolated populations or subpopulations of Fender's blue butterfly within the Willamette Valley (BLM 2012a).

Federally Threatened

Northern Spotted Owl

In 1990, the U.S. Fish and Wildlife Service (Service) listed the northern spotted owl as threatened under the Endangered Species Act (ESA) due to widespread loss of nesting, roosting, and foraging habitat across its range and the inadequacy of regulatory mechanisms for its conservation. That year, the Interagency Scientific Committee developed the first spotted owl conservation plan, identifying two "conservation needs":

1. Large blocks of nesting, roosting and foraging habitat that support clusters of reproducing owls, are distributed across a variety of ecological conditions and are spaced so as to facilitate owl movement between the blocks
2. Habitat conditions within and surrounding large blocks of habitat that facilitate owl movement between the blocks and ensure the survival of dispersing owls

Although the Service drafted a spotted owl Recovery Plan in 1992, the federal agencies incorporated the Interagency Scientific Committee conservation strategy into the 1994 Northwest Forest Plan, which became the *de facto* spotted owl conservation plan.

In 2004, independent scientific review concluded that, although subsequent spotted owl research had refined the conservation needs identified by the Interagency Scientific Committee, they remained valid (Courtney *et al.* 2004). Also in 2004, biological opinions issued by the Service identified two additional "habitat-specific" conservation needs for the spotted owl[8]:

1. A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the northern spotted owl's range, and a monitoring program to clarify whether these risk reduction methods are effective and to determine how owls use habitat treated to reduce fuels
2. In areas of significant population decline, sustain the full range of survival and recovery options for this species in light of significant uncertainty

[8]The Service, in its' biological opinions, also identified two "habitat-independent" conservation needs: A coordinated research and adaptive management effort to better understand and manage competitive interactions between spotted and barred owls, and monitoring to better understand the risk of West Nile virus and sudden oak death pose to spotted owls and, for West Nile virus, research into methods that may reduce the likelihood or severity of outbreaks in spotted owl populations. As habitat-independent, these conservation needs would not be influenced by BLM land use planning.

The Service added these conservation needs because of recent findings that the range-wide loss of suitable habitat to wildfire, especially in southern Oregon, posed a greater threat to spotted owl conservation than previously thought, and because of observed declines in the spotted owl population. The results of the contemporary meta-analysis, published in 2006, revealed a "precipitous decline" in the number of spotted owls in Washington, and suggested that what had occurred in Washington already was underway in northern Oregon. These findings caused federal scientists and nonfederal researchers who were collecting spotted owl demographic data throughout its range to begin collecting supplementary data to evaluate the influences of barred owls, weather, habitat change and spotted owl reproduction on spotted owl vital rates and population trends.

In 2006, the Service convened a panel of seven experts to help identify threats facing the spotted owl (USFWS 2011a). The experts identified past habitat loss, current habitat loss and competition from barred owls as the most pressing threats, even though the rate of timber harvest on federal land had been greatly reduced under the Northwest Forest Plan. They noted that evidence of these threats was found in the scientific literature. The range of threat scores by the individual experts was narrowest for barred owl competition and slightly greater for habitat threats, indicating more agreement about the threat from barred owls. The experts identified disease, and the effect of climate change on vegetation, as potential future threats.

The experts ranked the threats by importance in each of the twelve physiographic provinces in the spotted owl's range. The more fire-prone provinces (including the Cascades (eastern portion) and Oregon Klamath provinces of the BLM planning area) scored high on threats from ongoing habitat loss due to wildfire and the effects of fire exclusion on vegetation change. Westside provinces (Cascades (western portion) and Oregon Coast Range provinces in the BLM planning area) generally scored high on threats from the negative effects of habitat fragmentation and ongoing habitat losses from timber harvest. The province with the fewest number of threats was the Cascades (west portion) province, and the provinces with the greatest number of threats were the Oregon Klamath and the Willamette Valley provinces, all three of which are in the BLM planning area.

According to analyses done to prepare the BLM 2008 RMP/EIS:

- BLM-administered lands in the Coast Range and Klamath provinces are necessary for spotted owl conservation, specifically to meet Conservation Needs 1 and 2.
- BLM-administered lands are needed to support adequate habitat for north-south spotted owl movement between the Coast Range and Klamath provinces (Conservation Need 2).
- BLM-administered lands are of minor importance throughout most of the western portion of the Cascades province when compared to National Forest lands.
- BLM-administered, nor other federal lands, can ensure adequate north-south spotted owl movement through the northern portion of the Oregon Coast Range Province because of the sparse federal ownership.

The BLM 2008 RMP/EIS examined spotted owl habitat conditions in three "areas of concern" identified in the scientific literature. Habitat conditions create barriers or strong filters to spotted owl movement between physiographic provinces in these areas. However, the Service did not recommend management to address "areas of concern" in its 2008 Northern Spotted Owl Recovery Plan, the 2008 Final Rule on Critical Habitat, the 2011 Revised Northern Spotted Owl Recovery Plan, or the 2012 Final Rule on Critical Habitat (which took effect in 2013). Instead, the Service emphasized overall spotted owl movement between large habitat blocks and physiographic provinces.

Owl Estimation Methodology –The Northwest Forest Plan included the assumption that spotted owl nest sites and territories would be lost, over time, in the Matrix land use allocation. As such, the Northwest Forest Plan does not require pre-project survey of owl nesting habitat or the preservation of habitats occupied by nesting owls (even though some BLM districts monitor some or all of their owl sites, or survey for new sites). In 2007, the Ninth Circuit Court of Appeals ruled in *ONRC v. Allen,* among other things, that an incidental take statement may not use a nonnumerical measure of take without explaining why no number was provided and must set a measure of take that allows for reinitiation of consultation. The ruling did not specify how the Service was to quantify "incidental take" of owls. As a result, in 2008 the Service, BLM, and Forest Service jointly developed the *Methodology for*

Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions (also known as the ITS Methodology and the Owl Estimation Methodology or OEM) to quantify incidental takings of spotted owls in habitats that are not surveyed to protocol. The OEM uses habitat condition and nearest-neighbor analyses to predict where spotted owl nest sites are most likely to occur in unsurveyed habitat (i.e., predicted owl sites). The OEM includes thresholds to determine when an incidental taking would be likely to occur based on habitat change in a known or predicted nest patch and post-treatment habitat conditions in the 500-acre core area and provincial home range surrounding the known or predicted nest site/patch. The BLM maintains a data layer of known and predicted spotted owl sites.

On June 26, 2013, the District Court for the District of Columbia issued a decision in *Swanson Manufacturing v. Jewell*, No. 10-1843 (D.D.C.), among other things, setting aside the OEM and prohibiting its use until undergoing public notice and comment. BLM is continuing to review the decision and any implications it may have for the planning process.

Meta-analyses – In 2011, spotted owl scientists and biologists, and statisticians, from federal and state agencies, and non-governmental organizations, published the results of a meta-analysis of spotted owl population change for up to 23 years through 2008 in eleven long-term demographic study areas (Forsman *et al.* 2011). General results are shown in Table 44 (demographic study areas in the planning area are shaded.)

Results of this analysis have revealed the following:

- Spotted owl fecundity (i.e., the number of young produced by a nesting pair) appeared to be little influenced by barred owl encounters in the nest territory. However, scientists cautioned that this might be an artifact of barred owls displacing spotted owls from nest territories.
- Observed declines in the Klamath and Southern Cascades demographic study areas happened predominantly during the latest five years (2004 – 2008).
- Habitat conditions, land ownership, climate, and weather had little observed effect on fecundity.
- Recent (latest five years) observed declines occurred across the spotted owl's range.
- Apparent survival rates declined in ten of the demographic study areas; the Klamath demographic study area was the exception.
- Observed declines were "most precipitous" in the northern portion of the spotted owl's range: the demographic study areas in Washington and the northern half of Oregon.

Table 44. Northern spotted owl demographic parameters from demographic study areas

Study Area	Fecundity	Apparent Survival*	Population change†
Cle Elum	Declining	Declining	Declining
Rainier	Increasing	Declining	Declining
Olympic	Stable	Declining	Declining
Coast Range (central Coast Range)	Increasing	Declining since 1998	Declining
HJ Andrews (central western Cascades)	Increasing	Declining since 1997	Declining
Tyee (southern Coast Range)	Stable	Declining since 2000	Stationary
Klamath	Declining	Stable	Stationary
Southern Cascades	Declining	Declining since 2000	Stationary
NW California	Declining	Declining	Declining
Hoopa	Stable	Declining since 2004	Stationary
Green Diamond	Declining	Declining	Declining

* Apparent survival calculations are based on model average.

† Population trends are based on estimates of realized population change.

- Estimated declines in adult survival were greatest in Washington where apparent survival rates were less than 80 percent in recent years, a rate that might not allow for sustainable populations.
- Declines in apparent adult survival for demographic study areas in Oregon (i.e., in the planning area) occurred predominately during the latest five years (2004 – 2008) and were not detected by the previous (2006) meta-analysis.
- The negative effect of barred owl presence on spotted owl apparent survival might be increasing.
- Scientists are concerned with the collective declines in adult survival across the subspecies range because spotted owl populations are most sensitive to change in adult survival.
- Spotted owl populations declined in seven of the eleven demographic study areas. In the other four demographic study areas, populations were stable or the precision of the estimate was statistically insufficient to verify a decline.
- The average population decline of all eleven demographic study areas was 2.9 percent/year from 1985 to 2008. Although this is a lower rate of decline than the 3.7 percent/year detected by the 2006 meta-analysis, the rates are not directly comparable because the previous meta-analysis examined a different series of years and because two of the demographic study areas were discontinued.
- In the eight demographic study areas that are part of the Northwest Forest Plan effectiveness monitoring network, spotted owl populations declined 2.8 percent/year. These data suggest that demographic rates for spotted owl populations on federal lands were slightly better than elsewhere, but this comparison is confounded by the interspersion of nonfederal land in study areas and the likelihood that spotted owls use habitat on multiple ownerships in some demographic study areas.
- The number of populations that declined and the rate at which they declined are noteworthy, particularly the precipitous declines in the three demographic study areas in Washington and the Coast Range demographic study area in Oregon. Estimates of population declines in these areas ranged from 40 to 60 percent through 2008. Spotted owl populations on the H.J. Andrews, Northwest California, and Green Diamond demographic study areas declined by 20 to 30 percent whereas the Tyee, Klamath, Southern Cascades and Hoopa demographic study areas showed declines of 5 to 15 percent.

Fifteen-year Monitoring Report – In 2011, the BLM and Forest Service reported on the first 15 years of Northwest Forest Plan implementation (Davis *et al.* 2011). Some of the findings include:

- Spotted owl survival rates are most affected by the amount of nesting/roosting habitat and competitive interaction with the barred owl. Maintaining large blocks of suitable spotted owl habitat likely will play a key role in spotted owl persistence.
- The large, repetitive late-successional reserve design is functioning, as intended. Approximately 70 percent of extant suitable spotted owl habitat occurs on federal lands; 70 percent of that is in reserved land use allocations. The rate of suitable habitat loss is within Northwest Forest Plan expectations.
- Forest succession accounted for some dispersal habitat recruitment. The Oregon Coast Range is one of the most-productive tree-growing regions in the Northwest Forest Plan area.
- Although losses of dispersal habitat occurred – primarily from wildfire – range-wide recruitment rates on federal lands exceeded losses.
- Extant habitat supports spotted owl movement between and through all federal reserves in western Oregon (Conservation Need 2).
- Wildfire remains a leading cause of habitat loss. Eighty-five percent of fire-prone habitats on federal land occur in the so-called "core" of the owl's range: the Klamath Mountains and western Cascades of Oregon.

Barred Owl Research – Recent studies shed light on competitive interactions between spotted owls and barred owls. These studies indicate that the barred owl is a direct threat to spotted owl conservation. Barred owls now occur throughout the spotted owls range, and use habitats and prey species more broadly than do spotted owls, including all habitats and prey species used by spotted owls.

In the dry forest of western Oregon (Dugger *et al.* 2011), scientists found "strong" associations between barred owl detection and the extinction of a spotted owl pair from an extant nest territory, and barred owl detection and the inability of a spotted owl pair to colonize (establish) a nest territory. Spotted owls did better as the amount of old-forest habitat[9] in the 500-acre core area (the area immediately surrounding the nest) increased and the fragmentation of old-forest habitat in the provincial home range decreased. The findings "increase the importance of conserving large amounts of contiguous, old-forest habitat to maintain Northern Spotted Owls on the landscape."

In the moist forest of western Oregon (Weins 2012), barred owls used all, as well as a broader range of, habitats and prey species used by spotted owls, formed smaller nest territories and outnumbered spotted owls. Both species used patches of old (> 120 yrs. old) conifer forest in proportions 2 – 5 times greater than their availability, and both species showed strong selection for riparian-hardwood forest along streams, especially for foraging.

There is no evidence that stand-specific habitat management can provide spotted owls with a competitive advantage over barred owls. Instead, current research continues to emphasize the importance to spotted owl conservation of large blocks of contiguous old-forest habitat that are closely spaced.

In 2012, the Service issued a draft EIS, "Experimental Removal of Barred Owls to Benefit Threatened Northern Spotted Owls," that describes and includes analysis of eight alternatives for the experimental removal of barred owls on a scale sufficient to determine if the removal would increase spotted owl site occupancy and improve population trends. This initial phase of research would last for multiple years, is intended to implement Recovery Action 29 of the 2011 Revised Recovery Plan, and almost certainly will involve some BLM-administered lands in the planning area. The Service would implement this research under its own authorities. The Service would use the results from the experiments to inform future decisions on potential long-term management strategies for barred owls.

Revised Recovery Plan for the Northern Spotted Owl (2011) – In 2008, the Service, citing new threats to the spotted owl, finalized its 2008 northern spotted owl recovery plan. That same year, the Service also published a final rule establishing a network of spotted owl critical habitat units based on the 2008 recovery plan reserve system. However, three professional societies of biologists criticized both the 2008 recovery plan and the 2008 final rule for curtailing the Northwest Forest Plan reserve network that was designed to meet the owl's conservation needs. The Service responded by issuing a revised spotted owl recovery plan in 2011 and, in 2012, a new final rule establishing 2013 critical habitat (the Service published the final rule in 2012; it took effect in 2013).

The Revised Recovery Plan identifies competition from barred owls, ongoing loss of suitable habitat because of timber harvest and catastrophic fire, and losses of amount and distribution of suitable habitat because of past activities and disturbances, as the most important range-wide threats to the spotted owl. To address these threats, the recovery strategy has five elements, all in the context of adaptive forest management:

- Development and application of a range-wide modeling framework
- Management of barred owls
- Monitoring and research
- Habitat conservation
- Active forest management

[9]"Old forest: All older (≥ 100 years) conifer or mixed stands that have not received a harvest entry exceeding 20 percent basal area; characterized by trees with ≥ 35 cm DBH" (Ecological Archives A021-108-A1).

The 2011 Revised Recovery Plan recommends investigating the competition between spotted and barred owls, experimental control of barred owls to better understand the impact the species is having on spotted owls, and, if recommended by research, management of barred owls. The Service recommends numerous research and monitoring activities, including continuing the demographic monitoring, spotted owl habitat monitoring, and spotted owl distribution inventories. The foundation of the Revised Recovery Plan for conserving forest habitat on federal lands is the Northwest Forest Plan until such time that the Service recommends an alternate habitat conservation network or until the BLM or Forest Service revises their land management plans. The 2011 Revised Recovery Plan encourages the active, restoration-focused management of forests to address climate change and the dynamic ecosystem processes in many areas, and estimates that recovery of the spotted owl could be achieved in approximately 30 years.

Three recovery actions are directly pertinent to the BLM planning effort:

- Recovery Action 6 – In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery.
- Recovery Action 10 – Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population.
- Recovery Action 32 – Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on Federal and non-federal lands across its range, land managers should work with the Service as described below to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees.

Although the RA 10 narrative makes clear that the Service anticipates that some spotted owl sites will be lost to forest treatment, the level of anticipated loss is unclear. That said, the Service recommends, "As a general rule, forest management activities that are likely to diminish a home range's capability to support spotted owl occupancy, survival and reproduction in the long-term should be discouraged."

Also with respect to Recovery Action 10, recommendations regarding "high value spotted owl habitat" appear to be somewhat redundant. The Revised Recovery Plan defines "high value" spotted owl habitat as that habitat addressed by Recovery Action 32 plus the additional habitat needed under Recovery Action 10 to sustain currently occupied and historic spotted owl sites (USFWS 2011a).

Critical Habitat for the Northern Spotted Owl (2013) – In addition to other lands in Washington, Oregon and California, Service delineated 1,230,417 acres of BLM-administered land in the planning area as spotted owl critical habitat, in seven critical habitat units and thirty subunits:

- North Coast Ranges and Olympic Peninsula (two subunits in the planning area)
- Oregon Coast Ranges (All six subunits in the planning area)
- West Cascades South (All six subunits in the planning area)
- East Cascades North (Four subunits in the planning area)
- East Cascades South (One subunit in, and one subunit partly in, the planning area)
- Klamath West (Two subunits in, and two subunits partly in, the planning area)
- Klamath East (Five subunits in, and one subunit partly in, the planning area)

The ESA defines critical habitat as that which is "essential to the conservation of the species and which may require special management considerations or protection…." The final rule identifies the "special management considerations or protections" for each critical habitat unit.

BLM-administered lands in the North Coast Ranges and Olympic Peninsula, Oregon Coast Ranges and West Cascades South critical habitat units have the following special management considerations (77 FR 71909 and 71910):

- Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32. This applies to all land-use allocations.
- Management emphasis needs to be placed on meeting northern spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential physical or biological features of northern spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals.
- Continue to manage for large, continuous blocks of late-successional forest.
- In areas that are not currently late seral forest or high-value habitat and where more traditional forest management might be conducted (e.g. matrix), these activities should consider applying ecological forestry prescriptions.

BLM-administered lands in the East Cascades North and East Cascades South units have the following special management considerations (77 FR 71910):

- Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32. This applies to all land-use allocations.
- Emphasize vegetation management treatments outside of northern spotted owl territories or highly suitable habitat.
- Design and implement restoration treatments at the landscape level.
- Retain and restore key structural components, including large and old trees, large snags, and downed logs.
- Retain and restore heterogeneity within stands.
- Retain and restore heterogeneity among stands.
- Manage roads to address fire risk.
- Consider vegetation management objectives when managing wildfires, where appropriate.

The special management considerations for BLM-administered lands in the Klamath West and Klamath East units "represent a mix of the requirements needed to maintain or enhance the essential physical or biological features in mesic and dry forest types;" this is a mix of the 12 special management considerations listed above depending on site-specific forest conditions. "Habitat associations in the Klamath zone are diverse and unique, reflecting the climate, topography, and vegetation of this area. Nesting and roosting habitat somewhat resembles that of other zones, with a greater emphasis on topography that provides some relief from high temperatures while foraging habitat in this zone includes forests that are more open. Consequently, management actions consistent with maintaining and developing northern spotted owl habitat need to consider local conditions."

The Service characterizes these "special management considerations or protections" as recommendations instead of firm management standards. The Service advocates implementing "ecological forestry" practices – for example, as described by Franklin and Johnson (which includes regeneration harvest) – in critical habitat. However, the Service does not define the degree to which the various forest treatments may be implemented and remain consistent with the final rule. As the Service stated, "Specifically prescribing such [recommended] management is beyond the scope or purpose of this document, and should instead be developed by the appropriate land management agency at the appropriate land management scale (e.g., National Forest or Bureau of Land Management District)… through the land managing agencies' planning processes and with technical assistance from the U.S. Fish and Wildlife Service, as appropriate" (77 FR 71881).

In evaluating whether a proposed action in critical habitat would constitute the "destruction or adverse modification" of critical habitat, which the ESA prohibits, the final rule (77 FR 71941) directs the Service to evaluate the action at each of the following scales (the bullets are according to internal Service direction):

Subunit

- The extent of the proposed action, both its temporal and spatial scale, relative to the subunit within which it occurs.
- The specific purpose for which the affected subunit was identified and designated as critical habitat
- The cumulative effects of all completed activities in the unit
- The impact of the proposed action on the ability of the affected critical habitat to continue to support the life history functions supplied by the PCEs
- The impact of the proposed action on the subunit's likelihood of serving its intended conservation function or purpose
- The overall consistency of the proposed action with the intent of the recovery plan or other landscape-level conservation plans
- The special importance of project scale and context in evaluating the potential effects of timber harvest to spotted owl critical habitat

Unit

- The extent of the proposed action, both its temporal and spatial scale, relative to the unit within which it occurs.
- The impact of the proposed action on the unit's likelihood of continuing to contribute to the conservation of the species

Range-wide

- The extent of the proposed action, both its temporal and spatial scale, relative to the entire critical habitat network

To summarize the final rule for BLM land use planning, the BLM is to manage its lands in each subunit to "address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls." Each subunit, as a whole, "is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between subunits and critical habitat units." Thus, the final rule provides the BLM with latitude to manage critical habitat as long as the BLM demonstrates that its proposed activities, individually and cumulatively, would not preclude spotted owl persistence and connectivity at the subunit scale and above during the short term, and the restoration of normal forest ecological functions, including structurally-complex stands, during the long term.

HexSim – One of the criticisms the BLM received regarding its spotted owl analyses for the 2008 RMP/EIS, from members of the public and at least one professional society, was the lack of forecasts of how the alternatives would affect spotted owl populations. However, as the BLM stated and reviewing scientists verified, there was no credible method for the BLM to make such forecasts. Since 2008, the EPA developed the HexSim model, which the Service used during its development of 2013 critical habitat to forecast relative spotted owl population response to different critical habitat unit configurations. Although, as the Service stated, the simulations were not intended to forecast spotted owl demographic response (i.e., to accurately predict population levels), they were useful for comparing relative spotted owl population trends among different possible critical habitat configurations. HexSim is a new tool to inform BLM decision-making.

Marbled Murrelet

Marbled murrelets are documented in the Coos Bay, Eugene, Roseburg, and Salem Districts and are suspected in the Medford District. There are 321 known, occupied marbled murrelet sites within the decision area encompassing 47,078 acres; most of which are within the Coos Bay District (Table 45). The Service listed marbled murrelet under the ESA as threatened in 1992 (57 FR 45328). The primary causes for listing under the ESA were the loss and modification of nesting habitat due to timber harvest, mortality associated with gill-net fishing, and effects of oil spills at sea. The marbled murrelet feeds at sea and has been documented to nest up to 49 miles inland (Mack *et al.* 2003); however, most nesting occurs within 35 miles of the ocean.

The 2012 population estimates for marbled murrelets between Astoria, Oregon and Coos Bay, Oregon (Marbled Murrelet Conservation Zone 3) is 6,359 birds and between Coos Bay, Oregon and Shelter Cove, California is 4,960 birds (Strong 2013).

The Service revised marbled murrelet critical habitat in 2011 (76 FR 61599). There are 1,474,784 acres of designated critical habitat for the marbled murrelet within the planning area; 33 percent of which (483,814 acres) is within the decision area (Table 4).

Oregon Silverspot Butterfly

The Oregon silverspot butterfly was listed under the ESA as threatened in 1980 (45 FR 44935). Historically, its range extended from the Long Beach Peninsula in Pacific County, Washington, south to Del Norte County, California. Populations were restricted to the immediate coast, centered around salt-spray meadows, or within a few miles of the coastline in similar meadow-type habitat (USFWS 2011b). At the time of listing (1980), the only viable population known was on the Siuslaw National Forest in Tillamook County, Oregon (USFWS Fact Sheet). Additional populations have since been discovered at Cascade Head, Bray Point, and Clatsop Plains in Oregon, on the Long Beach Peninsula in Washington, and in Del Norte County in California. This species is suspected in Salem District. However, given its narrow range of habitat, management direction on BLM-administered lands is unlikely to affect the species or its habitat. Critical habitat for the Oregon silverspot butterfly was designated in 1980 (45 FR 44935). There are 368 acres of designated critical habitat for the Oregon silverspot butterfly within the planning area but none occurs within the decision area.

Steller Sea Lion – Western Distinct Population Segment

The Steller sea lion was listed under the ESA as Threatened in 1990 (55 FR 49204), critical habitat was designated in 1993 (58 FR 45269) and the Western distinct population segment (DPS) was listed as Endangered in 1997 (62 FR 24345). This species is suspected in Coos Bay District. However, given its marine habitat, management direction on BLM-administered lands are unlikely to affect the species or its habitat.

Table 45. Marbled murrelet critical habitat and occupied sites within the decision area

District/Field Office	Designated Critical Habitat for the Marbled Murrelet	Occupied Marbled Murrelet Sites	
	(acres)	*(#)*	*(acres)*
Coos Bay	142,109	237	28,890
Eugene	97,466	32	5,592
Klamath Falls	0	0	0
Medford	16,194	0	0
Roseburg	77,939	21	6,254
Salem	150,105	34	6,342
Total	**483,814**	**321***	**47,078**

* Two districts share three occupied marbled murrelet sites.

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp was listed under the ESA as threatened in September 1994 (59 FR 48136). At time of its listing (1994), the species was known to occur only in California (USFWS 2008). In 1998, additional populations were discovered in vernal pools in Jackson County, Oregon, in an area north of Medford known as the Agate Desert. The vernal pool fairy shrimp is documented in Medford District. Critical habitat for the vernal pool fairy shrimp was designated in 2003 (68 FR 46684). There are 7,354 acres of designated critical habitat for the vernal pool fairy shrimp within the planning area; six percent of which (422 acres) is within the decision area.

Western Snowy Plover – Pacific Coast Population

The Pacific Coast population of the Western snowy plover was listed under the ESA as threatened in 1993 (58 FR 12864) and critical habitat was designated in 2005 (70 FR 56970). Historically, snowy plovers nested in at least 29 locations on the Oregon coast (USFWS 2012a). Currently, only eight locations in Oregon support nesting western snowy plovers, a 72 percent reduction in active breeding locations. Western snowy plover are documented in the Coos Bay District. A revision to critical habitat was finalized by the Service on June 19, 2012 (77 FR 36728). There are 2,279 acres of designated critical habitat for the snowy plover within the planning area; 17 percent of which (385 acres) is within the decision area.

Federally Proposed

Streaked Horned Lark

The streaked horned lark was proposed as Threatened under the ESA on October 11, 2012 (77 FR 61938). The streaked horned lark is endemic to the Pacific Northwest and historically ranged from southern British Columbia to Rouge River Valley of southwestern Oregon (USFWS 2012b). It is extirpated throughout much of its range. Current range-wide population is about 1,170–1,610 individuals, with 900–1,300 of those occurring in the Willamette Valley. The largest known populations breed in the southern Willamette Valley at the Corvallis Municipal Airport and on the U.S. Fish and Wildlife Service's Willamette Valley National Wildlife Refuge Complex. Streaked horned larks are documented in Coos Bay and Medford Districts and are suspected in the Eugene District.

Taylor's Checkerspot Butterfly

Taylor's checkerspot butterfly was proposed as endangered under the ESA on October 11, 2012 (77 FR 61938). Historically, this species was found throughout grasslands in the Willamette Valley, Puget Sound, and south Vancouver Island. Historic range and abundance is not precisely known because exhaustive searches did not occur until recently (USFWS 2012c). However, the species was documented at more than 70 sites in British Columbia, Washington, and Oregon (14 recorded sites from Oregon). Currently, Taylor's checkerspot butterfly is extirpated from British Columbia and all but one locale in the Willamette Valley. By 1989, fewer than 15 populations remained in the Pacific Northwest, and as of October 2002, there were only four confirmed populations, although it may exist at three additional locales. In Oregon, the checkerspot is found at only one site, in Benton County, on a grassy bald and power line right-of-way area owned by the Weyerhaeuser Company. This species is suspected in the Eugene District.

Wolverine

The wolverine was proposed as threatened under the ESA on February 1, 2013 (78 FR 7864). Currently, an estimated 250 to 300 wolverines occur in the lower 48 states, where the species has rebounded after broad-scale predator trapping and poisoning programs led to its near extinction in the early 1900s (USFWS 2011e). Wolverine habitat is dependent on high-elevation areas that are cold and receive enough winter precipitation to maintain snow late into the spring; wolverines are dependent on spring snow cover for successful reproduction. They do not appear to specialize on specific vegetation or other structural characteristics. Mean seasonal elevations used by wolverines in the northern Rocky Mountains and North Cascades vary between 1,400 and 2,600 meters (4,592 and 8,528 feet). Wolverine habitat is limited to the crest of the Cascade Mountains and scattered mountain-tops in the Medford

District and Klamath Falls Field Office (i.e., areas at an elevation of at least 4,592 feet). However, the wolverine is not documented or suspected within the decision area. In Oregon, there have been only six verified sightings since 1920 (USFWS 2013b).

Federal Candidate

Fisher

The fisher became a candidate for listing under the ESA in April 2004 (69 FR 18770). Historically, fishers occurred in Oregon throughout the Coastal and Cascade mountains (USFWS 2010b). Currently, the range of the fisher is reduced. Remaining populations of fishers are restricted to two separate and genetically isolated populations in southwestern Oregon: one in the northern Siskiyou Mountains and one in the southern Cascade Range (descended from reintroduced fishers that were translocated from British Columbia and Minnesota).

Fishers were most abundant historically in low- to mid-elevation, conifer-dominated forests having relatively continuous canopies and complex physical structure near the forest floor (Aubry and Lewis 2003). In the western U.S., fishers generally avoid clearcuts and forested stands with less than 40 percent canopy cover, and occur at low densities in second-growth forests and landscapes that have been extensively fragmented by timber harvesting. Denning sites for fisher include cavities in large-diameter (> 80 cm dbh) live trees, snags, and logs. However, recent reports have documented that fisher can occasionally use a broader range of habitats where complex vertical and horizontal structure is present (Raley *et al.* in Aubry *et al.* 2012). Fisher have been documented in areas that have been intensively managed for timber production and where there are few late-successional stands outside of major incised drainages (Clayton and von Kienast 2009). The majority of these stands do not provide the large, decadent trees and snags with vertical and horizontal structure which are generally associated with fisher dens as described in Aubry and Lewis (2003) and Aubry and Raley (2006). Some of the incised drainages provide the type of stands that may provide fisher denning habitat and may serve as dispersal corridors (Clayton and von Kienast 2009).

The main reason for population declines is habitat loss and fragmentation due to timber harvest, roads, urban development, recreation, and wildfires (Aubry and Lewis 2003; USFWS 2010b). Other threats include small population sizes and isolation, predation, and human-caused mortality from vehicle collisions, poaching, and incidental capture and injury. The fisher has been documented in the Coos Bay, Eugene, Medford Districts and is suspected in the Klamath Falls Field Office and the Roseburg District.

Greater Sage-grouse

The greater sage-grouse became a candidate for listing under the ESA in March 2010 (75 FR 13910). Prior to European settlement, Oregon had 17.7 million acres of sage-grouse habitat (USFWS 2011c). Twenty-one percent of this habitat has been lost, and the remaining habitat is fragmented due to natural and artificial factors. Currently, human disturbance has an impact on sage-grouse due to direct habitat loss and fragmentation resulting from wildfire, invasive plants (e.g., cheatgrass and noxious weeds), juniper encroachment, energy development, urbanization, agricultural conversion, intensive grazing, and infrastructure development. Historically, within the decision area, the Klamath Falls Field Office had four leks (breeding colonies); the most recent occupancy was in 1993 (BLM 2008). Currently, there are no known populations within the decision area, even though suitable habitat exists (BLM 2008; S. Hayner, pers. comm., 31 January 2013).

Oregon Red Tree Vole – North Coast DPS ("Dusky Footed Vole")

The North Coast DPS of the Oregon red tree vole became a candidate for listing under the ESA on October 13, 2011 (76 FR 63720). The North Coast DPS of the Oregon red tree vole is also known as the "dusky footed vole." Henceforth, the North Coast DPS of the Oregon red tree vole will be referred to as the dusky footed vole to reduce confusion with Oregon red tree voles in other parts of the species range. The dusky footed vole is documented in the Eugene and Salem Districts and is suspected in the Roseburg District.

The dusky footed vole occurs in western Oregon from the Cascade crest to the Pacific coast, with a geographic range covering approximately 16.3 million acres (USFWS 2011d). A comparison of historical data with current surveys strongly suggests that the North Oregon Coast population has declined significantly. Dusky footed voles now appear to be uncommon or absent in much of the North Coast Range and North Cascades of Oregon.

Recent survey results show that dusky footed vole populations in the North Oregon Coast Range are isolated with limited distribution (USFWS 2011d). The effects of both past and current habitat loss and habitat modification that results in poor quality forests and insufficient older forest habitats threaten the dusky footed vole. Thinning younger stands occupied by voles can reduce or eliminate them from the stands. Although voles may eventually return to the stands, it is unknown how long before the stands are reoccupied. However, some forms of harvest may not exert a substantial negative impact on dusky footed voles if managed with the goal of enhancing late-successional characteristics.

Oregon Spotted Frog

The Oregon spotted frog became a candidate for listing under the ESA in 1991 (56 FR 58814). The Oregon spotted frog has been lost from at least 78 percent of its former range. Precise historic data is lacking, but this species has been documented in British Columbia, Washington, Oregon, and California. It is believed to have been extirpated from California (USFWS 2012d). Historically, the Oregon spotted frog was found in Multnomah, Clackamas, Marion, Linn, Benton, Jackson, Lane, Wasco, and Klamath counties in Oregon. Currently, it is known to occur from extreme southwestern British Columbia, south through the eastern side of the Puget/Willamette Valley Trough and the Columbia River Gorge in south-central Washington, to the Cascades Range, to at least the Klamath Valley in Oregon. This species is currently known to occur in Deschutes, Klamath, and Lane Counties. The Oregon spotted frog has been documented in the Klamath Falls Field Office and Medford District.

Bureau Sensitive and Bureau Strategic Species

The number of Bureau Sensitive wildlife species documented or suspected in the decision area has increased from 77 in 2007 to 85 species in 2011. Similarly, the number of Bureau Strategic wildlife species documented or suspected in the decision area has increased from eight in 2007 to 53 species in 2011.

Survey & Manage Species

Currently, there are 52 wildlife species within the decision area that fall under survey and manage standards and guidelines (2001 Survey & Manage ROD). The 2012 Plan Evaluation contains a summarized history of the survey and manage program:

> *"The 1995 RMPs were amended by the January 2001, Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the northern spotted owl.*
>
> *In March 2004, the BLM completed a supplemental environmental impact statement and issued a record of decision to remove the survey and manage mitigation measure. The U.S. District Court for the Western District of Washington found the Record of Decision invalid since it relied on a supplemental environmental impact statement that the Court found deficient. In 2006, the Court issued an order of relief, which allowed the BLM to eliminate the survey and manage requirement for four types of activities, commonly called the 'Pechman Exemptions.'*
>
> *Another interagency supplemental environmental impact statement was prepared to address deficiencies in the 2004 supplemental environmental impact statement. The BLM issued a record of decision in July 2007 to amend the plans within the Northwest Forest Plan area to remove the survey and manage mitigation measure.*

In January 2008, a lawsuit was filed, and in December 2009, the presiding judge issued an Order granting Plaintiffs motion for partial summary judgment. The judge found that the SEIS violated NEPA due to a lack of a true no action alternative; lack of new information warranting elimination of Survey and Manage; and lack of high-quality information and accurate scientific data related to fire and fuels treatments, costs, and species data.

A settlement agreement between the parties was approved by the court on July 6, 2011. The agreement stipulates that projects within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 Record of Decision without subsequent 2001-2003 Annual Species Reviews as modified by the 2011 Settlement Agreement. The Settlement Agreement modifies the 2001 Survey and Manage species list; establishes a transition period for application of the species lists; acknowledges existing exemption categories (2006 Pechman Exemptions); and, establishes exemptions from surveys for certain activities. The settlement agreement is in effect until the BLM conducts further analysis and decision making pursuant to the National Environmental Policy Act and issues a record of decision to supersede the Survey and Manage mitigation measure.

The 2008 RMP revision did not include management objectives or direction for Survey and Manage Species. A plan revision would provide an opportunity to determine whether to retain, modify, or eliminate the Survey and Manage mitigation measure."

The Ninth Circuit Court of Appeals issued an opinion on 25 April 2013 that reversed the District Court for the Western District of Washington's approval of the 2011 Survey and Manage Settlement Agreement. The case is now remanded back to the District Court for further proceedings. This means that the December 2009, District Court order which found National Environmental Policy (NEPA) inadequacies in the 2007 analysis and records of decision removing Survey and Manage is still valid. There is no remedy or injunction at this time, and the remand requires further proceedings consistent with the opinion.

Additional Species

Bald Eagle and Golden Eagle

The number of bald eagle breeding areas in Oregon increased from 65 in 1978 to 496 in 2007 (Isaacs and Anthony 2011). There was exponential growth in the bald eagle population of 7.3 percent per year from 1978 to 2007 (Isaacs and Anthony 2011). These authors suggest that the bald eagle population could double or triple before reaching carrying capacity. The loss of a small percentage of bald eagle breeding areas is likely inconsequential as long as the population numbers continue to increase.

Under the 1995 RMPs, there are 176 Bald Eagle Management Areas designated in the decision area totaling 17,945 acres (Table 46) and they vary in size from three to 962 acres each. Previously, there were 149 bald eagle nest trees

Table 46. Bald and Golden eagle management areas within the decision area

District	Bald Eagle Management Areas	
	(#)	*(acres)*
Coos Bay	26	765
Eugene	73	8,254
Klamath Falls	21	1,921
Medford	20	1,057
Roseburg	25	3,731
Salem	11	2,217
Total	**176**	**17,945**

amongst 89 territories in the decision area (BLM 2008). Bald Eagle Management Areas are designed to protect existing nest sites, winter and communal roosting areas, and potential nesting habitat (BLM 2008).

Golden eagle populations in the western U.S. are suspected of a long-term decline (Isaacs 2011). The trend in the golden eagle population in Oregon is unknown because of insufficient survey, inventory, and monitoring across the state. However, a consistent and statewide survey effort for golden eagles was conducted in 2011 and the results suggest that there is a long-term loss of potential breeding areas of 14.2 percent in Oregon. Golden eagles or their nests were found at 85.8 percent (278) of the 324 historical breeding areas in Oregon, but no golden eagles or nests were found at 14.2 percent (46) of the historical breeding areas (Isaacs 2011).

Within the planning area, there are 95 golden eagle breeding areas, concentrated mainly in the Klamath Falls Field Office, Roseburg District, and the Medford District (i.e., Klamath, Douglas, and Jackson counties) (Table 47). Based on 2011 data, 45 percent of the 38 breeding areas surveyed in the planning area were occupied by golden eagles (Table 6). Suspected causes of golden eagle population decline in Oregon include reduced prey abundance (e.g., jackrabbits), increased off-road recreation, increased rodent shooting, and loss of potential nest trees (Isaacs 2011).

In the U.S., both species of eagle are protected under the Migratory Bird Treaty Act (16 U.S.C. 703-712; 1918) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 1940). Based on current policy which provides direction as to how BLM will comply with the Bald and Golden Eagle Protection Act (WO IM-2010-156 – Bald and Golden Eagle protection Act – Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy), the BLM will use the best available demographic, population, and habitat association data to analyze impacts to golden eagles or their habitat, then include the following within the analysis area determined for the action/authorization:

- The potential direct and indirect impacts to individual birds and their habitat (e.g., direct mortality, destruction of eggs, nests, individual breeding territories, communal roosts, migration corridors, fragmentation of habitat, reduction in habitat patch size, disturbance from human presence, noise, commotion)
- The potential direct and indirect impacts, if any, to the local or regional eagle population and their habitat
- The potential short-term and long-term effects of the project on golden eagle populations and their habitat

TABLE 47. GOLDEN EAGLE BREEDING AREAS WITHIN THE PLANNING AREA

County*	**Golden Eagle Breeding Areas** *(#)*		
	Historical (pre-2011)	**Surveyed in 2011**	**Occupied in 2011**
Klamath	44	22	9
Douglas	19	4	3
Jackson	17	10	4
Curry	5	0	-
Clackamas	2	0	-
Coos	2	1	0
Josephine	2	0	-
Lane	2	0	-
Linn	2	1	1
Total	**95**	**38**	**17**

* THE REMAINING COUNTIES IN THE PLANNING AREA (CLATSOP, COLUMBIA, TILLAMOOK, WASHINGTON, MULTNOMAH, YAMHILL, MARION, LINCOLN, POLK, AND BENTON) DO NOT HAVE HISTORICAL GOLDEN EAGLE BREEDING AREAS. DATA FROM ISAACS 2011.

Landbirds

Direction in the Memorandum of Understanding between the BLM and Service to promote the conservation of migratory birds (BLM MOU WO-230-2010-04; 2010) states that the BLM shall address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for BLM-administered lands.

Oregon-Washington Partners-In-Flight, American Bird Conservancy, and Klamath Bird Observatory have prepared a series of conservation plans for landbirds intended to inform planning efforts and habitat management actions (Altman and Alexander 2012). The strategy for achieving functioning ecosystems for landbirds is described through the habitat requirements of "focal species." By managing for a suite of species representative of important habitat attributes in functioning ecosystems, many other species and elements of biodiversity also could also be conserved. Inclusion of these focal species in the analysis could help inform what the differences in effects amongst the alternatives are for landbirds as well as the habitat attributes and forest stages/ecosystems they represent.

There are three landbird conservation plans that pertain to the planning area:

- Habitat Conservation for Landbirds in the Coniferous Forests of Western Oregon and Washington (August 2012) – 25 focal species and habitat attributes (Altman and Alexander 2012),
- Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington (March 2000) – 34 focal species and habitat attributes (Altman 2000a), and
- Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington (June 2000) – 12 focal species and habitat attributes (Altman 2000b).

Trends And Forecasts

Northern Spotted Owl

The biological stress on the northern spotted owl is increasing. Current research indicates that interspecific competition with the barred owl is a leading, although not the only, cause. Other ongoing threats to the spotted owl include the effects of past habitat loss and fire exclusion on vegetation change, continuing habitat losses to wildfire and timber harvest, and continuing fragmentation of older forest. Although current research provides no evidence that the BLM can manage individual forest stands in a manner that gives spotted owls a competitive advantage over barred owls, it continues to confirm the importance of managing large blocks of contiguous old-forest habitat for spotted owl conservation (Courtney *et al.* 2004; USFWS 2011c).

Marbled Murrelet

Miller *et al.* (2012) report that the marbled murrelet population is declining throughout its range (estimated at 29 percent decline for the listed population from 2001 to 2010). The annual decline during this time was 3.7 percent. The marbled murrelet population declines in Washington (Marbled Murrelet Conservation Zones 1 and 2) are estimated, respectively, at 7.4 and 6.5 percent annually In contrast, there is not a statistically significant trend in marbled murrelet populations in Oregon and northern California (Marbled Murrelet Conservation Zones 3 and 4).

There is a strong association between total marbled murrelet populations and total suitable habitat at the scale of the Northwest Forest Plan Area (Raphael *et al.* 2011). Between 1994-1996 and 2006-2007, there was a net loss of higher suitability habitat for marbled murrelets of abou-t 7 percent within Washington, Oregon, and California. In Oregon between 1996 and 2006, there was a net loss of higher suitability habitat of 4.7 percent across all landowners and a net loss of higher suitability habitat of 2.0 percent on federal lands. The loss of marbled murrelet habitat on federal lands was primarily due to fire. The habitat modeling presented in Raphael *et al.* (2011) was limited to within 35 miles of the coast (Zone 1) in Oregon and California where all known marbled murrelet nests and nearly all detections are located. In Washington, habitat modeling also included Zone 2 (35 – 50 miles from the coast) since there is evidence of more extensive use of the areas farther inland by marbled murrelets.

The Service conducted a 5-year status review in 2004, which determined that no change in status was warranted. The 5-year status review concluded that marbled murrelet populations in Washington, Oregon, and California continue to decline (especially in California) and continue to be at risk from the threats identified at listing with the possible addition of West Nile Virus as a new threat (McShane *et al.* 2004). However, several threats, including the annual rate of habitat loss, loss of occupied sites due to survey error, and mortality from gill-net fishing, appear to have been reduced since the species was listed in 1992. These improvements will help to slow the rate of decline and lengthen the time to extinction.

Population declines in the listed range are related mainly to historic and ongoing nesting habitat loss and low breeding success (due to high predation related to reduced quality of remaining nesting habitats) (McShane *et al.* 2004). It is unrealistic to expect that the species will recover before there is significant improvement in the amount and distribution of suitable nesting habitat.

Management Opportunities

Northern Spotted Owl

In 2008, the BLM developed RMPs that, as the analysis demonstrated, contributed to a western Oregon landscape that met each of the conservation needs of the spotted owl. This time, the BLM could develop strategies that not only adequately address each conservation need, but also help delay regional extirpations of the spotted owl sufficiently long for the Service to determine and implement a successful recovery strategy.

The Revised Recovery Plan for the Northern spotted owl suggests a 30-year recovery period. This is the same timeframe suggested by the 2008 Recovery Plan, before the findings of the most recent meta-analysis became available. Given observed trends and the current lack of a strategy to counter barred owl competition, the BLM planning process could consider a more-conservative 50-year recovery timeframe originally suggested by the Interagency Scientific Committee. So, the BLM's challenge is to develop RMPs that contribute to a western Oregon landscape in which spotted owls persist in each of the Service's spotted owl modeling regions for 50 years or, if that is not possible, 30 years, and demonstrate that persistence. Making this contribution might be impossible in some parts of the planning area. The observed encounter rate between spotted owls and barred owls is unusually high in the Oregon Coast Ranges demographic study area compared to other demographic study areas and the BLM is limited in what it can do through habitat management on its limited landbase. The BLM however, does bring powerful analytical capabilities to the task, including the new HexSim analytical tool.

The BLM could evaluate different networks of large habitat blocks to determine their relative contributions to spotted owl conservation. At least one, but not all, action alternative could align the large block reserve network with 2013 critical habitat for the spotted owl.

During its work to delineate critical habitat, the Service could not forecast forest ingrowth or habitat change with any degree of accuracy. However, as our previous planning analyses revealed, the BLM's ability to forecast habitat changes, on all lands throughout the planning area and under different management scenarios, is a powerful tool for delineating large habitat blocks needed by the spotted owl. This tool might allow the BLM to design a network that both addresses the "special management considerations or protections" identified in the final rule, and, within that context, provides the BLM with maximum flexibility to address other values and uses.

During its evaluations to develop critical habitat, the Service, for its specialized needs, set analytical sideboards that are inconsistent with BLM planning needs. For example, during its HexSim analyses, the Service confined spotted owl reproduction to areas being evaluated as critical habitat, regardless of habitat conditions outside those areas. In this planning effort, the BLM could refine some of the Service's analytical assumptions to better comport with the "reasonably foreseeable" standard of NEPA. Once done, the BLM could use the Service's HexSim model to test whether the reserve design and land use practices of each BLM alternative would support spotted owl persistence to 50 and 30 years in each of the Service's spotted owl modeling regions.

The BLM could build upon the 2008 RMP/EIS analyses to test whether each management alternative meets the conservation needs of the spotted owl. The BLM could examine Conservation Need 1 in the same manner as before, except with more refined habitat layers for BLM-administered and other lands, a more refined model to simulate forest ingrowth and habitat change, and (for the first time) simulated stochastic events. The BLM also could measure forest fragmentation in the dry forest within known and predicted provincial spotted owl home ranges under each alternative. Although there is no threshold to compare against, unlike the Conservation Need 1 thresholds, Dugger *et al.* (2011) identified forest fragmentation as a factor in owl nest site abandonment and re-occupancy.

The BLM could refine the 2008 RMP/EIS analyses of Conservation Need 2 in favor of the more-refined method developed for the 15-year monitoring report. This newer method also could address "areas of concern" on BLM-administered lands, making separate analyses unnecessary.

With respect to Conservation Need 3, the 2008 RMP/EIS analyses were limited to comparisons of fire severity and fire resiliency by alternative. The 15-year monitoring report developed new methods to evaluate fire risk in western Oregon, a process that will be further refined when the State of Oregon issues state-wide information that is currently in development. Therefore, the BLM could replace the 2008 RMP/EIS analyses of Conservation Need 3 with simulations of stochastic change.

The 2008 RMP/EIS analyses of Conservation Need 4 were confined to fairly weak evaluations of the number of functional northern spotted owl nest territories that would occur on all land ownerships under each alternative, and the number/percent of known and predicted spotted owl activity sites on BLM-administered lands in the harvest and non-harvest land bases. These limitations were due to our analytical capabilities at the time. However, this time the BLM could use HexSim, with parameters refined according to scientific review and the BLM's planning needs, to forecast demographic responses out to 50 years under each alternative and in each of the Oregon modeling regions.

With respect to Recovery Action 6, the BLM could evaluate the reserve design in the moist forest under each alternative, and how management would affect the development of structural complexity and biological diversity that is beneficial to spotted owl recovery.

For the evaluations of Recovery Actions 10 and 32, the BLM could work with the Service to develop modeling standards to determine, with HexSim, how the application of different approaches to each recovery action, together and separate, would affect spotted owl demographic response under each alternative.

Marbled Murrelet

Alternative strategies for marbled murrelet management that differ from current policies could be explored. The positive correlation between the marbled murrelet population and the amount of nesting habitat, particularly the higher suitability habitat, suggests that the amount of nesting habitat sets the carrying capacity for marbled murrelets (Raphael *et al.* 2011). The conservation of remaining nesting habitat and restoration of currently unsuitable habitat could be key to murrelet recovery given the correlation between population and nesting habitat of marbled murrelets. Also, since there is not a statistically significant trend in marbled murrelet populations in Oregon and northern California (Miller *et al*. 2012; Strong 2013), there could be an opportunity to explore alternative management strategies.

Examples of current policies regarding marbled murrelet include:

- Unmapped Late-Successional Reserves around occupied marbled murrelet sites (1994 ROD)
- Conduct 2 years of surveys to assure that no marbled murrelet nests exist in the areas planned for timber harvest (1994 ROD);
- If behavior indicating occupation is documented, all contiguous existing and recruitment habitat for marbled murrelets (i.e., stands that are capable of becoming marbled murrelet habitat within 25 years) within a 0.5-mile radius will be protected (1994 ROD).

- Guidelines for the "Management of Marbled Murrelet Nesting Structure within Younger Stands" that allow thinning operations without protocol surveys when effects from proposed actions are discountable, insignificant or entirely beneficial so they would not adversely affect marbled murrelets.
    - Roseburg and Coos Bay Districts updated their guidelines in July 2012; Eugene and Salem Districts updated their guidelines in October 2011.
    - There are similarities and some differences between the two sets of guidelines.

Alternative strategies for managing marbled murrelets could include:

- The extent of protection provided around occupied marbled murrelet sites could be changed (i.e., reduced or enlarged).
- There is also opportunity to define "higher quality" and "lower quality" nesting habitat from a marbled murrelet management perspective.
- The pre-disturbance survey requirements could vary depending on the quality and/or location of marbled murrelet habitat that would be affected by proposed actions.
    - For example, surveys in "higher quality" nesting habitat could be required based on current protocols whereas surveys in "lower quality" nesting habitat would not be required.
    - For example, nesting habitat within 35 miles of the coast (Zone 1) could be surveyed whereas surveys in nesting habitat 35 - 50 miles from the coast (Zone 2) would not be required.
    - For example, the requirement for pre-disturbance surveys could be excluded from the Medford District because several years of protocol surveys suggest that marbled murrelets do not occur within that District (2012 Plan Evaluation).
- Management and conservation of marbled murrelet nesting habitat could vary depending on the quality and/or location of the habitat.
    - For example, "higher quality" nesting habitat could be conserved whereas "lower quality" nesting habitat could have other resource emphases.
    - For example, nesting habitat within 35 miles of the coast (Zone 1) could be conserved whereas nesting habitat 35 – 50 miles from the coast (Zone 2) could have other resource emphases.
- Guidelines for managing marbled murrelet nesting structure in younger stands could be incorporated into the RMP.

Bureau Sensitive & Strategic Species

Bureau Sensitive species would be managed within guidance provided in BLM Manual 6840 – Special Status Species, but there could be different management approaches consistent that guidance. This manual states: "[t]he application of the special status species policy to provide specific protection to species that are listed by the BLM as sensitive on lands governed by the O&C Act must be consistent with timber production as the dominant use of those lands." Some examples of how Bureau Sensitive species management could be applied in different manners include:

- Management of Bureau Sensitive species could vary between O&C lands and Public Domain lands.
- Management of Bureau Sensitive species could vary by land use allocation on O&C lands, giving greater emphasis to Bureau Sensitive species management in reserve allocations.
- Other provisions and direction under the alternatives may provide sufficiently for Bureau Sensitive species without the need for additional, specific direction for Bureau Sensitive species.

Survey and Manage

Alternative strategies to the survey and manage standards and guidelines could be explored. The 2001 Survey and Manage Standards and Guidelines could be carried forward as written, but other strategies for species conservation could be evaluated including:

- Survey and manage species could be "absorbed" into the existing Bureau Sensitive and Strategic species (i.e., under BLM Manual 6840).
- Survey and manage could be applied based on land use allocation (e.g. reserves vs. non-reserves).
- Survey and manage list could be modified through a streamlined Annual Species Review process.
- Guidance in the 2011 Survey and Manage Settlement Agreement could be incorporated into the development of an alternative.

It is noteworthy that modification of the existing survey and manage standards and guidelines could have implications for the listing status of the dusky footed vole.

Bald Eagles and Golden Eagles

Alternative strategies for Bald Eagle Management Areas that differ from current policies could be explored. Current guidance for Bald Eagle Management Areas could be carried forward, but other strategies for managing this species could be explored including:

- Other provisions and direction under the alternatives may provide sufficiently for the species without specific direction designating Bald Eagle Management Areas.
- The extent or number of Bald Eagle Management Areas could be reduced (i.e., eliminated or reduced), since the bald eagle population has been and is expected to continue increasing.
- Management areas for golden eagles could be established, given their reported decline in population.
- Within golden eagle management areas, direction could be established regarding off-road recreation, rodent hunting, and the conservation of potential nest trees.

Wild Horses

Key Points

- Current management direction is adequate for the management of the Pokegama Herd Management Area.

Current Conditions And Context

The Pokegama Herd Management Area (HMA) is the only herd management in the planning area. The Pokegama HMA encompasses a total of 80,875 acres, of which 67,869 acres consisting of public, private, and state land lie within the planning area. The Klamath Falls Field Office administers approximately 15,775 acres (11,980 O&C lands, 3,795 Public Domain lands) of the HMA. Management of the Pokegama HMA is in accordance with the Wild Free-Roaming Horse and Burro Act of 1971 (P.L. 92-195). Management is designed to achieve and maintain a thriving natural ecological balance on the public lands.

There are no known conflicts with other resources within the HMA. The appropriate management level for the Pokegama HMA is 30-50 head. The appropriate management level has been maintained through two captures that were completed in 1996 and 2000. The BLM has not implemented additional captures since 2000.

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