

Appendix E

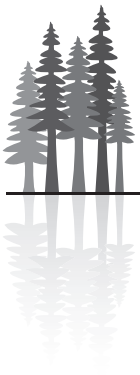
Energy and Minerals



This appendix provides detailed background on mineral and energy developments.

In this appendix:

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Reasonably Foreseeable Mineral and Energy Developments Summary

TABLE E-1. FLUID MINERAL DEVELOPMENT POTENTIAL

	Eugene	Roseburg	Medford	Klamath Falls
Conventional Oil/Gas	N/A	Zero to 114 wells	N/A	N/A
Seismic notices of intent		Expected to be confined to existing road systems; negligible effects.		
Road construction		7 miles new road = 39 acres.		
Well pad		Nested wells and services = 114 acres.		
Collection pipe:		Collection piping will utilize road prism.		
Plug & abandon wells		No additional effect.		
Coal bed natural gas	N/A	N/A	N/A	N/A
Seismic notices of intent				
Road construction				
Well pad				
Collection pipe:				
Plug & abandon wells				
Geothermal	N/A	N/A	N/A	See below.

For Klamath Falls Resource Area:

Geophysical Exploration (includes seismic reflection and gravity/magnetic field surveys):

- Notices of Intent: 2; Very small acres disturbed
- Exploratory Wells: 1-2: 0.1 acre per site; .25 acre per well for roads. 0.35-0.7 acres total disturbance

Geothermal Operations:

- Notices of Intent:
 - Surface Geophysical Surveys: 6: very limited surface disturbance
 - Temperature Gradient Holes: 5: 0.1 acre per site; .25 acre per well for roads. 2.25 acres total disturbance

Exploration wells: 5 wells; One acre per well pad; 40 ft. wide ROW @ 0.5 mile per well = 17 acres total disturbance

Geothermal Power Plant Development:

1 possible in the life of the plan; if proposed, evaluate separately in cooperation with the State.

Direct Use of Geothermal Energy for space heat:

2 possible; evaluate separately if proposed



TABLE E-2. SALABLE MINERAL DEVELOPMENT SCENARIO SUMMARY FOR 2008-2018

	Roseburg	Salem	Eugene	Coos Bay	Medford	Klamath Falls
New quarries	1	5	2	5	3	1 to 2
Acres disturbed	2 acres per quarry, plus ½ acre for access.					2 to 3 acres per quarry, plus ½ acre for access.
Existing quarries	60 6 quarries expanded @ 2 acres per quarry	38 8 quarries expanded. Less than 2 acres per quarry.	71 4 quarries expanded at approximately 1 acre each.	32 6 quarries expanded. Less than 2 acres each quarry.	188 10% of quarries expanded at less than 1 acre per quarry, plus 1/10 acre per quarry for new access.	18 quarry & cinder sites used Intermittently.
Depletions	10 quarries	2 quarries	2 quarries	1 quarry	5 quarries	Up to 4 quarries
Decorative stone		3 to 6 sales per year	1 to 2 sales per year		750 sales over the 10-year period	1 to 2 sales per year

TABLE E-3. LOCATABLE MINERAL DEVELOPMENT SCENARIO

	Roseburg	Salem	Eugene ^a	Coos Bay	Medford	Klamath Falls
Bench Placer notices	2	10	6	6	80	0
Roads	0.3 acres per	0.3 acres per	0.3 acres per	0.3 acres per	Of 80 estimated, 10 would have roads at ½ acre per notice.	0
Test pits, support facility	1 acre per notice	1 acre per notice	1 acre per notice	1 acre per notice	1 acre per notice on average.	
Notice to plan	1	1	0	1	0	0
Vein notices	2	4	4	one	100 notices; surface disturbance 1 to 5 acres per notice.	4
Roads	3 per notice 40x200 = ½ acre per notice	3 per notice 40x200=1/2 acre per notice	3 per notice 40x200= ½ acre per notice	3 per notice 40x200= ½ acre per notice	Mostly existing roads; minimal temporary roads; estimate 0.50-acre for half of the notices; and zero acres for the other half of the notices.	Mostly existing roads; minimal temporary roads.
Support facilities	1 acre per notice	1 acre per notice	1 acre per notice	1 acre per notice	1 acre for half of the notices (many current notices take ore off-site for processing).	
Sample sites	½ acre per notice	0.50-acre per notice	0.50-acre per notice	0.50-acre per notice	Ten holes per notice; 0.1 acre per hole; estimate 1/5 of the notices will drill a hole.	Ten holes per notice; 0.1 acre per hole.
Plans of Operation	1	1	1	1	15 (lode & placer)	0
Exploratory holes	5; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre. Estimate ½ of the plans will be lodes and have exploratory holes.	
Support facility	1 acre	1 acre	1 acre	1 acre	1 acre per plan	
Second Phase Exploration						
Roads	5 (standard as above)= 2.5 acres	10 (standard as above)= 2.5 acres	10 (standard as above)= 2.5 acres	10 (standard as above)= 2.5 acres	Mostly existing roads; minimal temporary roads; estimate ½ acre for ½ of the plans; zero acres for the other half of the plans.	



	Roseburg	Salem	Eugene ^a	Coos Bay	Medford	Klamath Falls
Drill pads		10 holes, 0.1 acre per hole	10 holes, 0.1 acre per hole	10 holes, 0.1 acre per hole	10 holes, 0.1 acre per hole; on ¼ of the plans.	
Mine Development						
Bench placer	One; 1 acre	One, 7.5 acres	one; 7.5 acres		Eight of the plans are estimated to be bench placers at five acres per plan.	
Lode	One	one	None		Seven of the plans are estimated to be lodes with one requiring a 25 acre heap leach.	
Surface excavation	1 acre	10 acres			5 acres per plan.	
Stockpile topsoil	1 acre	2acres			1 acre per plan.	
Support facility	1 acre	2acres			1 acre per plan.	
Roads	1 acre	2 acres			Less than 1 acre per plan.	
Mineral Processing	Done offsite	Done offsite			One acre for half of the plans.	
Silica sand deposit		One	*See footnote	one		0
Mine site		21 acres		20 acres		
Stockpile heavy minerals		One acre		2 acres		
vegetation stockpile		One acre		½ acre		
Office & magnetic separation		One acre		One acre		
Laterite placer plan of operation				One plan		0
Exploratory Holes drilled				10 @ 0.1 acre per hole		
New temporary Roads				0.75 acres total		
Support facility				One acre		
Second Phase Expansion						
Temporary roads				2.5 acres total		
Ten additional drill holes				One acre total		
Recreational mining	5 notices; 2 Acres total	30 notices; 7.5 acres total	30 notices; 7.5 acres total	30 notices; 7.5 acres total	800 Estimate 300 acres, this is disturbance only under the water level.	See suction dredging above.

^a Eugene footnote: Locatable minerals with silica sand potential withdrawn from mineral entry in the Florence area. However, sand is excavated and removed from BLM property near Florence, Oregon, on an easement granted to the adjacent landowner.



Foreseeable Development of Oil and Gas Resources Scenario for the BLM Eugene, Roseburg, and Medford Districts and the Klamath Falls Resource Area of the Lakeview District

Summary

This report estimates the potential for occurrence of oil and gas activity on Federal acreage managed by the BLM in the Eugene, Roseburg, and Medford Districts, and in the Klamath Falls Resource Area of the Lakeview District during the next 10 years. The analysis is based on current developments within and outside of these Districts, including historical Oil and Gas investigations that began with the first exploration well drilled near Newberg in 1902. This analysis compliments the similar discussion for the Coos Bay and Salem Districts where proven hydrocarbon resources exist.

It is expected that, with a few exceptions, most public domain and revested Oregon and California Railroad Grant lands will be available for leasing of hydrocarbon energy resources subject to management by guiding stipulations. A review of oil and gas occurrence potential, oil and gas system and play analysis, oil and gas production activities, potential for resource occurrence and development, and leasing was made to establish the oil and gas potential presented here. This information was used to project activity through 2018. Given the current incipient nature of petroleum development in Oregon in 2007 (i.e., current coalbed natural gas development and new exploration of the Mist Gas Field), completely new assumptions and information that could impact Reasonably Foreseeable Development scenarios for each district may occur during the course of the next 10 years and beyond.

The districts are in western Oregon and encompass lands within all or parts of eight counties: Linn, Lane, Douglas, Jackson, Josephine, Curry, Coos, and Klamath. The potential for occurrence of conventional petroleum in the districts has been the focus of numerous studies. These investigations have resulted in one developed field in the Salem District (Mist Gas Field), beginning with a discovery well in 1979. A prospect for coalbed natural gas is being developed in the Coos Bay District. However, small amounts of conventional and unconventional oil and gas have been found throughout western Oregon, based on the projected sedimentary basins.

Research has identified sedimentary basins, petroleum systems, and coal basins. Based on these petroleum systems, five plays and associated prospects have been identified. The research cited within this report projects that these plays have low to moderate potentials for development.

Based on BLM protocol for mineral potentials, it is further projected that the Eugene and Medford Districts, and the Klamath Falls Resource Area have low to moderate potential for petroleum occurrence and low potential for development. Therefore, it is unlikely that petroleum will be developed in these BLM administrative areas within the 10-year Reasonably Foreseeable Development scenario for the planning area. The Roseburg District contains plays, prospects, and an area of focused petroleum shows that project a moderate potential for petroleum occurrence and a moderate potential for development. The BLM-administered acreage with this moderate potential is approximately 37,000 acres.

It is anticipated that the Roseburg BLM-administered lands could have a development of up to 114 wells, with total disturbed acreage up to approximately 153 acres within the 10-year Reasonably Foreseeable Development scenario.



Introduction

This Reasonably Foreseeable Development (RFD) describes scenarios for leasable oil and gas commodities within lands managed by the BLM's Eugene, Roseburg, and Medford Districts and the Klamath Falls Resource Area of the Lakeview District (collectively referred to as districts). The purpose of this RFD scenario is to provide models that anticipate the level and type of future petroleum development activity in the planning area, and to serve as the basis for analyzing cumulative impacts. The RFD first describes historic and current development. Future trends and assumptions for hypothetical exploration and extraction operations are then described. All projections are estimates based on available information presented in the Historic and Current Development section.

Methodology

Extensive review of existing literature was completed, as well as acquisition of unpublished information. Resulting information, such as prospects, plays, basins, exploration wells, seeps, coal exposures, and petroleum encounters in water wells, were crafted into Geographic Information Systems (GIS) map layers. These layers were then incorporated into GIS maps of BLM-administered lands and geologic mapping. The results provided quantifiable locations and acreages estimates of petroleum potentials, or lack of, for BLM-administered lands within each district boundary (USDI BLM 2008).

Scope

This RFD is based on the known and inferred mineral resource capabilities of the lands involved, and applies to conditions and assumptions discussed under Historic and Current Development, as well as Future Trends and Assumptions. Changes in geologic data, interpretation, and/or economic conditions that alter the RFD may result in deviation of these projections over time.

Impacts caused by oil and gas development, as well as impacts to oil and gas development, cannot be assessed without estimating future oil and gas activity. Such estimates of future activity incorporate:

- oil and gas occurrence potential, as documented by historic research and papers
- oil and gas system and play analysis (including existing plays currently developed and the potential development for new plays such as identified sediment basins and Coalbed Natural Gas)
- oil and gas production, including economics and technology
- potential for resource occurrence and development
- leasing and development, including Federal and non-Federal activities

The above factors cannot be predicted with certainty, but some generalizations are possible. The estimates presented here are based on past and present activities as well as on trends within and without the Districts, including future price deviations. These estimates may be lower than what may actually happen if price and play developments are more positive than anticipated. Likewise, if expansion of existing plays is not successful, if new plays are not developed, and/or if commodity prices are less than anticipated, these estimates may be exaggerated.



Historic and Current Development

Oil and Gas Occurrence Potential

The districts encompass lands in eight counties, including Linn, Lane, Douglas, Jackson, Josephine, Curry, Coos, and Klamath counties. The districts are located in western, southwestern, and southern Oregon. The BLM-management extends to both Public Domain (PD) and revested Oregon and California Railroad (O&C) lands. It is expected that most of these lands will be available for mineral leasing.

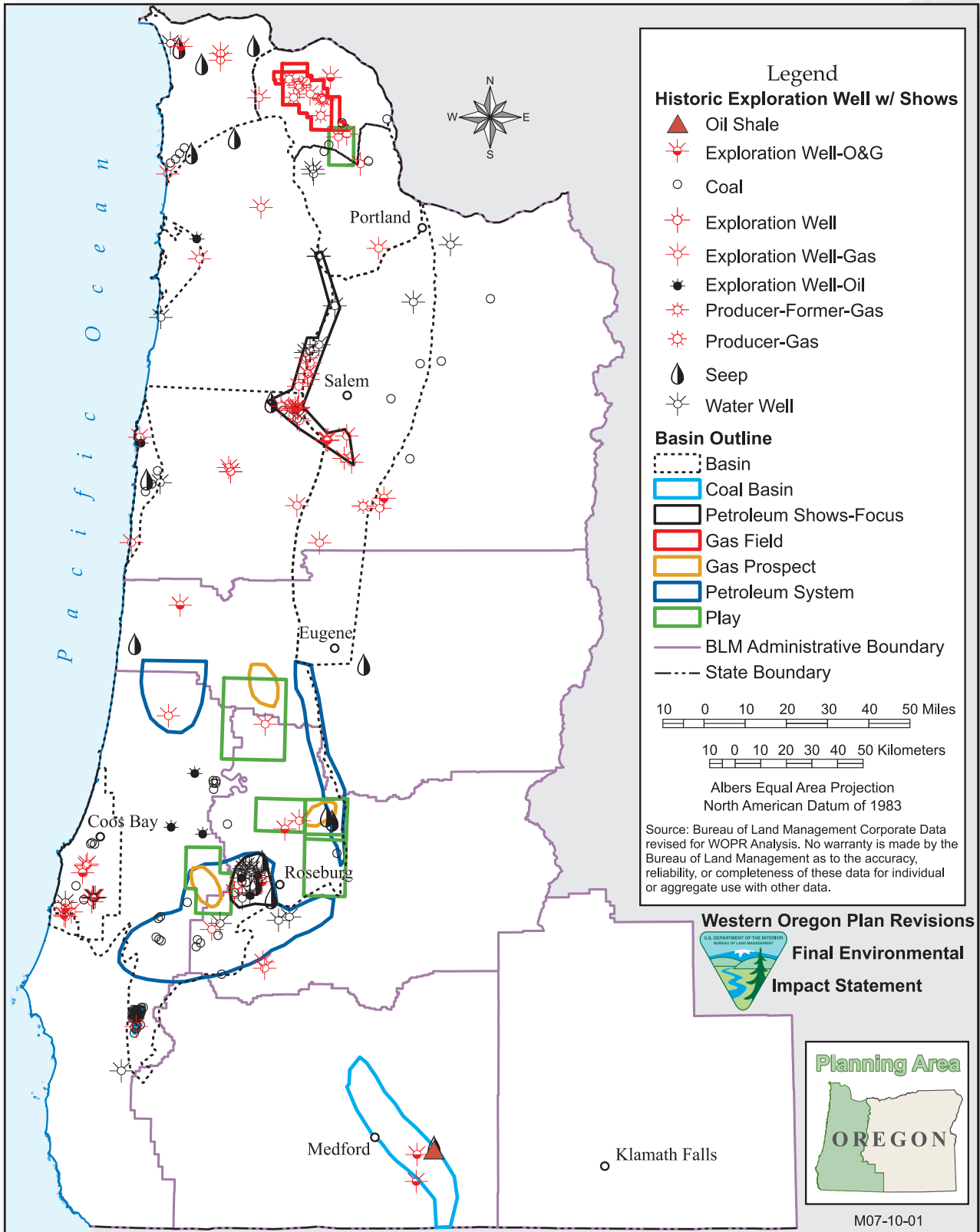
Petroleum development in the districts has been the focus of numerous studies such as Dillar (1909, 1914, as found in Weissenborn 1969 and others), Washburne (1914 as found in Olmstead et al. 1989), Stewart and Newton (1954), Newton (1969), Newton (1980), Olmstead et al. (1989), Niem and Niem (1990), and Ryu et al. (1996). The districts have also been the focus of numerous industry explorations and investigations, by such companies as Northwest Natural (Oregon Natural Gas Development), Mobil Oil Corporation, Methane Energy Corporation, Standard Oil Company of California, Guarantee Oil Company, Sinclair Oil & Gas Company, Amoco, as well as numerous others (Olmstead et al. 1989, Niem and Niem 1990, Stewart and Newton 1954, Meyer 2007).

Although exploration of Western Oregon has been more or less continuous since 1902, three major peaks of petroleum exploration have occurred. The first took place between 1920 and 1940. This peak of exploration was very wide-spread, as there was little geologic information guiding the exploration. The second peak occurred between 1940 and 1960, and investigated the deeper Oligocene and Eocene marine sediments. This phase culminated in the discovery of the Mist Gas Field in 1979 (Olmstead et al. 1989, Olmstead and Alger 1985, Houston 1997). The third occurred in the 1980s, with the placement of deep wells up to 13,177 feet total depth (Niem and Niem 1990). This third peak has continued into the search and development of unconventional petroleum resources such as Coalbed Natural Gas, with a play being developed in the Coos Bay Basin.

Little oil and gas exploration has been conducted in the Medford District and Klamath Resource Area (Niewendorp 2008, Wiley 2008, Wells 2008). Oil and gas exploration wells have been drilled, with at least two shows (see *Figure E-1*). A potential oil shale deposit was also been identified. These are located in or near a delineated coalfield, identified as the Rogue River Coalfield (Olmstead et al. 1989, Stewart 1954, Sidle 1981; Jackson County 1989, 2004, 2006). Most energy investigations have focused on geothermal explorations (Niewendorp 2008).



FIGURE E-1. WESTERN OREGON OIL AND GAS INVESTIGATIONS AND PROJECTIONS



Source: USDI BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955



Oil and Gas System and Plays

The Eugene and Roseburg Districts are part of a structural sedimentary basin system that extends onshore and offshore from the Klamath Terrains boundary north to the Columbia River (extending into Washington as the Puget-Willamette Trough); from the continental shelf east to the Cascade Mountain/Willamette Valley interface. This is known as the Western Tertiary Basin Province (Olmstead et al. 1989). This province has been of interest for petroleum exploration since the 1880s (Newton 1969, Orr and Orr 2000), with exploratory oil and gas drilling beginning in 1902 near Newberg (Stewart and Newton 1954, Olmstead et al. 1989).

The northern portion of the Western Tertiary Basin Province possesses at least six identified basins or sub-basins (Newton 1969, Orr and Orr 2000, Olmstead et al. 1989). These basins include:

- Tualatin Basin (a sub-basin of the Willamette Valley)
- Willamette Valley
- Newport Basin (a sub-basin of the larger off-shore Newport Basin)
- Tillamook Basin (a sub-basin of the larger off-shore Newport Basin)
- Astoria Basin
- Nehalem Basin (or arch)

Of these, the Willamette Basin extends into the Eugene District (see *Figure E-2*).

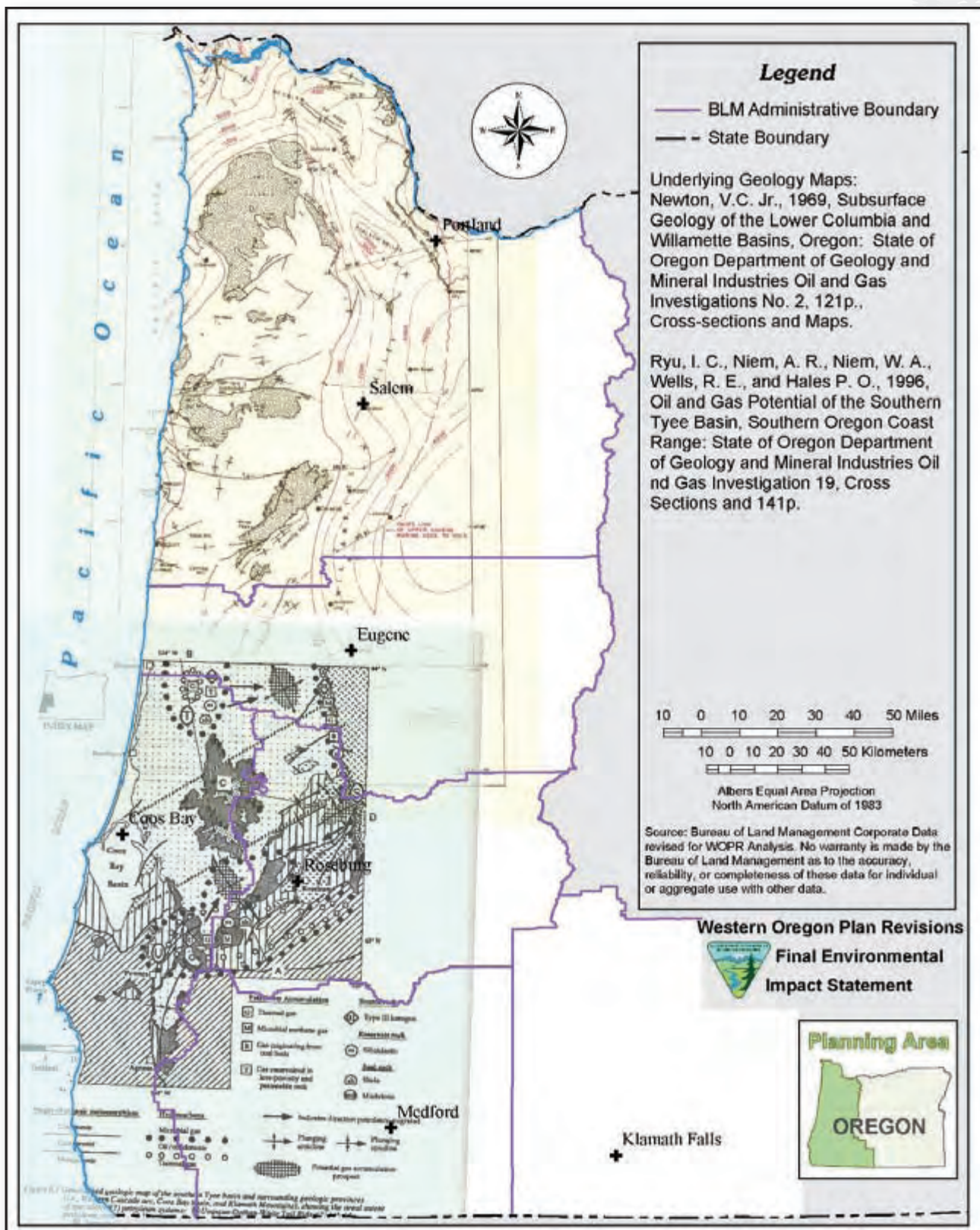
The Willamette Valley basin extends from the southern end of the Puget Sound Trough at the Columbia River south into the Eugene District. This basin is mapped adjacent to the Tyee Basin through parts of the Salem District and the Eugene District (see *Figure E-2* and *Figure E-3*) (Newton 1969, Ryu et al. 1996). The lower rock, or basement rock, is the Eocene Siletz River Volcanics or Kings Valley Siltstone. Overlying these are sandstones and siltstones to the Eocene Nonconformity. This nonconformity is covered by volcanics, overlain by sandstone, limestone, and coal beds. The assemblage is capped by the Columbia River Basalts, which are covered by tuff and silt. The petroleum potential boundary in the Eocene rock is defined to the east by the change from marine sediment to volcanic sediment (facies change) (Newton 1969) (see *Figure E-2*). Numerous wells with gas shows have been drilled within the valley. The eastern edge of the valley provides numerous possibilities for structural traps, with the marine beds providing source rock for petroleum accumulations. Even though numerous holes have been drilled and source and structure is present, true potential has not been clearly defined. The Eocene Nonconformity (marine facies) is at maximum the mapped depth of 5,000 feet below sea level (Newton, 1969).

The southern portion of the Western Tertiary Basin Province is identified as the Tyee Basin. This basin extends north from the Klamath Terrains to approximately the Lincoln City-Salem Latitude (Ryu et al, 1996). The Tyee Basin is actually composed of two basins: the NE-SW oriented Umpqua basin of early Eocene age and the north-south oriented Tyee Forearc Basin of middle Eocene age. The Umpqua Basin is divided by the Umpqua Arch, composed of a volcanic high. The two sub-basins include the Smith River Sub-Basin, located east of Florence and Reedsport, and the Myrtle Point-Sutherlin Sub-Basin along the southern boundary (Ryu et al. 1992, 1996). The Yaquina Sub-Basin of the Salem District could be considered as part of the Tyee Basin, as well as the southern portion of the Willamette Valley Sub-Basin (Ryu et al. 1996; Newton 1969). The Coos Basin overlies and bounds by mapping, the Tyee Basin to the west (Ryu et al. 1996) (refer to *Figure E-2*).

The basin structure is controlled by compression resulting from the subducting easterly moving Juan de Fuca plate in relation to the overriding westerly moving North American Plate. The fold axes are oriented north-south (Orr and Orr 2000). The northern basins are defined by the contact between the Miocene or Oligocene rock and Eocene rock. This is a point of erosion of the Eocene rock, which was covered by Miocene or Oligocene rock, defined as a nonconformity (unconformity if covered by Miocene or Oligocene



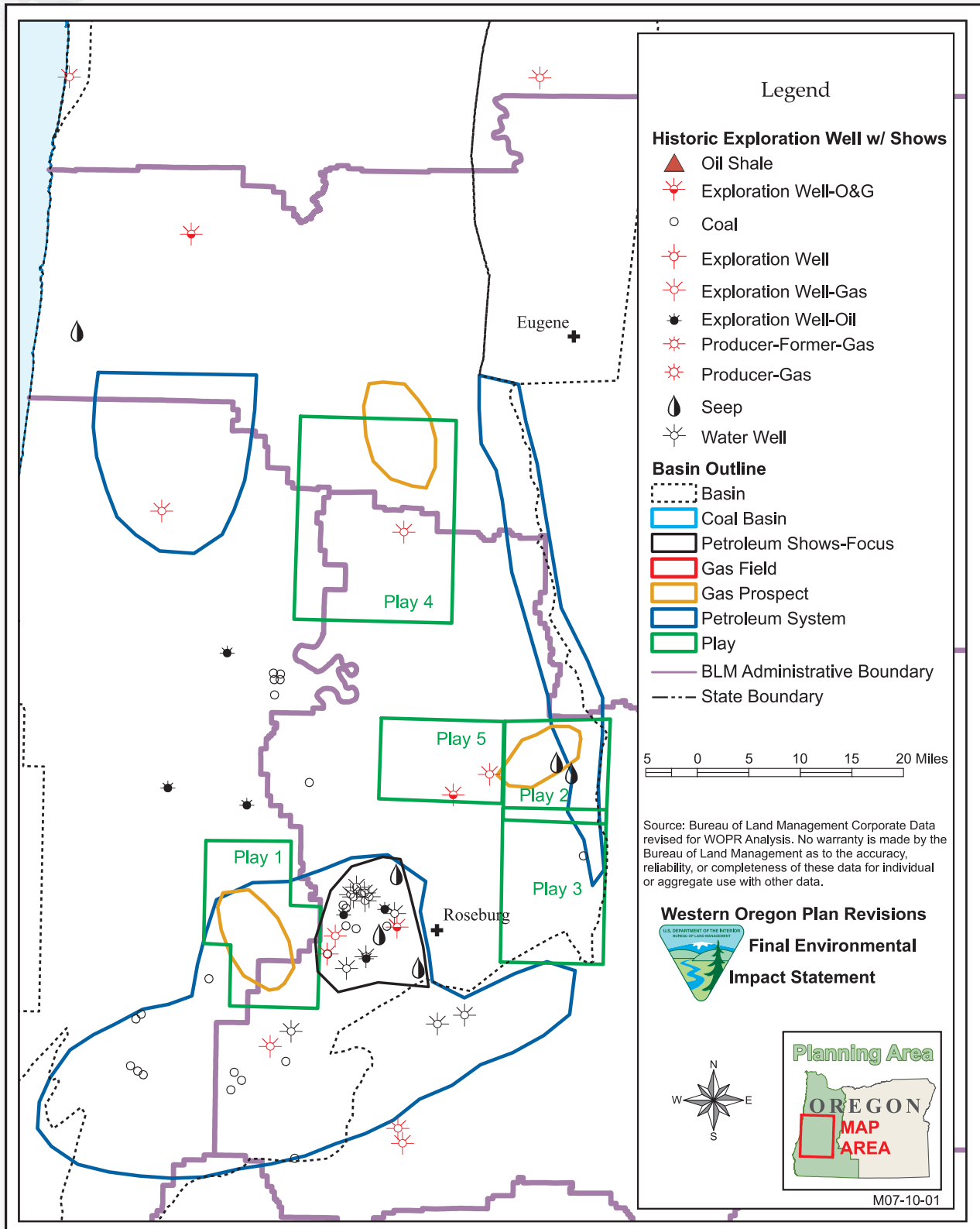
FIGURE E-2. BASIC UNDERLYING GEOLOGY



Source: Newton 1969, Ryu et al. 1996



FIGURE E-3. BASIN, PETROLEUM SYSTEMS, PLAYS, AND PROSPECTS



Sources: USDI BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955



sedimentary rock). This break in the geologic column is considered the Eocene nonconformity and a focus of petroleum exploration. The Eocene rocks consist of marine sediments, with latter sedimentation creating coal beds in many areas (Newton 1969) (refer to *Figure E-2*).

The Tyee Basin structure is a result of compressional tectonics. However, rotation of tectonic forces produced differing orientations for the Umpqua Basin and the Tyee Forearc Basin (Ryu et al. 1996, Wells et al. 2000). In general, the projected conventional oil and gas systems result from organic rich source rock and coal from the Umpqua Basins being trapped by the rock of the overlying Tyee Forearc Basin (Ryu et al. 1996). The coal seams of the Coos Basin (Coos Bay District) are currently being investigated for coal bed natural gas. However, deeper source rocks may exist and contribute to the coal bed natural gas resource. These source rocks would be part of the underlying Tyee Basin (Pappajohn 2007, Newton et al. 1980).

Based on geologic interpretation and petroleum exploration, Ryu et al. (1996) identified petroleum systems, plays, and prospects within the Tyee Basin. An oil and/or gas play is an area, geologic formation, or geologic trend that has good potential for oil and/or gas development, or is generating a large amount of interest in leasing and drilling (USDI BLM 2001). As defined by Magoon (1988 as found in Ryu et al. 1996):

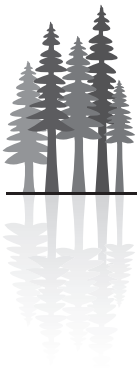
- A **Petroleum System** is a relationship of source rock and the resulting petroleum accumulation. This relationship contains a source rock for petroleum; migration paths; reservoir rock; seal; trap; and the appropriate geologic processes that form these hydrocarbon materials. The extent of the Petroleum System can be delineated as an area that contains both the mature source rock and oil or gas accumulations. The name of the Petroleum System would consist of the name of the source rocks, followed by the name of the reservoir rock, followed by the level of certainty for its occurrence.

There are three levels of certainty: known, hypothetical, and speculative. Known systems have a strong geochemical match between the source rocks and an existing petroleum accumulation. These are identified in the name by an exclamation point in parentheses: (!). Hypothetical systems have geochemical data that identify a source rock, but do not link the source rock to a known petroleum accumulation. These are identified in the name by a period in parentheses: (.). An example is the Mist Gas Field. The Speculative system has geological or geophysical evidence used to project the existence of a link between source rocks and potential petroleum accumulations. These are identified in the name by a question mark in parentheses: (?).

- A **Play** is the existence of a trap (a geologic structure that allows petroleum to accumulate) that is detectable with geological, geophysical, or geochemical technology. A play does not need all of the elements of a petroleum system.
- A **Prospect** is a drillable trap that is located within a play.

Ryu et al. (1996) identified three distinct speculative petroleum systems, five distinct plays, and three distinct gas prospects within the Tyee Basin (refer to *Figure E-3*). The identified petroleum systems include:

- The Umpqua-Dothan-White Tail Ridge (?) Hybrid Petroleum System: There is a potential of dry gas (methane) from buried coals and carbonaceous mudstone of the White Tail Ridge Formations, with migrations to traps of the Tyee Sandstones. Because there is no known connection between the potential source of petroleum and the potential traps and because there is no known commercial accumulations of natural gas, the system is considered speculative. According to BLM GIS-based estimates, the total acreage of this petroleum system is approximately 574,000 acres. Of this, approximately 215,000 acres are within the Coos Bay District, approximately 352,000 acres are within the Roseburg District, and approximately 8,000 acres are within the Medford District.



- The Umpqua-lower Tyee Mountain (?) Petroleum System; Basin Center Gas (?): This system may contain a tight-gas sandstone reservoir, collecting thermogenic (temperature-induced conversion to petroleum) wet-gas and oil derived from mudstone of the Umpqua Group. The model projects natural gas migrating along fractures to accumulate in Tyee Mountain turbidite sandstones. An unconventional mudstone reservoir is possible in the Umpqua Group. According to BLM GIS, the total acreage of this petroleum system is approximately 145,000 acres. Of this, approximately 116,000 are within the Coos Bay District and approximately 29,000 acres are within the Eugene District.
- The Spencer-White Tail Ridge-Western Cascade Arc (?) Petroleum System: The petroleum sources of this system are the coals and carbonaceous mudstone and sandstones of the Spencer Formation and White Tail Ridge Formation, generated by the deep burial and heating by the Western Cascades arc plutons. The reservoir rock would be the overlying sandstones and delta facies. According to BLM GIS, the approximate total acreage of this petroleum system is 119,000 acres. Of this, approximately 69,000 acres are within the Eugene District and approximately 50,000 acres are within the Roseburg District.

All of these systems are considered speculative. Additional drilling and exploration may alter that qualifier (or completely remove the potential). As an example, the Mist Gas Field was considered a speculative field until the discovery well was drilled in 1979, which led to its designation as a gas field (Ryu et al. 1996).

In addition to the three petroleum systems, Ryu et al. (1996) have identified five different plays described below in the *order of their potential to produce hydrocarbons*, as shown in *Figure E-3*:

1. The Williams River-Burnt Ridge anticlinal Plays: This is a complex domal structure in the Tyee Formation (Play 1 of 5). Natural gas might be found in the lower Umpqua strata in the footwall beneath Siletz River Volcanics. The White Tail Ridge sandstone could also serve as a trap. Isolated faults and thrust faults, as well as pinchouts and unconformities, also provide potential traps. A gas prospect may exist within this play. According to BLM GIS, the total acreage of this play is approximately 94,000 acres. Of this, approximately 20,000 acres are within the Roseburg District and approximately 74,000 acres are within the Coos Bay District.
2. Western Cascades plays and Bonanza thrust near Nonpareil: This system incorporates anticlines and faults, including the extension of the Bonanza Fault, at the contact of the Tyee Basin and the Western Cascades (Play 2 of 5). The potential reservoir rocks include the Spence and White Tail Ridge formations. Source rock includes several one- to six-foot thick coal beds, carbonaceous sandstone, and mudstone. Other plays may exist in the foothills of the Western Cascades, with the buried Spencer Formation being the structural or stratigraphic play. The Spencer Formation is exposed from Glide to Cottage Grove. A gas prospect is projected within the play. According to BLM GIS, the total approximate acreage of this play is 64,000 acres, all of which is contained within the Roseburg District.
3. Klamath Mountains sub-thrust play, Glide area: It is interpreted that the Klamath Mountains (Klamath Terrains) are thrust over the Coast Range rocks, burying parts of the Southern Tyee Basin. Possible plays may exist in the underlying Tyee Basin stratigraphy in the areas of the Wildlife Safari fault and southeast and southwest of Glide (Play 3 of 5). The White Tail Ridge Formation is the potential reservoir unit with source being derived from the Remote Member and Tenmile Formations. However, it is debated whether the Tyee stratigraphy (Siletz River Basalts) formed in place through an abandoned rift zone. This would mean that there is no overthrusting of the Klamath Terrains over the Tyee Basin, and therefore no associated traps or plays (Ryu et al. 1996). However, more recent geology mapping has indicated that the overthrusting does exist (Well et al. 2000, DuRoss et al. 2002, Wells 2008). Therefore, while unexplored, potential for petroleum traps along the Klamath Terrains/Tyee Basin boundaries may exist. According to BLM GIS, the total approximate acreage of this play is 96,000 acres, all of which is contained within the Roseburg District.



4. Tyee Mountain anticlinal plays: Several untested anticlines exist in the Tyee Mountain and Baughman members of the Tyee Formation beyond the Williams River-Burnt Ridge anticlinal plays (Play 4 of 5). Stratigraphic traps could exist along the flanks of the Siletz River Volcanics in the Umpqua Arch. A specific untested anticlinal structure exists at Stony Point. While these untested structures exist, the potential of the northern anticlines is low when compared to the southern anticline systems, due to the lack of maturation, organic-rich source rock, and reservoir rocks. However, a gas prospect may exist in the northern portion of the play. According to BLM GIS, the total approximate acreage of the play and prospect is 203,000 acres. Of this, approximately 25,000 acres are located within the Coos Bay District, approximately 91,000 acres are located within the Eugene District, and approximately 87,000 acres are located within the Roseburg District.
5. Anticlinal and subthrust plays in the Myrtle Point-Sutherlin Sub-Basin: These plays consist of thrust faults and anticlinal and synclinal folds of rock of the Umpqua Group, Bushnell, and White Tail Ridge formation in the Myrtle Point-Sutherlin Sub-Basins. The area of the play is the Roseburg-Sutherlin-Glide area (Play 5 of 5). Gas shows have been encountered in tight sandstones and methane emanations from water wells. However, there has been no commercial production. According to BLM GIS, the total approximate acreage of the play is 60,000 acres, all of which is contained within the Roseburg District.

Additionally, numerous exploration wells, seeps, and petroleum producing water wells exist within the districts. As shown in *Figure E-6*, an area of concentration of petroleum shows is located within the Umpqua-Dothan-White Tail Ridge (?) hybrid petroleum system. Although shows are found throughout the four districts, this concentration provides a concentrated area of petroleum shows. According to BLM GIS, the total acreage of this focus of petroleum shows is approximately 68,000 acres, of which all is contained within the Roseburg District.

All of these structures and systems completely or in part underlay the Eugene and Roseburg Districts. Areas of gas and oil exploration and shows also exist throughout the Districts (Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Newton 1969, Sidle 1981, Kvenvolden et al. 1995) (refer to *Figure E-3*).

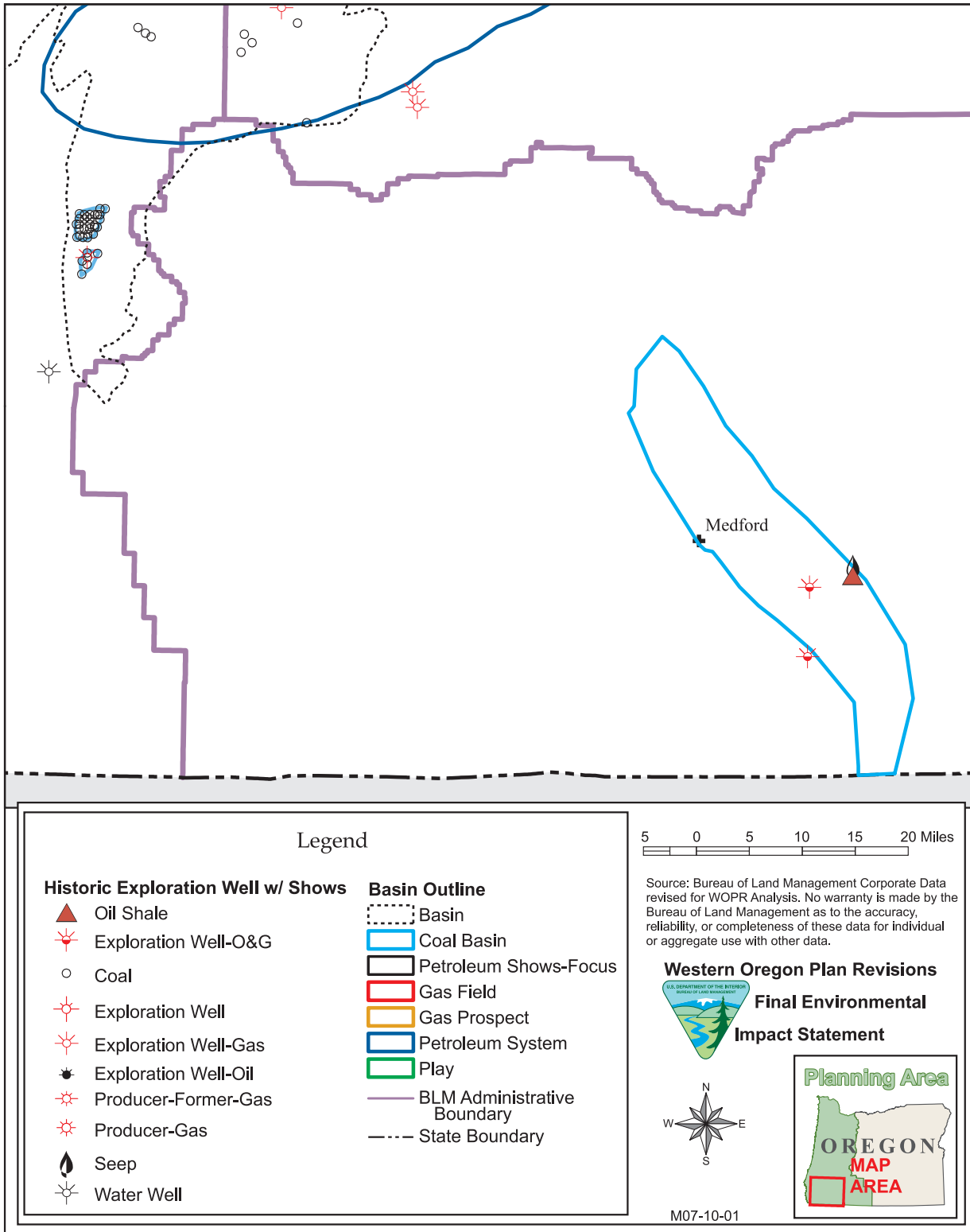
The Medford District is south and east of the Tertiary Basin System/Tyee Basin, incorporating Klamath accreted terrains in the west and the Cascade Volcanics and Basin and Range structures to the East. The Klamath Resource Area of the Lakeview District lies east of the Medford District and incorporates “Basin and Range” structures. The accreted Klamath terrains are bound by the Tyee Basin (The Tyee Basin is the southern portion of the Western Tertiary Basin System) to the North. They extend into northern California and are variously bounded on the east by Cascade Volcanics and rocks within the Basin and Range province. The Oregon portion of the Basin and Range province is a northern projection of the crustal extension that extends through the southwestern United States.

Coal exposures and basins exist throughout western Oregon (Mason and Erwin 1955) (refer to *Figure E-1*). One major coal basin has been identified in the Medford District within Jackson County (Sidle 1981; Jackson County, 1989, 2004, 2006; Weissenborn 1969). This coal field is known as the Rouge River Coal Field. The field extends southward from Evans Creek to a point about 10 miles south of the Oregon-California border (Weissenborn 1969) (see *Figure E-4*). According to BLM GIS, the total approximate acreage of the Rouge River Coal Field is 221,000 acres, all of which is contained within the Medford District boundaries (the portion in California is not analyzed).

All coal seams in western Oregon could produce coal bed natural gas. However, the true potential is unknown, as investigations for coal bed natural gas potential for these seams are just beginning (Wiley 2006, Pappajohn 2007, Meyer 2007). Potential could exist within the coal seams of the Umpqua Group, as well as with coeval formations north throughout the coast range. If coal bed natural gas is producible in the Coos Basin, exploration may extend to other speculative formations (May 2005, Pappajohn 2007).



FIGURE E-4. COAL BASINS



Sources: USDI BLM 2008, Olmstead et al. 1989; Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955



Current development of the coal bed natural gas resource is being conducted by the Methane Energy Corporation within the Coos Bay District. The company has completed numerous exploratory and production wells within the Coos Basin. Based on this exploration, the company has projected a defined area for coal bed natural gas development, described as an “Area of Mutual Interest” (AMI). This incorporates the Coos Basin (Torrent Energy Corporation 2008).

The following descriptions of oil and gas occurrence potential are projected for BLM-administered mineral rights within the western Oregon Districts. Prospects, Plays, Basins and other potentials overlap district boundaries. Therefore, a total system potential may incorporate more than one district.

Eugene District

The Eugene District incorporates portions or all of Linn, Lane, and Douglas counties. At least one exploration well with shows of oil and gas (Fed-Mapleton 1) and two petroleum seeps are within the Eugene District boundary. Sedimentary basins underlying the Eugene District include both the Tyee Basin and the Willamette Valley Basin. Two Petroleum Systems extend into the district, as well as the Tyee Mountain anticlinal play and its associated Gas Prospect (see *Figure E-5*)

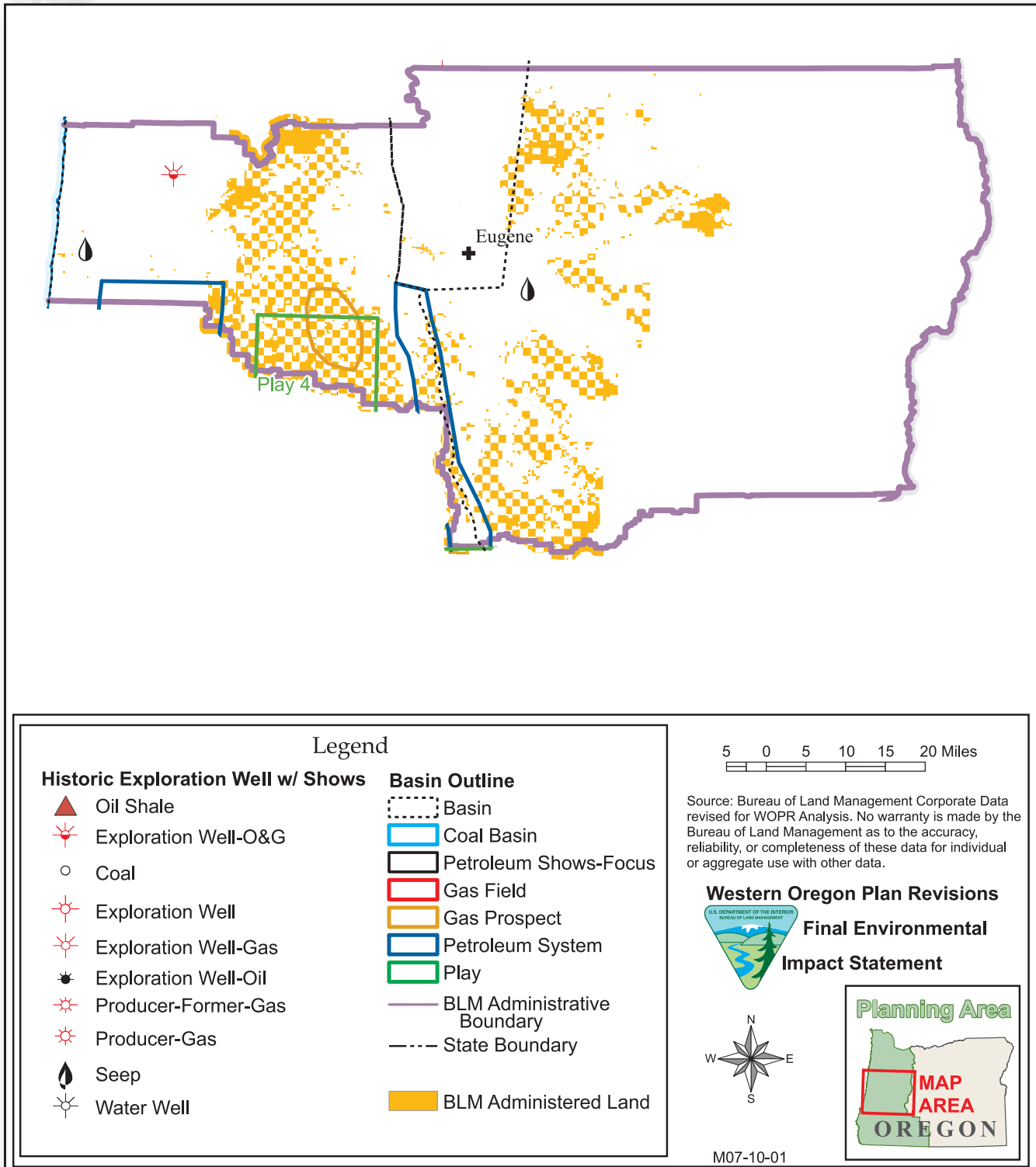
Table E-4 represents the approximate acreage of the basins, systems, plays, and prospects located within the Eugene District:

TABLE E-4. EUGENE DISTRICT ACREAGES

System	Total Acreage Within the Eugene District	Total BLM-Managed Surface Acreage	Total BLM-Managed Sub-Surface Split-Estate Acreage
Tyee Basin	794,000	160,000	500
Willamette Sedimentary Basin	252,000	5,000	12,000
Spencer-White Tail Ridge-Western Cascade Arc (?) Petroleum System	69,000	13,000	100
Umpqua-lower Tyee Mountain (?) Petroleum System	29,000	4,000	0
Tyee Mountain anticlinal play and associated gas prospect (Play 4 of 5)	91,000	55,000	0



FIGURE E-5. EUGENE DISTRICT



Sources: USDI BLM 2008, Olmstead et al. 1989; Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955



Roseburg District

The Roseburg District incorporates the major portion of Douglas County, with minor portions of Linn and Jackson Counties. The district has been the focus of historical exploration with at least 2 oil and gas exploration well shows, 7 exploration gas well shows, 3 exploration oil well shows, 5 petroleum seeps, 12 petroleum shows in water wells, and 12 coal exposures. Sedimentary basins underlying the Roseburg District include the Tyee Basin. Two petroleum systems extend into the Roseburg District, as well as five projected plays. One complete gas prospect and another partial gas prospect associated with two plays exist, as well as one focused area of petroleum exploration (see *Figure E-6*).

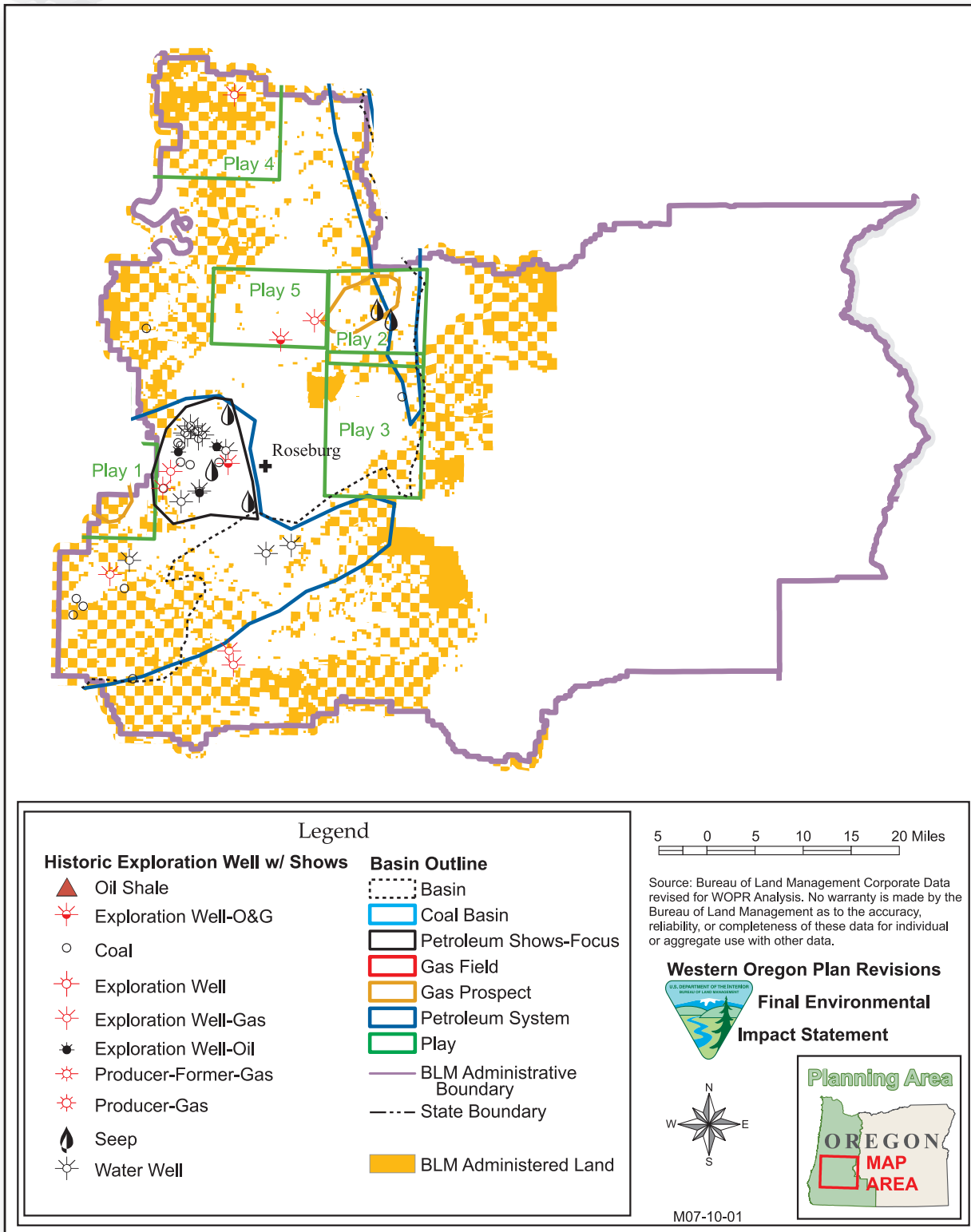
Table E-5 represents the approximate acreage of the basins, systems, plays, and prospects within the Roseburg District:

TABLE E-5. ROSEBURG DISTRICT ACREAGES

System	Total Acreage Within the Roseburg District	Total BLM-Managed Surface Acreage	Total BLM-Managed Sub-Surface Split-Estate Acreage
Tyee Basin	889,000	207,000	300
Spencer-White Tail Ridge-Western Cascade Arc (?) Petroleum System	50,000	11,000	0
Umpqua-Dothan-White Tail Ridge (?) hybrid Petroleum System.	352,000	83,000	0
Williams River-Burnt Ridge Anticlinal Play and associated Gas Prospect (Play 1 of 5)	20,000	7,000	0
Western Cascades Plays and Bonanza Thrust near Nonpareil and associated Gas Prospect (Play 2 of 5)	64,000	10,000	0
Klamath Mountains Subthrust Play, Glide Area (Play 3 of 5)	96,000	18,000	0
Tyee Mountain Anticlinal play (Play 4 of 5)	87,000	41,000	0
Anticlinal and Subthrust Plays in the Myrtle Point-Sutherlin Subbasin (Play 5 of 5)	60,000	3,000	0
Area of Focused Petroleum Shows	68,000	2,000	0



FIGURE E-6. ROSEBURG DISTRICT



Sources: USDI BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955)



Medford District

The Medford District incorporates portions or all of Jackson, Josephine, Douglas, Curry and Coos Counties. At least two oil and gas exploration wells with shows, one petroleum seep, one oil shale prospect, and one coal field exist within the Medford District boundary. A small portion of the Tyee Basin sedimentary basin and a petroleum system underlies the northwest part of the district. No plays or prospects have been mapped within the District (see *Figure E-7*).

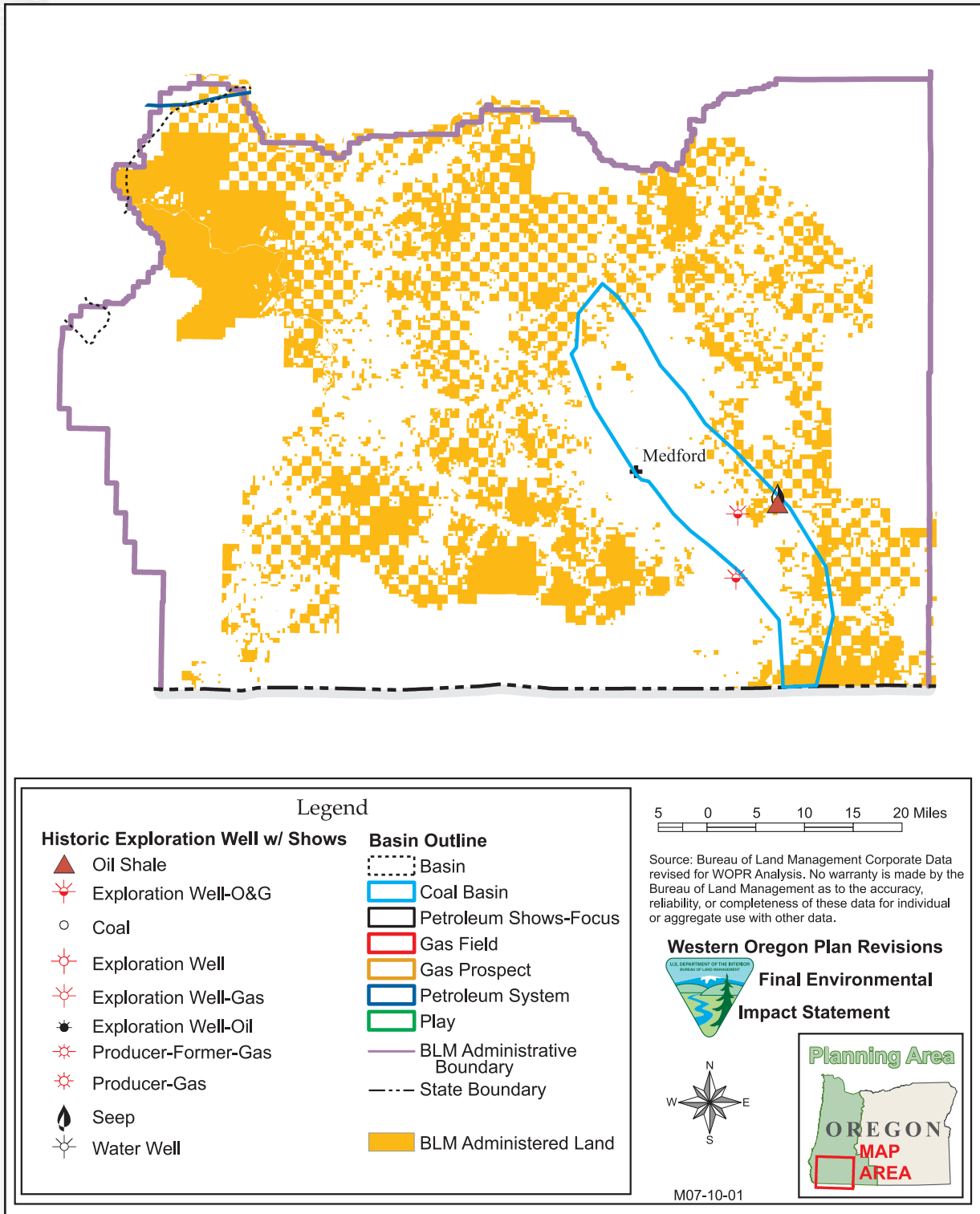
Table E-6 represents the approximate acreages of basins, petroleum systems, and coalfields located within the Medford District.

TABLE E-6. MEDFORD DISTRICT ACREAGES

System	Total Acreage Within the Medford District	Total BLM-Managed Surface Acreage	Total BLM-Managed Sub-Surface Split-Estate Acreage
Tyee Basin	20,000	4,000	0
Umpqua-Dothan-White Tail Ridge (?) Hybrid Petroleum System	8,000	2,000	0
Rogue River Coal Field	221,000	33,000	3,000



FIGURE E-7. MEDFORD DISTRICT



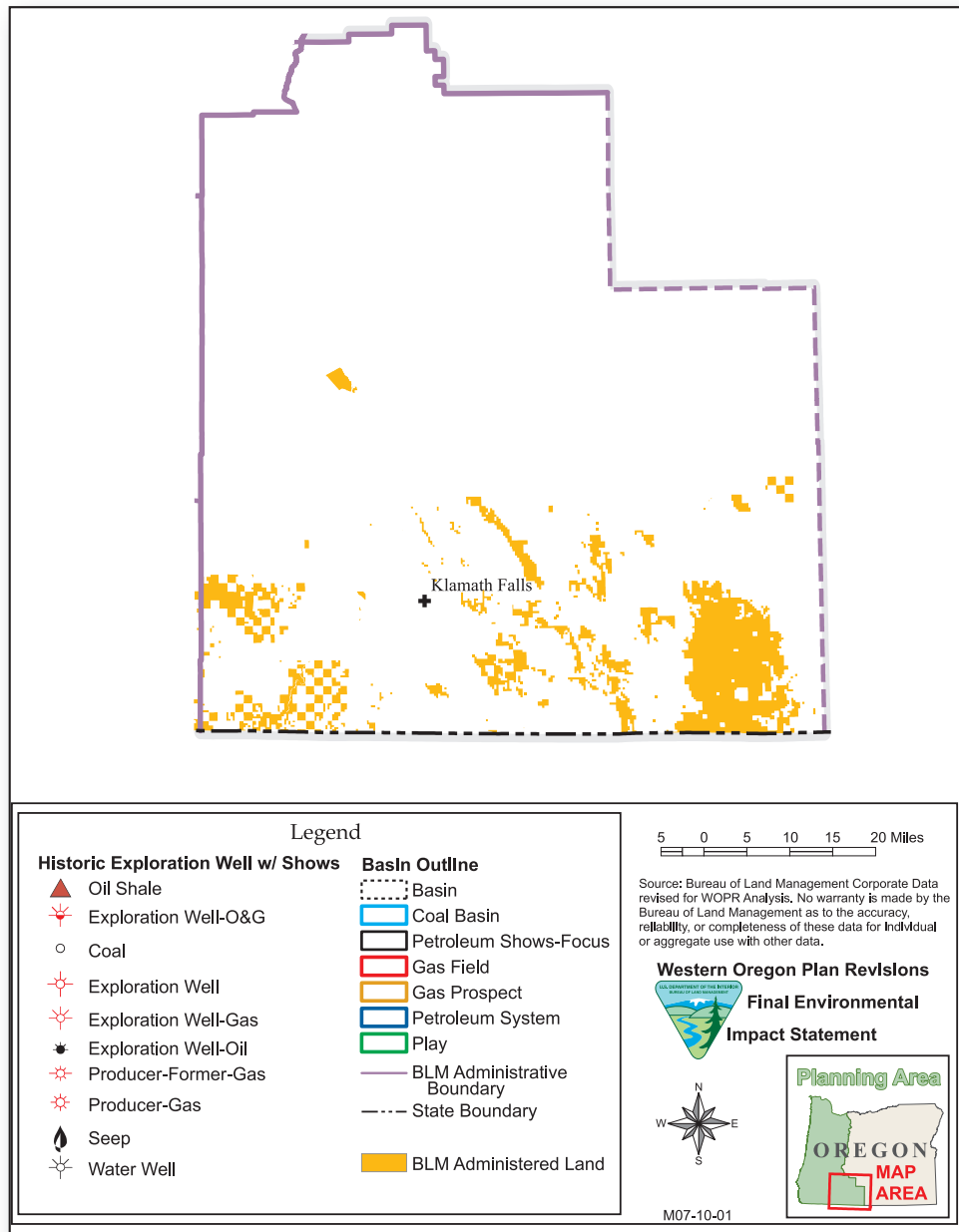
Sources: USDI BLM 2008, Olmstead et al. 1989, Niemi and Niemi 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955



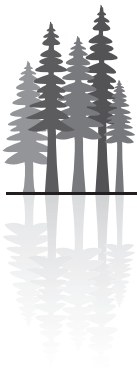
Klamath Falls Resource Area of the Lakeview District

The Klamath Falls Resource Area of the Lakeview District incorporates Klamath County. No recorded exploration wells with shows, seeps, water wells with petroleum shows, or coal were found in the literature search or in agency communications (see *Figure E-8*). Most energy wells drilled have been in the search and delineation of geothermal energy. It should be noted that the lack of exploration does not indicate a lack of petroleum potential, but simply a lack of information. Therefore, future potential cannot be analyzed. Gas and oil production has been located in similar basin and range provinces, such as in the state of Nevada (Hess 2001).

FIGURE E-8. KLAMATH FALLS RESOURCE AREA



Sources: BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980; Stewart and Newton 1954, Sidle 1981, Newton, 1969, Kvenvolden et al. 1995; Mason and Erwin 1955



Oil and Gas Production

Conventional Oil & Gas Resources

There is no current petroleum production within the Eugene, Roseburg, or Medford Districts or the Klamath Falls Resource Area of the Lakeview District. The only commercial production within Western Oregon occurs in the Mist Gas Field, located within the Salem District.

The Mist Gas Field Designation (see *Figure E-9*) was initiated with the discovery of natural gas in 1979. The main target zone is the reservoir rock of the Clark and Wilson Sandstone (Olmstead and Alger 1985). As of 2007, there have been over 45 separate pools identified (Meyer 2007) with two gas storage reservoirs (DOGAMI 2003). Locations of additional pools are expected with the use of 3-D Survey (Meyer 2007). Current exploration is focused to the northwest of the Mist Gas Field (Houston 2007). However, this is due to economics as opposed to existence of resource. All areas north of Vernonia, Oregon could be considered possible extensions of the Mist Gas Field (Meyer 2007).

Annual production for 2005 from the Mist Gas Field was 305 million cubic feet (MMcf), with a total field production to date of 70 billion cubic feet (Bcf) (DOGAMI 2007). As of 2006, the Mist Field had produced approximately 68 Bcf, with a value of about \$140 million (DOGAMI 2007). The State of Oregon applies a severance tax of 6% on production, which goes to the common school fund. In total, over 500 oil and gas wells have been permitted in the field by 2003 (DOGAMI 2003). There are currently 18 actively producing wells, one water disposal well, 21 observation wells, and 20 gas injection and/or withdrawal wells operating on the site (DOGAMI 2007). Eight new Applications for Permit to Drill (APD) are being submitted to DOGAMI for additional exploration and production wells (Houston 2007).

An annual production history of the Mist Gas Field for the past 10 years is shown on *Table E-4* earlier in this appendix (DOGAMI 2003 and 2007).

Non-Conventional Petroleum (Coal Bed Natural Gas):

There is currently no coal bed natural gas production in Oregon. However, the Coos Basin, located in Coos County, is being developed as a production resource. The current development of the coal bed natural gas resource is being conducted by the Methane Energy Corporation. The company has completed numerous exploratory and production wells within the Coos Basin. The Methane Energy Corporation has also received National Pollutant Discharge Elimination System permits for surface disposal of production water.

The DOGAMI has initiated a public meeting process to establish a Gas Field Designation for the Coos Basin. The first public meeting was conducted on January 29, 2007. There is only one other Gas Field Designation in Oregon, which is the Mist Gas Field. The Gas Field Designation is required to fulfill state requirements regarding well spacing designations, mineral rights, and control drainage.

Coal bed natural gas development is also beginning in southwest Washington, approximately 20 miles north of the Salem District. Exploration is being completed by the Methane Energy Corporation's sister company (a subsidiary of Torrent Energy Corporation), Cascade Energy Corporation (Torrent Energy Corporation 2008). There is also interest in the southwest Washington coal fields from Comet Ridge Limited (Meyer 2007).

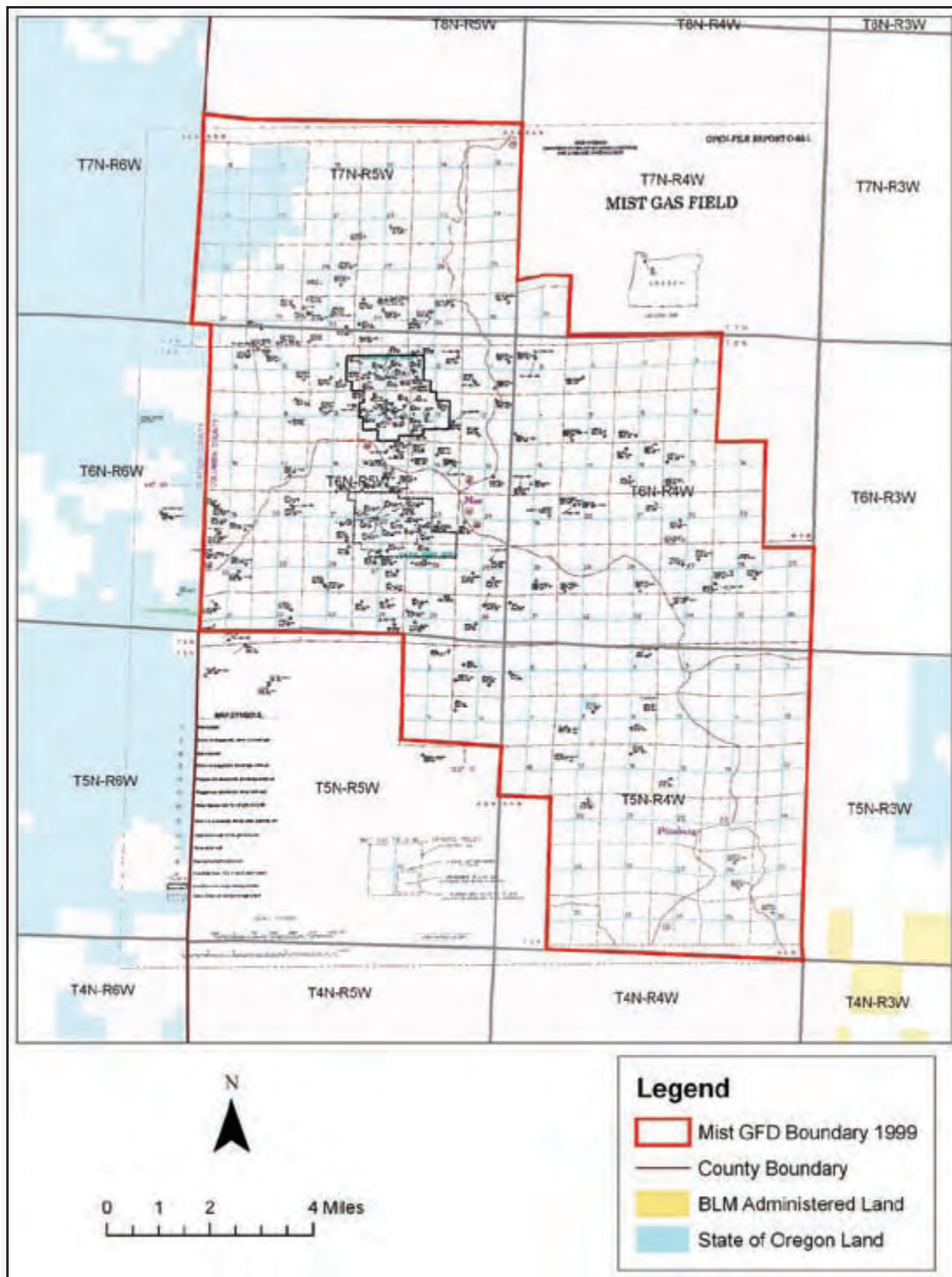
Potential for Resource Occurrence and Development

Potentials for resource occurrence and potentials for resource development (USDI BLM 1985) have been estimated for the districts. Definitions for potential for resource occurrence include:

- Low Potential - Hydrocarbon occurrence is unlikely.
- Moderate Potential - Conditions exist for hydrocarbons to occur.
- High Potential - Hydrocarbon shows have been documented or production has been established.



FIGURE E-9. MIST GAS FIELD, 1999 BOUNDARY



Source: DOGAMI 2003



Definitions for potential for resource development include:

- Low Potential - Economic or other conditions would likely preclude development.
- Moderate Potential - It is reasonable to conclude that development could occur.
- High Potential - Development is likely to occur within the life of the plan.

The districts contain two identified sediment basins, three petroleum systems, five plays, three prospects, one focused area of petroleum shows, and one identified coal field. However, according to Ryu et al.(1996), the southern Tye Basin (which incorporates the Eugene and Roseburg Districts) has a low to moderate petroleum potential. Yet, as shown by the potential systems, plays, and prospects, there are several areas that have not been investigated.

Ryu et al. (1996) have ranked the five plays in order of potential to produce hydrocarbons, with “1” being the greatest potential and “5” having the least potential. This is based on the size and closure of the structures; position of source, reservoir, and seals; and the timing of the play formation in relation to the timing of potential hydrocarbon migration to the play.

There has been little exploration of portions of the districts outside the Tye Basin (i.e., Medford District and Klamath Falls Resource Area). Therefore, future potential cannot be analyzed. However, gas and oil production has been located in similar basin and range provinces, such as in the State of Nevada (Hess 2001).

**Eugene District: Moderate Potential for Occurrence
 Low Potential for Development**

Two sedimentary basins, two petroleum systems, one play, and one prospect have been projected for the Eugene District. The sedimentary basins have a low to moderate petroleum potential. The identified play is ranked as fourth of five plays in potential. The petroleum systems, plays, and prospect have potential for the existence of hydrocarbons (Ryu et al. 1996). Wells and seeps have confirmed the presence of hydrocarbons within the district. However, because production has not been established and the play has a low potential in its ranking compared to the five identified plays, the potential for occurrence is *moderate*.

There is no additional public record that indicates petroleum investigation of lands within the Eugene District has occurred since 1996 (Ryu et al. 1996). The last petroleum exploration well was drilled in 1955 (refer to *Figure E-17*) (Olmstead et al. 1989). There has been no commercial development of the systems. The identified play is ranked fourth of five. Petroleum accumulations would need to be confirmed and the petroleum system move to “known” status for resource development to occur. Therefore, the potential for development within the plan’s 10-year forecast is *low*.

The potential acreage of BLM-administered lands to have *moderate potential for occurrence* and *low potential for development* is approximately 72,000 acres.

**Roseburg District: Moderate Potential for Occurrence
 Moderate Potential for Development/Low Potential for Development**

One sedimentary basin, two petroleum systems, five plays, two prospects, and one concentration of petroleum shows have been projected for the Roseburg District. The sedimentary basin has a low to moderate petroleum potential. The identified plays rank from highest to lowest (1 to 5) in potential out of five plays. The petroleum systems, plays, and prospects have potential for existence of hydrocarbons (Ryu et al. 1996). Numerous wells and seeps have confirmed the presence of hydrocarbons within the district. However, because production has not been established, the petroleum systems are speculative, and the plays have not been confirmed, the potential for occurrence is moderate.



There is no additional public record that indicates petroleum investigation of the lands within the Roseburg District has occurred since before 1996 (Ryu et al. 1996). The last petroleum exploration well was drilled in 1990 (refer to *Figure E-18*) (Niem and Niem 1990). There has been no commercial development of the systems. However, the projected plays range in a ranking of one to five for potential and there has been a definable area of exploration and petroleum shows. Therefore, based on the ranking of the plays and their associated petroleum systems, the potential for development within the Plan's 10-year forecast is *low to moderate*.

The potential acreage of BLM-administered lands to have *moderate potential for occurrence* and *moderate potential for development* (Plays 1, 2, and 3 and the area of exploration and petroleum shows) is approximately 37,000 acres.

The potential acreage of BLM-administered lands to have *moderate potential for occurrence* and *low potential for development* (Plays 4 and 5 and petroleum systems outside of Plays 1, 2, and 3) is approximately 124,000 acres.

Medford District: **Low Potential for Occurrence**
Low Potential for Development

Non-Conventional: **Moderate Potential for Occurrence**
Low/Moderate Potential for Development

The Medford District contains petroleum shows, an oil shale prospect, a small portion of a petroleum system boundary, and an identified coal field. However, for conventional petroleum systems, there is insufficient information for the occurrence of commercial quantities of hydrocarbons. Therefore, the potential for occurrence is *low*.

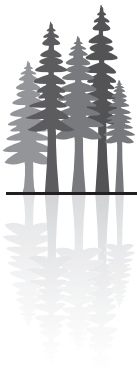
Due to the lack of evidence for commercial petroleum accumulations, the potential for development within the plan's 10-year forecast is *low*.

Non-conventional petroleum development in the form of coal bed natural gas is occurring within the Coos Basin of Oregon and within southwest Washington. The Rogue River Coal Field exists within the Medford District. It is known by the nature of coal that methane is associated with the beds. Investigations of known coal exposures are currently being done. If coal bed natural gas becomes commercial in the developing fields, industry may look at the potential of developing other coal fields (Pappajohn 2007). In addition, a single identified Oil Shale prospect also exists. Therefore, the potential for nonconventional oil and gas resource occurrence in the Medford District is *moderate*.

Currently there is a lack of an existing commercial coal bed natural gas project. If coal bed natural gas becomes commercially successful in other districts, development potential of other coal systems could occur within the 10-year scenario (Pappajohn 2007). Resource development potential is dependent on the future of current enterprises. Although the Medford District does have an oil shale potential and the Energy Policy Act of 2005 (U.S. 109th Congress 2005) emphasizes the development of oil shale, any potential for future development will be many years away, and the focus of development is on larger prospects within the United States. Therefore, the potential for nonconventional development within the plan's 10-year forecast is extremely *low*.

The potential acreage of BLM-administered lands to have *moderate potential for occurrence* and *low potential for development* is approximately 33,000 acres.

Klamath Falls Resource Area: **Low Potential for Occurrence**
Low Potential for Development



There are no petroleum seeps or exploration shows, identified sedimentary basins with petroleum potentials, petroleum systems, plays, or prospects located within the Klamath Falls Resource Area of the Lakeview District. While oil and gas potentials do exist in similar geologic provinces (Basin and Range), little to no investigation has been performed within this Resource Area. Energy exploration that has been conducted has focused on geothermal potential. Therefore, largely due to the lack of information, the potential for occurrence is *low*.

Likewise, due to the lack of information, the potential for development within the plan's 10-year forecast is *low*.

Leasing

After initial field work, research, and subsurface mapping (which may include the acquisition of seismic data), leasing is often the next step in oil and gas development. Leasing may be based on speculation, with the riskiest leases usually purchased for the lowest prices.

Leases on lands where the Federal Government manages the oil and gas rights are offered via oral auction. Auctions typically occur at least quarterly. The maximum lease size is 2,560 acres, and the minimum bid is \$2.00 per acre. An administrative fee of \$75 per parcel is charged and each successful bidder must meet citizenship and legal requirements. Leases are issued for a 10-year term, and a 12.5% royalty rate on production is required to be paid. Federal Regulations pertaining to oil and gas leasing are located at 43 CFR 3100. All monies from lease and royalty receipts are payable to the Mineral Management Service. Leases which become productive are "held by production," and typically do not terminate until all wells on the lease have ceased production, with all of the wells plugged and abandoned, and the surface reclaimed to an acceptable condition.

The Oregon-Washington BLM lease sales are generally held on a quarterly basis, offering nominated and internally selected lands. Federal oil and gas leases sold within the Oregon/Washington BLM for 2006 have ranged from a high of 227,392 acres in the March sale, to a low of 20,919 acres in September. The total lease acreage sold from March to December (four sales) was approximately 308,610 acres. From those sales, the Oregon/Washington BLM received approximately \$5,467,720 in oil and gas lease revenues.

Non-federal leasing and APDs for production in the State of Oregon are currently focused in the vicinity of the Mist Gas Field, the Coos Basin, and Eastern Oregon. The Mist Gas Field currently maintains 16 production wells. The DOGAMI has recently (2006-2007) received eight APDs submitted for production (Houston, 2007). The Coos Basin currently has 115,000 acres of leased land, with three multi-well/single pad and single pad/single well production systems. Foreseeable development of the Mist Gas Field in the Salem District could result in potentially an additional 10,800 acres of BLM-administered lease offerings. If these offerings were sold for the 2006 average of \$17.71 per acre, the net receipts would be nearly \$191,268.

At this time, there has been no expressed interest in oil and gas leases in Western Oregon outside of the Salem and Coos Bay Districts.

Future Trends and Assumptions

Based on history of past exploration; historic, current, and projected development of oil and gas in other BLM Districts; mapped geology; and foreseeable development potential in the planning area, activity over the next decade may be stable to increasing. Current petroleum developments and interest in other BLM Districts in Oregon, and the increasing value of petroleum products (Energy Information Administration 2007), indicates potential interest within the districts. The supply of natural gas in the region may be augmented by one or more proposed Liquefied Natural Gas terminals that may be sited within the districts' boundaries. Oil and gas activity on BLM-administered mineral rights within the Districts is expected to consist of competitive and over-the-counter leases, geophysical surveys, and processing of Applications for Permit to Drill.



Some exploration for coal bed natural gas in the form of coal seam investigation and mapping is also predicted, especially of the Rouge River Coal Field. However, development of coal bed natural gas in the district is not expected within the next 10 years. This is due to the length of research time needed to delineate a field and the current rate of advancement of the Coos Basins field. It should be noted that if commercial coal bed natural gas developments do occur within the State, other coal bed natural gas prospects could develop rapidly.

Of the districts analyzed, the Roseburg District maintains the highest potential, although moderate in classification. Three identified plays and area of exploration have a *moderate potential for occurrence* and a *moderate potential for development*. Therefore, it is projected that the acreages managed by the Roseburg BLM within these plays and area of exploration would have the greatest probability for exploration and development within the next 10 years. All of the other Districts analyzed in this study would have a *low probability* for development within the next 10 years. Therefore, acreages of impacts will only be analyzed for those BLM-administered *moderate potential* lands located within the Roseburg District.

Because the lands in the Roseburg District are considered *moderate in potential* (USDI BLM 1985) and due to the classification of low to moderate potential by Ryu et al. (1996), development of these lands could range from none to the maximum. Therefore, while there is no indication of eminent development, the following analysis will utilize the maximum potential. That potential is based on development of *moderate potential* lands at one well per 160-acre spacing (spacing currently employed at the Mist Gas Field). The total BLM-administered and non-BLM-administered acreage of this defined *moderate potential* is approximately 247,000 acres. The total acreage of BLM-administered *moderate potential* lands in the Roseburg District is approximately 37,000 acres or 15% of the area. Total well development of both BLM and non-BLM managed area would be 1,555 wells. Maximum development on BLM-administered lands would be 228 wells. However, as these are unproven potentials, and the reservoir will not be uniform, it is unlikely that more than 50% of total development will occur within the 10-year scenario. Therefore, given the *moderate potential* of the area, the range of development for BLM lands in the 10-year scenario is 0 to 114 wells.

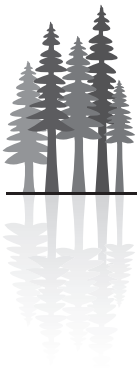
Geophysical Exploration

Geophysical exploration is conducted to try to determine the subsurface geologic structure of an area. The three geophysical survey techniques generally used to define subsurface characteristics are measurements of the gravitational field, magnetic field, and seismic reflections.

Gravity and magnetic field surveys usually involve the use of aerial surveillance, utilizing aircraft. There are usually no ground disturbing activities to the project areas associated with this analysis.

Seismic reflection surveys, which are the most common of the geophysical methods, produce the most detailed subsurface information. Seismic surveys are accomplished by sending shock waves, generally by a small explosion or mechanically vibrating the ground surface. Instruments measure the time and intensity with which the waves reflect off stratigraphic layers. This information can be used to depict the subsurface structure of the rock. Vibroseis (Thumper) methods vibrate the ground surface to create a shock wave. “Thumper” trucks are quite large and are equipped with “pads” that cover about four-feet square. The pads are lowered to the ground, and the vibrators are electronically triggered in close coordination with the technicians operating the recording equipment. After the signal is recorded, the trucks move forward a short distance and the process is repeated. Up to 50 square feet (five square meters) of surface area is required to operate the equipment at each recording site.

The small explosive method requires that charges be detonated on the surface or in a drill hole. Holes for the charges are drilled utilizing truck-mounted portable drills to create small-diameter (two or six-inch) holes, which are typically drilled to depths of between 50 and 100 feet. Generally 4 to 12 holes are drilled per mile of line and a 5 to 50-pound charge of explosives is placed in the hole, covered, and detonated. The created shock wave is recorded by geophones placed in a linear fashion on the surface. In rugged terrain, a portable



drill carried by helicopter can sometimes be used. A typical drilling seismic operation may utilize 10 to 15 men operating five to seven trucks, although portable “buggies” that can be hauled behind smaller four-wheel drive All Terrain Vehicles are also commonly used in more sensitive areas.

Advanced Three Dimensional Survey (3-D Survey) is utilized within the Mist Gas Field. This process analyzes five to six miles using lines with 1,700 shot holes at 70-foot spacing. The lines are spaced at 400 feet apart. The lines are hand brushed (no surface disturbance) for survey. The survey crews utilize an Inertial Survey System that allows for accurate surveying without the need to maintain a line of sight. This allows flexibility in brushing paths. The shot hole pad is three feet by four feet (3x4) in size. The pad is hand cleared to mineral soil with hand tools. The drill rig is then placed on the pad. If existing access to the pad is limited, the drill rig is placed and removed by helicopter. The holes are drilled to 15-foot depths. The charge is exploded subsurface, leaving no surface expression. Where there is surface expression, the damaged is mitigated with hand tools. In open valleys and areas with access, thumper rigs are used, as they disturb even less ground. These requirements are in place because the Mist Gas Field is located in Commercial Forest land and is required by the land manager to minimize disturbance to near non-existent (Meyer 2007).

Surface Impacts of Geophysical Explorations

It is anticipated that the foreseeable geophysical activity in the identified Moderate Potential lands within the Roseburg District would consist of the currently used 3-D Seismic process. The total area of the identified BLM-administered potential expansion area is approximately 57 square miles (approximately 37,000 acres). Using the 3-D spacing of shots, it is anticipated that complete investigation of the area could utilize 16,150 shots. With pad ground disturbance of 12 square feet, the total disturbance on BLM-administered lands could be up to 4.5 acres. This disturbance is created using hand tools, no power tools other than those needed for brushing, and, based on experience in the Mist Gas Field, is completely reclaimed within five years or less (Meyer 2007). Disturbance will be less where pre-existing roads and/or landings can be used. Therefore, estimates to disturbance on non-BLM managed lands are indeterminate.

Drilling and Production Phase

Notices of Staking may occur during the plan period. Companies usually submit an Application for Permit to Drill after the Notice of Staking is accepted. Private surface owner input, if a split estate is involved, would be actively solicited during this stage. After the Application for Permit to Drill is approved, the operator initiates construction activities in accordance with stipulations and Conditions of Approval (COAs). Access road lengths vary, but usually the shortest feasible route is selected to reduce the haul distance and construction costs. In some cases, environmental factors or landowner’s wishes may dictate a longer route. Drilling activity in the planning area is predicted to be done using existing roads and constructing short roads to access each drill site location. The district will utilize currently developed and utilized forest management Best Management Practices, in addition to the BLM’s “Gold Book” (USDI/USDA 2007), for surface disturbance in road construction and pad development similar to timber harvest landings.

Based on past oil and gas drilling in Oregon, it is projected that three conventional petroleum exploratory “wildcat” wells could be drilled within the Roseburg District. The estimated success rate of finding hydrocarbons is predicted to be no greater than 10 percent, based on the average U.S. wildcat well success rate. Future identification of additional structures would likely increase this estimate. Development within the identified *moderate potential* area would be directed by 3-D Survey as opposed to wildcatting (Meyer 2007).

Based on spacing units established within the Mist Gas Field, full production development of the projected approximate 37,000 acres of BLM-administered *moderate potential* lands within the Roseburg District would require a total of 228 wells. However, as these are unproven potentials, and the reservoir will not be uniform, it is unlikely that more than 50% of total development will occur within the 10-year scenario. Therefore, given the Moderate Potential of the area, the range of development for BLM-administered lands in the 10-year scenario is 0 to 114 wells.



Surface Impacts of Drilling and Production

There are currently no production or exploration wells or pads within any of the districts' boundaries. Development of the *moderate potential* lands identified within the Roseburg District could require up to 114 wells on BLM-administered lands within the 10-year scenario. It is anticipated that all gas production would be carried by collector pipelines placed within road rights-of-way.

The identified plays range from 5 miles to 22 miles from the north-south Northwest Pipeline System that runs within the I-5 Corridor. A review of existing private and public roadways between the plays and the pipeline indicates an adequate transportation system of road rights-of-way to accommodate collector pipelines (USDI BLM 2008). The only additional pipeline right-of-way that would be required would be to connect new wells to existing roadways. These lines would be placed along rights-of-ways for new road construction. Therefore, it is not anticipated that pipeline rights-of-way would create an additional disturbance beyond existing and new road rights-of-way.

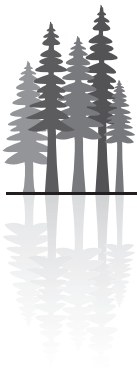
Initially operators would move construction equipment over existing roads to the point where the new drill site access road begins. Based on existing road systems and access, the use of 3-D Survey, and directional drilling, it is anticipated that most well development will utilize existing road infrastructure to develop the resource. However, it may be necessary to construct up to a quarter mile of access for each pad to remove the facility from the active roadway. Based on the ability to cluster wells (assumed to be four wells per pad), it is estimated that no more than 97 miles total of new road construction would be required on both BLM-administered and non-BLM lands. No more than 7.0 miles of new road construction on BLM-administered lands would be needed in full development of 114 wells. Most would be moderate duty access roads with a travel surface 18 to 20 feet wide. The total surface disturbance width would average 40 feet including ditches, utilities, pipelines, cuts, and fills. The total acreage impacted by new road building for both BLM and non-BLM managed lands would be 470 acres. Total disturbance for new roads on BLM-administered land would be approximately 34 acres. Roads not subsequently needed for other resource management would be reclaimed at the end of the project (USDI/USDA 2007).

In the second part of the drilling phase, the operator would construct the drilling pad or platform, anticipated to involve approximately two acres per well site. Support facilities are anticipated to disturb about two acres per well site. Total disturbance could be up to four acres per pad, with each pad containing four or more wells. The likely duration of well development and testing is predicted to be approximately six months to one year for each drill site. Total disturbance to BLM-administered and non-BLM lands in the *moderate potential* area is estimated to not exceed 1,555 acres. Disturbance of BLM-administered lands within the Moderate Potential area is not to exceed 114 acres.

Total disturbance of both BLM-administered lands and other lands for wells, support services, pipeline and new road construction within the District is expected to be approximately 2,025 acres (1% of the total Roseburg District Moderate Potential acreage). Total disturbance for just BLM-administered land with development of 114 wells is expected to be approximately 153 acres (0.5% of projected BLM-administered within the Roseburg District Moderate Potential acreage).

Surface disturbance would be restricted, as much as possible, to previously disturbed areas such as logging roads and landings. Industry is currently utilizing a multi-well to single pad approach which minimizes impact.

Interim reclamation would reduce initial disturbance. After initial construction, unused portions of well site areas would be reclaimed while the wells are in production. Disturbance will be limited to areas within overwork foundation structures and necessary infrastructure, such as well heads, pipelines, and access roads, as described in federal reclamation guidance (USDI/USDA 2007).



Therefore, the maximum development disturbance for the *moderate potential* lands managed by the BLM assumed in this 10-year scenario would range from zero to the maximum disturbance of approximately 153 acres.

Plugging and Abandonment

Wells that are completed as dry holes are plugged according to a plan designed specifically for the down-hole conditions of each well. Plugging is usually accomplished by placing cement plugs at strategic locations from the bottom of the well to the surface. Drilling mud is used as a spacer between plugs to prevent communication between fluid-bearing zones. The casing is cut off at least three feet below ground level and capped by welding a steel plate on the casing stub. Wells will be plugged and abandoned at the end of their production life, with the pad, support facilities, and road fully reclaimed.

Surface Impacts of Plugging and Abandonment

After plugging, all equipment and debris would be removed and the drill site would be restored as near as reasonably possible to its original condition. If new roads constructed for drilling are not needed for future access to the area, the road would be reclaimed using Best Management Practices established for the District, with the road prism revegetated as required by the Authorized Officer. Pipelines will be removed or plugged and abandoned in place to minimize new surface disturbance (USDI/USDA 2007).

Limitations

The acreage estimates used for BLM-administered surface estate are based upon current GIS layers, with acreage approximations to the nearest thousand. The accuracy of this information has not been verified against the Master Title Plats. The GIS coverage for subsurface estate within the district is incomplete. Therefore, the existence and location of BLM-administered subsurface estate within the district is not fully known.

A brief review of the Master Title Plats was completed within and near the Mist Gas Field, 1985 boundaries. Federal subsurface estate identified on the Master Title Plats was not recorded on the GIS layers. Most of the Master Title Plats that identified federal subsurface parcels were outside the Mist Gas Field boundaries. One parcel was identified within the Mist Gas Field boundary. Due to the incompleteness of the GIS layers, BLM-administered acreage of the surface and subsurface will need to be verified through review of Master Title Plats prior to exploration and development.



Restrictions and Requirements on Mineral and Energy Exploration and Development Activity

Introduction

This appendix discusses the leasing stipulations as they will be applied to BLM-administered lands in the Eugene District. Operating standards pertinent to the locatable and salable minerals program are also described. Mineral exploration and development on Federal lands must also comply with laws and regulations administered by several agencies of the State of Oregon; however, these requirements are not discussed in this document.

Leasable Mineral Resources

Oil and Gas Leasing

The Mineral Leasing Act of 1920 (as amended) provides that all publicly owned oil and gas resources be open to leasing, unless a specific land order has been issued to close the area. Through the land use planning process, the availability of these resources for leasing is analyzed, taking into consideration development potential and surface resources. Constraints on oil and gas operations are identified and placed in the leases as notices and stipulations. Oil and gas leases are then issued from the BLM Oregon State Office in Portland. Specific proposed notices and stipulations are listed later in this appendix.

The issuance of a lease conveys to the lessee an authorization to actively explore and/or develop the lease, in accordance with the attached stipulations and the standard terms outlined in the Federal Onshore Oil and Gas Leasing Reform Act (FOOGLRA). Restrictions on oil and gas activities in the planning area will take the form of timing limitations, controlled surface use, or no surface occupancy stipulations used at the discretion of the Authorized Officer to protect identified surface resources of special concern.

The field office which reviews the lease tract will attach stipulations to each lease before it is offered for bid. The review will be conducted by consulting the direction given in this Resource Management Plan. In addition, all lands administered by BLM within the planning area will be subject to the lease notices as shown on the following pages. All Federal lessees or operators are required to follow procedures set forth by: Onshore Oil and Gas Orders, Notices to Lessee (NTL), the Federal Oil and Gas Royalty Management Act (as amended), the Federal Onshore Oil and Gas Leasing Reform Act, and Title 43 Code of Federal Regulations, Part 3100.

Oil and Gas Operations

Geophysical Exploration

Geophysical operations may be conducted regardless of whether the land is leased or not. Notices to conduct geophysical operations on BLM surface are received by the resource area. Administration and surface protection are accomplished through close cooperation of the operator and the BLM. Seasonal restrictions may be imposed to reduce fire hazards, conflicts with wildlife, watershed damage, etc. An operator is required to file a "Notice of Intent to Conduct Oil and Gas Exploration Operations" for all geophysical activities on public land administered by the BLM. The notice should adequately show the location and access routes, anticipated surface damages, and time frame. The operator is required to comply with written instructions and orders given by the Authorized Officer, and must be bonded. Signing of the



Notice of Intent by the operator signifies agreement to comply with the terms and conditions of the notice, regulations, and other requirements prescribed by the Authorized Officer. A pre-work conference and/or site inspection may be required. Periodic checks during and upon completion of the operations will be conducted to ensure compliance with the terms of Notice of Intent, including reclamation.

Drilling Permit Process

The federal lessee or operating company selects a drill site based on spacing requirements, subsurface and surface geology, geophysics, topography, and economic considerations. Well spacing is determined by topography, reservoir characteristics, protection of correlative rights, potential for well interference, interference with multiple-use of lands, and protection of the surface and subsurface environments. Close coordination with the State would take place. Written field spacing orders are issued for each field. Exceptions to spacing requirements involving Federal lands may be granted after joint State and BLM review.

Notice of Staking

After the company makes the decision to drill, it must decide whether to submit a Notice of Staking or apply directly for a permit to drill. The Notice of Staking is an outline of what the company intends to do, including a location map and sketched site plan. The Notice of Staking is used to review any conflicts with known critical resource values and to identify the need for associated rights-of-way and special use permits. The BLM utilizes information contained in the Notice of Staking and obtained from the on-site inspection to develop conditions of approval to be incorporated into the application for permit to drill. Upon receipt of the Notice of Staking, the BLM posts the document and pertinent information about the proposed well in the District Office for a minimum of 30 days prior to approval, for review and comment by the public.

Application for Permit to Drill (APD)

The operator may or may not choose to submit a Notice of Staking; in either case, an Application for Permit to Drill must be submitted prior to drilling. An Application for Permit to Drill consists of two main parts: a 12-point surface plan that describes any surface disturbances and is reviewed by resource specialists for adequacy with regard to lease stipulations designed to mitigate impacts to identified resource conflicts with the specific proposal, and an 8-point subsurface plan that details the drilling program and is reviewed by the staff petroleum engineer and geologist. This plan includes provisions for casing, cementing, well control, and other safety requirements. For the Application for Permit to Drill option, the onsite inspection is used to assess possible impacts and develop provisions to minimize these impacts.

Geothermal Leasing

The Geothermal Steam Act of 1970 (as amended) provides for the issuance of leases for the development and utilization of geothermal steam and associated geothermal resources. Geothermal leasing and operational regulations are contained in Title 43 Code of Federal Regulations, Part 3200. Through the land use planning process the availability of the geothermal resources for leasing is analyzed, taking into consideration development potential and surface and subsurface resources. Constraints on geothermal operations are identified and placed in the leases as stipulations. Geothermal leases are then issued by the BLM Oregon State Office in Portland.

Geothermal resources are first offered by competitive sale. Prior to a competitive lease sale, or the issuance of a noncompetitive lease, each tract will be reviewed, and appropriate lease stipulations will be included. The review will be conducted by consulting the direction given in this resource management plan. The issuance of a lease conveys to the lessee authorization to actively explore and/or develop the lease in accordance with regulations and lease terms and attached stipulations. Subsequent lease operations must be



conducted in accordance with the regulations, Geothermal Resources Operational Orders, and any Conditions of Approval developed as a result of site-specific NEPA analysis. In the planning area, restrictions in some areas will include timing limitations, controlled surface use, or no surface occupancy stipulations used at the discretion of the Authorized Officer to protect identified surface resources of special concern.

In addition to restrictions related to the protection of surface resources, the various stipulations and conditions could contain requirements related to protection of subsurface resources. These may involve drainage protection of geothermal zones, protection of aquifers from contamination, or assumption of responsibility for any unplugged wells on the lease. Development of geothermal resources can be done only on approved leases. Orderly development of a geothermal resource, from exploration to production, involves several major phases that must be approved separately. Each phase must undergo the appropriate level of NEPA compliance before it is approved and subsequent authorizations are issued.

Leasing Notice and Stipulation Summary

The mineral leasing notices and stipulations below are considered to be the minimum necessary to issue leases in the operating area. The standard and the special status species leasing stipulations will be utilized on most lands. The powersite stipulation (USDI BLM Form 3730-1, Powersite Stipulation) will be utilized on lands within powersite reservations.

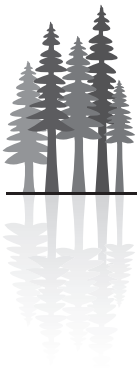
Stipulations also include waiver, exception, and modification criteria. If the Authorized Officer determines that a stipulation involves an issue of major concern, waivers, exceptions, or modifications of the stipulation will be subject to at least a 30-day advance public review. Waiver, exception, and modification are defined as follows:

- ***Waiver*** - The lifting of a stipulation from a lease that constitutes a permanent revocation of the stipulation from that time forward. The stipulation no longer applies anywhere within the leasehold.
- ***Exception*** - This is a one time lifting of the stipulation to allow an activity for a specific proposal. This is a case-by-case exemption. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria apply. It has no permanent effect on the lease stipulation.
- ***Modification*** - This is a change to a stipulation that either temporarily suspends the stipulation requirement or permanently lifts the application of the stipulation on a given portion of the lease. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria apply.

Whenever a special stipulation, such as No Surface Occupancy (NSO), Timing, or Controlled Surface Use (CSU) is used, the need for the special stipulation is described in the “Objective” that follows the stipulation. By imposing these special stipulations, it has been concluded that less restrictive stipulations would not be adequate to meet the stated objective.

Leasing Notices

The following Notices are to be included in each lease for all lands administered by BLM within the planning area where the pertinent resource potential exists. Lease notices are attached to leases in the same manner as stipulations; however, there is an important distinction between lease notices and stipulations: lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice must be fully supported by either laws, regulations, policy, onshore oil and gas orders, or geothermal resources operational orders.



Resource-Specific Leasing Notices

Notice

Special Status Species Stipulation

Resources: Botany and Wildlife

Stipulation: (All the)/(Certain) lands within this lease are within the suitable habitat of the (identify all Federal Threatened (FT), Endangered (FE) or Proposed Threatened (PT) and Proposed Endangered (PE) species, including scientific names), (an officially listed)/(a proposed for listing) Threatened or Endangered species. The Authorized Officer, through an environmental review process, has determined that because of the habitat characteristics of this species, all future post-lease operations must be analyzed and subjected to a U.S. Fish and Wildlife Service (FWS) Section 7 consultation or conference to ensure the action is not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat.

(All the)/(Certain) lands within this lease are known to bear the species listed (Insert list of species) which has (have) protected status as (State Threatened (ST); State Endangered (SE); Federal Candidate (FC); Bureau Sensitive (BS)); or are within the suitable habitat of (identify all State Threatened, State Endangered, Federal Candidate, or Bureau Sensitive species, including scientific names). These species are protected by BLM policy as described in Manual 6840. All future post-lease operations must be analyzed, utilizing recent field data collected at the proper time of year, to identify the presence of such species. If the field examination indicates that the proposed activity may adversely impact FC species, technical assistance will be obtained from FWS to ensure that actions will not contribute to the need to list a federal candidate as a federal threatened or endangered species. Technical assistance may be obtained from FWS to insure that actions will not contribute to the need to list a ST, SE, or BS species as a federal threatened or endangered species. Therefore, prior to any surface disturbing activities or the use of vehicles off existing roads on (this lease)/(the lands legally described as: _____). BLM approval is required. This restriction also applies to geophysical activities for which a permit is required. The approval is contingent upon the results of site specific inventories for any of the above mentioned species. The timing of these inventories is critical. They must be conducted at a time of year appropriate to determine the presence of the species or its habitat. The lessee is hereby notified that the process will take longer than the normal 30 days and that surface activity approval will be delayed.

If no FT, FE, PT, or PE species, or suitable habitat, are found during the inventories, then no formal Section 7 consultation with the USFWS will be necessary and the action will be processed using the procedures found in the applicable oil and gas Onshore Orders or geothermal resources operational orders. However, the lessee is hereby notified that, if any FT, FE, PT, PE, ST, SE, FC, or BS species are found during the inventories, or if the actions are proposed in designated or proposed critical habitat, then surface disturbing activities may be prohibited on portions of, or even all of the lease, unless an alternative is available that meets all of the following criteria: (a) The proposed action is not likely to jeopardize the continued existence of a threatened or endangered species; (b) the proposed action is not likely to destroy or adversely modify critical habitat for a threatened or endangered species; (c) the proposed action is consistent with the recovery needs in approved Fish and Wildlife Service recovery plans or BLM Habitat Management Plans for the threatened or endangered species; and (d) the proposed action will not contribute to the need to list species as federal threatened or endangered.

Objective: To protect officially listed or proposed threatened or endangered plant or wildlife species; and to insure that post leasing oil and gas or geothermal operations will not likely contribute to the need to list other special status species as threatened or endangered.



Exception: An exception may be granted by the Authorized Officer, if review of the proposed plan submitted by the operator indicates that the proposed action will have no effect on the (common name of species).

Modification: The boundaries of the stipulated area may be modified, by the Authorized Officer, if it is determined that portions of the area do not have any officially listed or proposed threatened or endangered species, federal candidate, state threatened or endangered species, or Bureau sensitive species, or their habitat.

Waiver: This stipulation may be waived if the (common name) is declared recovered and is no longer protected under the Endangered Species Act, or if other species found within the lease are no longer considered to be in the federal candidate, state threatened or endangered, or Bureau sensitive categories.

Notice

Cultural Resources: An inventory of the leased lands may be required prior to surface disturbance to determine if cultural resources are present and to identify needed mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator shall:

1. Contact the Bureau of Land Management (BLM) to determine if a cultural resource inventory is required. If an inventory is required, then;
2. The BLM will complete the required inventory; or the lessee or operator, at their option, may engage the services of a cultural resource consultant acceptable to the BLM to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the standard 10-acre minimum to cover possible site relocation, which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the BLM for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted.
3. Implement mitigation measures required by the BLM. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as data recovery and extensive recordation. Where impacts to cultural resources cannot be mitigated to the satisfaction of the BLM, surface occupancy on that area must be prohibited. The lessee or operator shall immediately bring to the attention of the BLM any cultural resources discovered as a result of approved operations under this lease, and shall not disturb such discoveries until directed to proceed by the BLM.

Authorities: Compliance with Section 106 of the National Historic Preservation Act is required for all actions that may affect cultural properties eligible to the National Register of Historic Places. Section 6 of the Oil and Gas Lease Terms (DOI BLM Form 3100-11, Offer to Lease and Lease for Oil and Gas) requires that operations be conducted in a manner that minimizes adverse impacts to cultural and other resources.

Special Leasing Stipulations

The following special stipulations will be utilized on specifically designated tracts of land as described in the resource management plan.

Leasing Stipulations

No Surface Occupancy

Resource: Land Use Authorizations

Stipulation: Surface occupancy and use is prohibited on Recreation and Public Purposes (R&PP) and FLPMA leases.



Objective: To protect uses on existing R&PP and FLPMA leases.

Exception: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

Modification: The area affected by this stipulation may be modified by the Authorized Officer, if the land use authorization boundaries are modified.

Waiver: This stipulation may be waived by the Authorized Officer, if all land use authorizations within the leasehold have been terminated, canceled, or relinquished.

No Surface Occupancy

Resource: Recreation Sites

Stipulation: Surface occupancy and use are prohibited within developed recreation areas.

Objective: To protect developed recreation areas.

Exception: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

Modification: The boundaries of the stipulated area may be modified by the Authorized Officer, if the recreation area boundaries are changed.

Waiver: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains developed recreation areas.

No Surface Occupancy

A 30-day public notice period will be required prior to modification or waiver of this stipulation.

Resource: Special Areas Stipulation: Surface occupancy and use are prohibited within Areas of Critical Environmental Concern (ACEC).

Objective: To protect important historic, cultural, scenic values, natural resources, natural systems or processes, threatened and endangered plant species, and/or natural hazard areas of the ACEC.

Exception: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

Modification: The boundaries of the stipulated area may be modified by the Authorized Officer, if the ACEC or Environmental Education Area (EEA) boundaries are changed.

Waiver: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains designated ACECs or EEAs.

No Surface Occupancy

Resource: Progeny test sites.

Stipulation: Surface occupancy and use are prohibited within progeny test sites.



Objective: To protect progeny test sites.

Exception: None.

Modification: The boundaries of the stipulated area may be modified by the Authorized Officer, if the progeny test site boundaries are changed.

Waiver: This stipulation may be waived, if the Authorized Officer determines that the entire leasehold no longer contains progeny test sites.

No Surface Occupancy

A 30-day public notice period will be required prior to modification or waiver of this stipulation.

Resource: Visual Resource Management (VRM) Class I

Stipulation: Surface occupancy and use are prohibited in VRM Class I areas.

Objective: To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, and to avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems.

Objective: To preserve the existing character of the landscape. *Exception:* An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

Modification: The boundaries of the stipulated area may be modified by the Authorized Officer, if the boundaries of the VRM Class I area are changed.

Waiver: This stipulation may be waived by the Authorized Officer, if all VRM Class I areas within the leasehold are reduced to a lower VRM class. Areas reduced to VRM Class II will be subject to the Controlled Surface Use stipulation for visual resources, and areas reduced to VRM Class III will be subject to standard lease stipulations.

Controlled Surface Use

Resource: Soils

Stipulation: Prior to disturbance of any suspected unstable slopes or slopes over 60 percent, an engineering/reclamation plan must be approved by the Authorized Officer. Such plan must demonstrate how the following will be accomplished:

- Site productivity will be restored.
- Surface runoff will be adequately controlled.
- Off-site areas will be protected from accelerated erosion, such as rilling, gully, piping, and mass wasting.
- Water quality and quantity will be in conformance with state and federal water quality laws.
- Surface-disturbing activities will not be conducted during extended wet periods.
- Construction will not be allowed when soils are frozen.

Exception: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan, which demonstrates that the impacts from the proposed action are acceptable or can be adequately mitigated.



Modification: The area affected by this stipulation may be modified by the Authorized Officer, if it is determined that portions of the area do not include suspected unstable slopes or slopes over 60 percent.

Waiver: This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include any suspected unstable slopes or slopes over 60 percent.

Controlled Surface Use

A 30-day public notice period will be required prior to modification or waiver of this stipulation.

Resource: Visual Resource Management (VRM) Class II.

Stipulation: All surface-disturbing activities, semi-permanent and permanent facilities in VRM Class II areas may require special design including location, painting and camouflage to blend with the natural surroundings and meet the visual quality objectives for the area.

Objective: To control the visual impacts of activities and facilities within acceptable levels.

Exception: None. Modification: None.

Waiver: This stipulation may be waived, if the Authorized Officer determines that there are no longer any VRM Class II areas in the leasehold.

Controlled Surface Use

Resource: Deferred Timber Management Areas

Stipulation: Unless otherwise authorized, drill site construction and access through Deferred Timber Management Areas within this leasehold will be limited to established roadways.

Objective: To substantially maintain the existing level of older and multi-layered conifer forest through year 2023.

Exception: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated.

Modification: The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include Deferred Timber Management Areas.

Waiver: This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include Deferred Timber Management Areas.

Controlled Surface Use

Resource: Riparian Management Areas.

Stipulation: Unless otherwise authorized, drill site construction and access through riparian management areas within this leasehold will be limited to established roadways.

Objective: To protect riparian vegetation and reduce sedimentation.

Exception: An exception to this stipulation may be granted by the Authorized Officer, if the operator submits a plan which demonstrates that impacts from the proposed action are acceptable or can be adequately mitigated.



Modification: The area affected by this stipulation may be modified by the Authorized Officer, if it is determined that portions of the area do not include riparian areas, floodplains, or water bodies.

Waiver: This stipulation may be waived by the Authorized Officer, if it is determined that the entire leasehold no longer includes Riparian Management Areas.

Controlled Surface Use

Resource: Late-Successional Management Areas

Stipulation: Unless otherwise authorized, drill site construction and access through Late-Successional Management Areas (LSMAs) within this leasehold will be limited to established roadways.

Objective: To protect vegetation and to retain and/or restore old-growth forest characteristics.

Exception: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that impacts from the proposed action are acceptable or can be adequately mitigated.

Modification: The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include LSMAs.

Waiver: This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include LSMAs.

Locatable Minerals Surface Management Standards for Exploration, Mining, and Reclamation

The following operational standards for mining activities have been compiled to facilitate compliance with the 43 Code of Federal Regulations (CFR) 3809 surface management regulations, which apply to all operations on mining claims located on BLM administered lands. It is the mining claimant's and operator's responsibility to avoid "unnecessary or undue degradation," and to perform all the necessary reclamation work.

All operators proposing occupancy, timber removal, road or trail construction, installation of structures of any kind, use of mechanized earth moving equipment, or suction dredges having hoses with an inside diameter greater than 4 inches must provide written notice to the District Office prior to the commencement of any mining related disturbance of the surface. If the mining or operation is in sensitive areas (not exploration work) a Plan of Operations will be required. Operations are not to proceed until the operator's bond or financial guarantee is accepted. Surface management performance standards include compliance with all pertinent State laws.

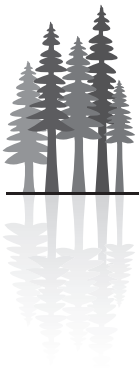
Operations ordinarily resulting in only negligible disturbance as defined in 43 CFR 3809.5(1) are considered to be casual use and no notification to or approval by the BLM is required. Likewise, use of a suction dredge in a stream having an intake nozzle of less than 4 inches in diameter, will not generally require the filing of a Notice or Plan of Operations. Such activity is generally considered casual use.

Vegetation/Timber Removal

An application must be submitted to the Authorized Officer pursuant to 43 CFR 3821.4 describing the proposed use of timber from O&C lands for mining purposes. No trees may be cut until the application is approved and the trees are marked.

Firewood

Merchantable timber may not be used for firewood. Firewood permits may be issued to the operator for use in conjunction with the mining operation but no wood may be used until a permit is obtained from the



BLM.. Firewood authorized for use in conjunction with a mining operation is not to be removed from the mining claim.

Topsoil

All excavations should have all the productive topsoil (usually the top 12 to 18 inches) first stripped, stockpiled, and protected from erosion for use in future reclamation. This also includes removal of topsoil before the establishment of mining waste dumps and tailings ponds, if the waste material will be left in place during reclamation.

Roads

Existing roads and trails should be used as much as possible. Temporary roads are to be constructed to a minimum width and with minimum cuts and fills. All roads shall be constructed so as to minimize negative impacts to slope stability.

Water Quality

All operations, including casual use, shall be conducted in a manner so as to prevent unnecessary or undue degradation of surface and subsurface water resources and shall comply with all pertinent Federal and State water quality laws.

Claim Monuments

State law prohibits the use of plastic pipe for claim staking in Oregon. The BLM policy requires all existing plastic pipe monuments to have all openings permanently closed. Upon loss or abandonment of the claim, all plastic pipe must be removed from the public lands. When old markers are replaced during normal claim maintenance, they shall be either wood posts or stone or earth mounds, constructed in accordance with the requirements of State law.

Drill Sites

Exploratory drill sites should be located next to or within existing roads when possible without blocking public access. When drill sites must be constructed, the size of the disturbance shall be as small as possible.

Dust and Erosion Control

While in operation, and during periods of shut-down, exposed ground surfaces susceptible to erosion will need to be protected. This can be accomplished with seeding, mulching, installation of water diversions, and routine watering of dust-producing surfaces.

Fire Safety

All State fire regulations must be followed, including obtaining a campfire permit or blasting permit, if needed. All internal gas combustion engines must be equipped with approved spark arresters.

Safety and Public Access

Mining claimants shall not exclude the public from mining claims with force, intimidation, or “no trespassing” signs. In the interest of safety, the general public may be restricted only from specific dangerous areas (e.g., underground mines, open pits, and heavy equipment operating and storage areas) by erecting fences, gates and warning signs, if they are included in the Mining Notice or Mining Plan and authorized by the BLM. It is the operator’s responsibility to protect the public from mining hazards. Gates, signs or road blocks may be installed only with BLM approval.



Sewage

Self-contained or chemical toilets are generally to be used at exploration or mining operations and their contents shall be disposed of at approved dump stations.

Equipment

The claimant must maintain the claim site, including structures and equipment, in a safe and orderly condition. Only equipment and supplies that are appropriate, reasonable, and regularly used for exploration or mining will be allowed on the claim.

Tailings Ponds

Settling ponds must be used to contain sediment, and any discharge must meet state standards.

Solid and Hazardous Waste

Trash, garbage, used oil, etc. must be removed from public land and disposed of properly. Trash, garbage or hazardous wastes must not be buried on public lands. The accumulation of trash, debris, or inoperable equipment on public lands is viewed as unnecessary degradation and will not be tolerated. Operators conducting illegal disposals shall be held financially responsible for the clean-up of such disposals.

Cultural and Paleontological Resources

Operators shall not knowingly alter, injure, or destroy any scientifically important paleontological (fossil) remains or any historical or archaeological site, structure, or object on federal lands or any identified traditional use areas. The operator shall immediately bring to the attention of the Authorized Officer, any paleontological (fossil) remains or any historical or archaeological site, identified traditional cultural properties, structure, or object that might be altered or destroyed by exploration or mining operations, and shall leave such discovery intact until told to proceed by the Authorized Officer. The Authorized Officer shall evaluate the discovery, take action to protect or remove the resource, and allow operations to proceed.

Threatened and Endangered Species of Plants and Animals

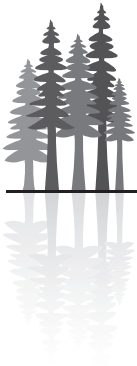
Operators shall take such action as may be needed to prevent adverse impacts to threatened or endangered species of plants and animals and their habitat that may be affected by operations, as stipulated in guidelines developed through consultation with the U.S. Fish and Wildlife Service.

Occupancy at Mining Sites

Occupancy means full or part-time residence on the public lands. It also pertains to barriers to access, fences, tents, trailers and the storage of equipment or materials. Living on the public land in excess of 14 days must be reasonably incident to and required for actual continuous mining or diligent exploration operations, and will require concurrence by the BLM. In general, operations at the casual use level are not sufficient to warrant occupancy. Occupancy may be allowed for mining operations if it is deemed reasonably incident to conducting the operations. To be reasonably incident, activities must constitute substantially regular work, lead to the extraction of minerals, involve observable on-the-ground activity that BLM may verify, and use appropriate equipment that is presently operable. Proposed occupancy or use must conform to the provisions in 43 CFR 3715 and such occupancy or use cannot commence until BLM has completed a review of the proposal. At the conclusion of the review BLM will make a written determination to be sent to the claimant/operator.

Security Guard

In some cases, it may be reasonably incident for a security guard to live onsite to protect valuable property, equipment, or workings that are necessary for the mining operation, or to protect the public from site hazards.



Reclamation

As per the 43 CFR 3809 regulations all Notices and Plans of Operation will have an approved reclamation bond.

Reclamation of all disturbed areas must be performed concurrently or as soon as possible after exploration or mining ceases and shall conform to the guidelines described in surface management regulations found in 43 CFR 3809.

Reclamation shall include, but shall not be limited to:

- 1) saving topsoil for final application after reshaping disturbed areas;
- 2) measures to control erosion, landslides, and water runoff;
- 3) measures to isolate, remove or control toxic materials;
- 4) reshaping the area disturbed, applying topsoil, and revegetating disturbed areas where reasonably practicable; and
- 5) rehabilitation of fisheries and wildlife habitat.

Equipment and Debris

All mining equipment, vehicles, and structures must be removed from the public lands during extended periods of non-operation and/or at the conclusion of mining, unless authorization from the BLM is given to the operator or claimant in writing. Accumulations of debris and trash on mining claims are considered unnecessary and undue degradation and must be removed immediately regardless of the status of the operation. Failure to do so will result in the issuance of a notice of noncompliance

Seeding

The BLM approved seeding prescription must be used to provide adequate re-vegetation for erosion control, wildlife habitat, and productive secondary uses of public lands.

Mulch

As directed by the BLM, during review of the Notice or Plan of Operations, the disturbed area may require mulching during interim or final reclamation procedures. Depending on site conditions, the mulch may need to be punched, netted, or blown on with a tackifier to hold it in place.

Roads

After mining is completed, all new roads shall be reclaimed, per the claimants or operators reclamation plan.

Tailings Ponds

The ponds should be allowed to dry out and the sediments removed and spread with the topsoil, unless the sediments contain toxic materials. If the ponds contain toxic materials, a plan will be developed to identify, dispose, and mitigate effects of the toxic materials. If necessary, a monitoring plan will also be implemented. The ponds should then be backfilled and reclaimed.



Guidelines for Development of Salable Mineral Resources

Proposed Operations

All salable mineral exploration and development, that involves surface disturbance, must have an operation and reclamation plan approved by the Authorized Officer. Extraction of mineral materials must be in accordance with a contract of sale or free use permit issued to qualifying organization by the Authorized Officer. All proposals will undergo the appropriate level of review and compliance with the National Environmental Policy Act.

Quarry Design

In steep terrain, quarry developments may require a series of benches to effectively maximize the amount of mineral materials to be removed in a safe manner. In all cases, bench height shall not exceed 40 feet. If the bench would be used by bulldozers to access other parts of the quarry, the width of the bench should be at least 25 feet. If the bench won't be used by equipment, then this width can be reduced to approximately 10 feet.

Clearing of timber and brush should be planned at least 10 feet beyond the edge of the excavation limit. Most often the brush would be piled and burned at the site, or scattered nearby.

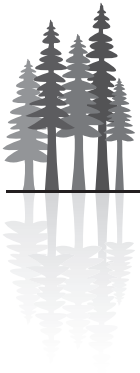
- All topsoil and overburden should be stockpiled and saved for eventual quarry site reclamation. These piles may need to be stabilized by mulching or seeding in order to minimize erosion during the winter months.

As a standard procedure, the excavation of the quarry floor should be designed with an outslope of approximately two percent to provide for adequate drainage.

Operating Procedures

Where practicable, the following requirements will be made a part of every contract or permit providing for the use of mineral material:

- Oversize shall be treated according to the site specific plan.
- The operator shall comply with local and State safety codes covering quarry operations, warning signs and traffic control. All necessary permits must be obtained from State and County agencies.
- Use of the site for equipment storage and stockpiling rock material is allowed for the duration of the contract or permit. Use of the site beyond that time will be authorized, if warranted, under a temporary use permit.
- All topsoil shall be stockpiled or windrowed as appropriate, for use in reclamation.
- Prior to abandonment, all material sites will be graded to conform with the surrounding topography. Topsoil will be utilized to create a medium for re-vegetation. Reseeding and tree planting, if necessary, will be done as prescribed by the Authorized Officer. Access roads no longer needed by the BLM will be abandoned and reclaimed as directed by the Authorized Officer.



Appendix F

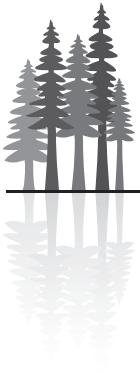
Lands



This appendix provides detailed data about lands and realty in the Eugene BLM District.

In this appendix:

Land Tenure Adjustment Criteria	F-3
Land Withdrawals and Land Tenure Zone 3 Lands	F-4
Inventory of Communication Sites	F-11





Land Tenure Adjustment Criteria

In accordance with the Federal Land Policy and Management Act of 1976 (FLPMA) and other laws, Executive Orders, and Departmental and Bureau policy, the following factors will be considered in evaluating opportunities for disposal or acquisition of lands or interests in lands. This list is not considered all inclusive, but represents the major factors to be considered.

General Land Tenure Adjustment Evaluation Factors

- Improves manageability of specific areas.
- Maintains or enhances important public values and uses.
- Consolidates Federal mineral estate and/or reuniting split surface and mineral estates.
- Facilitates development of energy and mineral potential.
- Reduces difficulty or cost of public land administration.
- Provides accessibility to land for public recreation and other uses.
- Amount of public investments in facilities or improvements and the potential for recovering those investments.
- Suitability of land for management by another Federal agency.
- Significance of decision in stabilizing or enhancing business, social, and economic conditions, and/or lifestyles.
- Meets long-term public management goals as opposed to short term.
- Facilitates National, State, and local BLM priorities or mission statement needs.
- Consistency with cooperative agreements and plans or policies of other agencies.
- Facilitates implementation of other aspects of the approved resource management plans.

Acquisition Criteria

- Facilitates access to public land and resources retained for long-term public use.
- Secures Threatened or Endangered or Sensitive plant and animal species habitat.
- Protects riparian areas and wetlands.
- Contributes to biodiversity.
- Protects high-quality scenery.
- Enhances the opportunity for new or emerging public land uses or values.
- Facilitates management practices, uses, scales of operation, or degrees of management intensity that are viable under economic program efficiency standards.
- Secures lands adjacent to other existing Zone 1 lands.
- Protects significant cultural resources and sites eligible for inclusion on the National Register of Historic Places
- Whether private sites exist for the proposed use.



Disposal Criteria

The following criteria will be used to identify parcels in Land Tenure Zones 2 or 3 suitable for disposal:

- Suitability for purposes including, but not limited to, community expansion or economic development such as industrial, residential, or agricultural development.
- Lands of limited public value.
- Lands that are difficult for the BLM to manage and unsuitable for transfer to other federal agencies or State and local governments.
- Lands that would aid in aggregating or repositioning other public lands or public land resource values where the public values to be acquired outweigh the values to be exchanged.

O&C Land Exchange Criteria

An O&C land exchange is an exchange within the O&C area as delineated in Public Law 105-321. Forest management and related factors to consider when evaluating the feasibility of an O&C land exchange include the following:

- Land exchanges that maintain the existing balance between the various land use allocations will be considered favorably.
- Offered lands that are primarily suitable for agriculture, business, or home sites, or that would require extensive post-acquisition management will not be favorably considered. The O&C lands designated for timber production will generally not be exchanged for lands that will be managed solely for a single use, such as species protection.
- Generally, where cutting rights are reserved on existing and future timber stands by the proponent, the proposed exchange will not be considered favorably.
- Proposals that result in a material reduction in the number of acres of O&C or Coos Bay Wagon Road (CBWR) land or acres of harvestable timber should not be considered favorably. See I.M. No. OR-99-081, dated August 4, 1999, for an interpretation of Section 3 of Public Law 105-321, which established a requirement of “No Net Loss” of O&C and CBWR lands in western Oregon.
- The exchange of O&C and CBWR lands specifically for lands located outside of the 18 O&C counties is prohibited by regulations in 43 CFR 2200.0-6(e). This restriction applies to timber and other interests in lands as well.

Land Withdrawals and Land Tenure Zone 3 Lands

Table F-1 contains detailed information about existing and proposed land withdrawals in the Eugene District. *Table F-2* lists Zone 3 lands, which are lands available for disposal.



TABLE F-1. EXISTING LAND WITHDRAWALS AND RECOMMENDATIONS FOR CONTINUANCE IN THE EUGENE DISTRICT

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
ORE 05555	BO of 7/12/1957	T.15S., R.7W. Section 7	40	Air Navigation	FAA	A	C
ORE 013117	PLO 3610	T.18S., R.1E. Section 31 T.19S., R.1E. Section 6	81.2	Fall Creek Reservoir	COE	B	C
OR 19234	PLO 497	T.17S., R.5W. Sections 27, 28	5.27	Fern Ridge Reservoir	COE	A	C
OR 19240	PLO 727	T.19S., R.1E. Section 34	1.37	Lookout Point Reservoir	COE	A	C
OR 711	PLO 4395	T.16S., R.12W. Section 33	1	Oregon Islands National Wildlife Refuge	USFWS	B	C
OR 25306	PLO 6287	T.16S., R.12W. Section 33	1	Oregon Islands National Wildlife Refuge	USFWS	B	C
ORE 016183A	PLO 3869	T.16S., R.7W. Section 19 T.18S., R.8W. Section 21 T.19S., R.7W. Sections 19, 35 T.22S., R.1W. Section 15	440.12	Lake Creek, Whittaker Creek, Clay Creek, Haight Creek, Sharps Creek Recreation Sites	BLM	B	C
ORE 012093	PLO 5490	*Various Townships	9,000.52	Reserved for multiple use management	BLM	Surface closed to Ag laws	C
OR 8754	PLO 5229	T.15S., R.1W. Sections 29, 30, 31, 32	260	Shotgun Creek Recreation Site	BLM	B	C
OR 37548	PLO 6662	T.20S., R.5W. Sections 9, 15, 21	832.5	Tyrrell Seed Orchard	BLM	B	C
OR 46473	PLO 6963	T.18S., R.12W. Sections 3, 15	257.6	Florence Sand Dunes	BLM	B	C
OR 48744	PLO 7081	T.17S., R.3E. Sections 3, 9, 10, 11	292.25	Eagle Rock Section of McKenzie River	BLM	B	C
OR 19133**	SO of 6/7/1922	T.19S., R.7W. Sections 21, 25, 35	550.49	Protect water power and reservoir development potential / PSC 41	BLM	D	
OR 19133**	SO of 6/7/1922	T.20S., R.6W. Section 5		PSC 41	BLM	D	
OR 19148**	SO of 5/23/1957	T.20S., R.2W. Section 31 T.21S., R.1W. Sections 31***, 33, 35	300.6	Protect water power and reservoir development potential / PSC 180	BLM	D	
OR 19148**	SO of 5/23/1957	T.21S., R.2W. Section 15		PSC 180	BLM	D	
OR 19186**	DO of 7/25/1952	T.16S., R.2E.	276.64	Protect water power and reservoir development potential / PSC 426	BLM	D	



Eugene District ROD and RMP

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
		Sections 23,24, 27					
OR 19040**	EO of 7/2/1910	T.16S., R.2E. Section 28***	152.28	Protect water power and reservoir development potential / PSR 95	BLM	D	
		Section 34***					
OR 19040**	EO of 7/2/1910	T.17S., R.2E. Section 2***		PSR 95	BLM	D	
OR 19040**	EO of 7/2/1910	T.17S., R.3E. Section 4		PSR 95	BLM	D	
OR 19059**	EO of 7/10/1910	T.16S., R.3E. Section 31***	163.56	Protect water power and reservoir development potential / PSR 285	BLM	D	
		T.17S., R.3E. Section 4					
OR 19113**	EO of 12/12/1917	T.15 S., R.6W. Section 7	5961.48	Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.16 S., R.7W. Section 19		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.17 S., R.8W. Sections 1***,3***,17****		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.18 S., R.7W. Sections 3***, 31, 33		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.18 S., R.8W. Sections 17,***,21, 27, 35		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.19 S., R.6W. Sections 7, 9, 29, 31		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.19 S., R.7W. Sections 1,3, 5, 9, 19, 21, 27,35		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.19 S., R.8W. Sections 3, 11, 13		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.20 S., R.6W. Sections 1, 3, 5, 9, 11		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19113**	EO of 12/12/1917	T.20 S., R.7W. Section 3		Protect water-power development Potential/ PSR 659	BLM	D	
OR 19115**	EO of 12/12/1917	T.16 S., R.2E. Sections 29, 33***, 35***	1103.6	Protect water-power development Potential/ PSR 661	BLM	D	



Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19115**	EO of 12/12/1917	T.17 S., R.2E. Section 1***		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19115**	EO of 12/12/1917	T.17 S., R.3E. Section 3*** Section 5***, Section 9***		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19115**	EO of 12/12/1917	T.20 S., R.2W. Section 31		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19115**	EO of 12/12/1917	T.21 S., R.1W. Section 31*** Sections 33, 35		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19115**	EO of 12/12/1917	T.21 S., R.2W. Sections 3***, 7***, 31		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19115**	EO of 12/12/1917	T.22 S., R.2W. Sections 5, 15, 23		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19115**	EO of 12/12/1917	T.23S., R.2W. Section 1		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19116**	EO of 12/12/1917	T.18S., R.8W. Section 28	40	Protect water-power development Potential/ PSR 662	BLM	D	
OR 19127**	EO of 2/19/1920	T.22S., R.1W. Sections 1***, 5, 9, 15***, 23, 27, 35	1,249.16	Protect water-power and reservoir development potential / PSR 730	BLM	D	
OR 19127**	EO of 2/19/1920	T.23S., R.1W. Sections 1, 7		PSR 730	BLM	D	
OR 19014**	SO of 12/12/1917	T.15S., R.6W. Section 7	8,234.24	Protect water-power development potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.16S., R.2E. Sections 29, 33***, 35***		Protect water-power development potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.16S., R.7W. Section 19		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.17S., R.2E. Section 1***		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.17S., R.3E. Section 3*** Section 5***, Section 9***		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.17S., R.8W. Sections 1***, 3***		Protect water-power development Potential / WPD 14	BLM	D	



Eugene District ROD and RMP

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19014**	SO of 12/12/1917	T.18S., R.7W. Sections 31,33		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.18S., R.8W Sections 17***, 21, 27, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.19S., R.6W Sections 7, 9, 29, 31		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.19S., R.7W Sections 1****, 3****, 5, 9, 11****, 19, 21, 27, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.19S., R.8W. Sections 3, 11, 13		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.20S., R.2W. Section 31		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.20S., R.6W. Sections 1, 3, 5, 9, 11		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.20S., R.7W. Section 3		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.21S., R.1W. Sections 31****, 33, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.21S., R.2W. Sections 3***, 7, 31		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.22S., R.1W Sections 1***, 5, 9, 15****, 23, 27, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.22S., R.2W Sections 5, 15, 23		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.23S., R.1W. Sections 1, 7		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.23S., R.2W. Section 1		Protect water-power development Potential / WPD 14	BLM	D	



Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19016**	SO of 12/24/1919	T.23S., R.1W. Section 1	80	Protect water power and reservoir development Potential/WPD 16	BLM	D	
OR 52939	PLO 7445	T.20S.,R.2W. Sections 30, 31, 32, 33, 34	178.95	Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.20S.,R.3W. Section 25, 36		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.21S.,R.1W. Sections 19, 30, 31, 32		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.21S.,R.2W. Sections 2, 3, 11, 13, 14, 24		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.21S.,R.3W. Section 1		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.22S.,R.1W. Section 5		Row River Trail and associated recreation facilities	BLM	B	
OR 50856	PLO 7215	T.18S.,R.12W. Section 2	36.52	Pacific Coastline Highway 101	BLM	B	

Segregation Effect:
 A: Withdrawn from operation of the general land laws, the Mining law, and the Mineral Leasing Act
 B: Withdrawn from operations of the General Land and Mining Laws
 C: Withdrawn from operation of the General Land Law
 D: Withdrawn from operation of the General Land Law, open to mining subject to Public Law 359
 E: Withdrawn from operation of the General Land Law, withdrawn from mining except metalliferous

Recommendation:
 C – Continue R - Revoke

* All public domain lands in and west of Range 8 East and all lands within the area, which become public domain lands in the future.
 ** Withdrawals remaining to be reviewed through the FLPMA withdrawal review process or under Order Number of DM 603.
 *** Opened to entry subject to Sec. 24 of the Federal Power Act.
 **** Opened to entry in part subject to Sec. 24 of the Federal Power Act.

Notes: Location description indicates sections within which withdrawn lands are located. Information on which withdrawn lands are available at the Eugene BLM District Office. Table does not include lands that have been completely transferred out of Federal ownership subsequent to withdrawal or lands within National Forest boundaries.

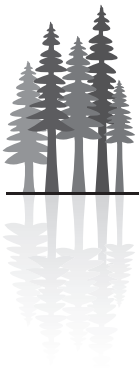


TABLE F-2. LAND TENURE ZONE 3 LANDS IN THE EUGENE DISTRICT

14 S	2 W	13	Lots 4-5 (part) ^a	2.00	O&C ^b	128
15 S	2 W	25	SE1/4SE1/4(part)	5.00	O&C ^{b,c}	129
17 S	3 W	15	Lots 6, 9	1.30	O&C ^d	130
16 S	3 W	30	Lot 3	15.28	PD ^e	131
16 S	6 W	7	Lot 6	3.76	O&C ^c	132
16 S	7 W	11	NW¼SE¼ (part)	2.50	O&C ^{b,c}	133
18 S	1 W	5	Lot 8 (part)	0.50	O&C	134
18 S	1 W	26	Lot 7	1.68	PD	135
18 S	7 W	11	NE¼NE¼ (part)	3.00	O&C ^b	136
18 S	9 W	7	SE1/4SW	40.00	PD ^e	137
18 S	10 W	11	Lot 9	6.24	PD	138
18 S	11 W	18	SE1/4SE	40.00	PD ^e	139
18 S	12 W	15	SE1/4NE1/4	40.00	PD ^e	140
19 S	3 W	35	Lot3 ^a	2.79	O&C	141
19 S	4 W	29	NE¼SW¼ (part)	0.36	O&C ^b	142
21 S	1 W	31	Lot 13	1.42	O&C	143
22 S	1 W	5	Lot 18	0.25	O&C ^{b,c}	144
				166.08		

^aTract may be sold only to current R&PP lessee so long as case is in effect.

^bAcreage is approximate until cadastral survey is completed.

^cThese listings were not included in the 1995 RMP.

^dActual acreage may vary due to erosion and accretion.

E = East; N = North; S = South; W = West;

UN = Unnumbered

PD = Public Domain Land; OC = Oregon and California Railroad Land; Ot = Other

Sources: Western Oregon Digital Base and District realty records



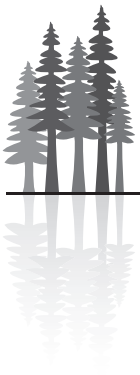
Inventory of Communication Sites

Table F-3 contains information on existing communication sites in the Eugene District. The resource management plan contains management directions related to management of communication sites.

TABLE F-3. INVENTORY OF COMMUNICATION SITES FOR THE EUGENE DISTRICT

Location # on Figure 5 in the RMP ^a	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
15	Badger Mountain	OR 55473, OR 48253, ORE 02880, OR 59637, OR 34510	17 S	7 W	35	Lot 7	44.05073	123.5015
16	Brickerville	Vacant	18 S	10 W	3	Lot 5	44.03375	123.886
17	Vaughn Hill	Vacant	18 S	6 W	5	SE, SW4NE4	44.03641	123.4373
18	Amy Road	OR 15674	16 S	7 W	1	NW, SW	44.20898	123.4823
19	Hawley Butte	OR 56656, OR 43048	21 S	1 W	29	Lot 7	43.71797	122.8375
20	Huckleberry Mountain	OR 51261	24 S	1 W	6	Lot 21	43.51053	122.8571
21	Horse Rock	OR 53355, OR 8815	15 S	2 W	1	Lot 4	44.30092	122.8831
22	Buck Mountain	ORE 017963, OR28799	16 S	2 W	7	Lot 1	44.19825	122.9851
23	Mt. Tom	Vacant	15 S	2 W	31	SW	44.21592	122.9784
24	South McGowan	Vacant	16 S	2 W	31	NW	44.13768	122.9786
25	Windy Peak	Vacant	16 S	8 W	27	SW	44.14644	123.6521
26	Elk Mountain	Vacant	16 S	8 W	26	NE	44.15383	123.622
27	Black Canyon	Vacant	17 S	2 W	7	SW	44.10226	122.9794
28	Camp Creek Ridge	Vacant	17 S	2 W	15	NE	44.09592	122.9066
29	High Point	Vacant	19. S	6 W	23	NW	43.9065	123.3783
30	Eagle's Rest	Vacant	20 S	1 W	12	NE	43.8471	122.7465
31	Cougar Mountain	Vacant	20 S	3 W	1	NE	43.86457	122.9869
32	Laurel Butte	Vacant	22 S	3 W	23	SE	43.64147	123.0066
33	Hobart Butte	Vacant	22 S	3 W	31	NW	43.61182	123.0993

^aMap numbers start at 15 because communication sites were numbered consecutively across the planning area in the Final Environmental Impact Statement.



Appendix G

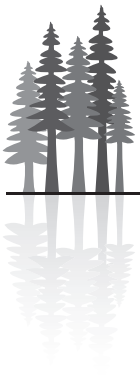
Recreation



This appendix provides supplemental material for the recreational section of the Eugene District Resource Management Plan.

In this appendix:

Interim Off-Highway Vehicle Management Guidelines.....	G-3
Planning Frameworks for Special Recreation Management Areas.....	G-6





Interim Off-Highway Vehicle Management Guidelines

This section provides interim off-highway vehicle (OHV) management guidelines that would be implemented until subsequent transportation management plans are completed. These interim guidelines have been developed at the district level for OHV emphasis areas.

Maps associated with these interim OHV management guidelines are available at the Eugene BLM District Office. These maps show OHV area designations, a preliminary road and trail network, and BLM-administered lands that have secured legal public access. See the resource management plan: *Table 22* for a list of individual closed areas, *Table 23* for off-highway vehicle area designations, and *Table 24* for off-highway vehicle emphasis areas in the Eugene BLM District

The BLM road maintenance levels that pertain to limitations on types of OHV use are described below.

- **Level 1** – This level is assigned to roads where minimum maintenance is required to protect adjacent lands and resource values. Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless roadbed drainage is being adversely affected, causing erosion. Closure and traffic restrictive devices are maintained as needed.
- **Level 2** – This level is assigned to roads that are passable by high clearance vehicles. Drainage structures are to be inspected within a 3-year period and maintained as needed. Grading is conducted as necessary to correct drainage problems. Brushing is conducted as needed to allow access. These are typically low standard, low volume, single-lane, natural and aggregate surfaced roads, which are functionally classified as resource roads.
- **Level 3** – This level is assigned to roads where management objectives require the roads to be open seasonally or year-round for commercial, recreational, or administrative access. Typically, these roads are natural or aggregate surfaced, but may include low use bituminous surfaced roads. These roads have a defined cross section with drainage structures (e.g., rolling dips, culverts, or ditches). These roads may be negotiated by passenger cars traveling at prudent speeds. User comfort and convenience are not considered a high priority. Drainage structures are to be inspected at least annually and maintained as needed. Grading is conducted to provide a reasonable level of riding comfort at prudent speeds for the road conditions. Brushing is conducted as needed to improve sight distance.
- **Level 4** – This level is assigned to roads where management objectives require the roads to be open all year (except they may be closed or have limited access due to snow conditions) to connect major administrative features (recreational sites, local road systems, administrative sites, etc.) to county, state, or federal roads. Typically these roads are single or double lane, aggregate, or bituminous surface, with a higher volume of commercial and recreational traffic than administrative traffic.

Eugene District

OHV Designations

- Limited to designated roads and trails: 321,138 acres
- Closed: 3,277 acres

Description

Includes all BLM-administered lands within the Eugene District. See additional interim guidelines for the Shotgun Creek OHV Emphasis Area.



Limited Area Management Guidelines

- Until road and trail designations are complete, all motorized vehicles will be limited to the interim road and trail network as mapped unless closed or restricted under a previous planning effort or due to special circumstances as defined below.
- Routes may be closed or limited under seasonal or administrative restrictions. These restrictions may include, but are not limited to, fire danger, wet conditions, special requirements for wildlife species, to protect cultural resources, or for public safety.
- Vehicles may pull off roads or trails to park or allow others to pass, up to 25 feet from the centerline of roads, or up to 15 feet from the centerline of trails.
- Limitations apply to all Class I (ATVs), Class II (4WDs) and Class III (motorcycles) vehicles; and to all activity types (recreational, commercial, etc.) unless authorized by the BLM for administrative purposes.

Closed Area Management Guidelines

All motorized vehicles are prohibited from entering closed OHV areas unless authorized by the BLM for administrative purposes.

Process for Ongoing Public Collaboration/Outreach

- The principal venue for public collaboration is through public outreach and scoping during future travel management planning efforts, special projects, and local partnership.
- Press releases will be sent out as needed informing the public of OHV opportunities and restrictions. Signs will be posted where appropriate.
- After the transportation management plan is completed, maps and brochures illustrating designations, describing specific restrictions, and defining opportunities will be available to the public at the Eugene BLM District Office.

Process for Selecting a Final Road and Trail Network

Route designations have been completed for the Upper Lake Creek Special Recreation Management Area and the Shotgun Creek OHV Emphasis Area. Final route designations for the rest of the district will be accomplished in a comprehensive, interdisciplinary travel and transportation management plan scheduled to be complete no later than five years after completion of the RMP revision.

The BLM's geo-database will provide information for identifying roads and trails for both motorized and non-motorized activities. On-the-ground inventories will be conducted if a reasonable determination can not be made using remote-sensing techniques. Proposed designations will be analyzed through public scoping and a NEPA analysis. Amendments to the designated system will be considered during the transportation management planning process.

Road and Trail Construction and Maintenance Standards

Construction and maintenance will be done in accordance with the standards in BLM Manual H-9114-1 and other professional sources.

Shotgun Creek OHV Emphasis Area

Acres: 8,090

OHV Designation:

Limited to designated roads and trails

Niche: Offers a multiple-use trail riding experience for motorcycle riders, ATV riders, and four-wheel drive enthusiasts.



Management Guidelines

- The trail system is available to Class I (ATVs), Class II (4WDs) and Class III (motorcycles) motorized vehicles with Oregon ATV permits.
- Routes open to OHV use will be signed and mapped.
- Routes available for OHV use may change periodically due to timber harvest activity or trail rehabilitation.

Process for Ongoing Public Collaboration/Outreach

The principal venue for public collaboration on the trail system is through local partnership relationships. A trail map is available to the public at the Eugene District Office and will be updated as trail routes change. The trail system is marked on the ground with regulatory and directional signs.

Process for Selecting a Final Road and Trail Network

Route designations were completed through two Shotgun OHV Trail System Environmental Assessments (EA OR 090-00-04 and EA OR 090-06-04). Amendments to the transportation system will be considered during the route designation planning process. These modifications will be accomplished in collaboration with trail partners and users.

Road and Trail Construction and Maintenance Standards

Trail maintenance will be a priority within this OHV emphasis area to ensure quality riding experiences for trail users and to conserve natural resource values.



Planning Frameworks for Special Recreation Management Areas

This section presents management guidelines for special recreation management areas in the Eugene BLM District.

Lower Lake Creek

Primary Market Strategy: Destination

Niche: Opportunities for swimming, water play, picnicking, fishing, and wildlife viewing in a natural setting.

Management Objectives: Improve visitor safety and decrease health hazards; enhance visitors' recreation experience and appreciation of natural resources.

Targeted Outcomes

Activities: Water play, hiking, mountain biking, primitive camping.

Experiences: Enjoy socializing with friends and families in a scenic area; physical activity (hiking and mountain biking) in a scenic area.

Benefits: Relaxation; physical exertion; interaction with family and friends.

Prescribed Setting Character

Physical: Adjacent to a state highway; rustic amenities away from developed parking lot.

Social: High levels of visitation; no possibility for solitude. Crowding expected on high-use weekends.

Administrative: Regulations posted; regular visitor services and law enforcement presence.

Activity Planning Framework

Management: Continue to provide for improved visitor safety and health as described in the Lower Lake Creek Recreation Area Management Plan (1997).

Marketing: Use information and interpretation to increase visitor awareness of safety and health issues in the Lower Lake Creek Special Recreation Management Area.

Monitoring: Monitor visitor satisfaction.

Administrative: Apply administrative actions as needed to maintain a safe and enjoyable experience.

McKenzie River

Primary Market Strategy: Destination

Niche: Opportunities for nonmotorized boating, fishing, and environmental education.

Management Objectives: Provide river-oriented recreation opportunities in coordination with other recreation providers along the river corridor.

**Targeted Outcomes:**

- Activities: Fishing, boating, scenic viewing, resource interpretation.
- Experiences: Water-based physical activity in a roaded natural setting.
- Benefits: Outdoor skills development; exercise; relaxation; and enjoyment of forested surroundings.

Prescribed Setting Character

Physical: Mostly natural appearing environment as viewed from sensitive roads and trails. Some obvious onsite controls of visitors. Access and travel is conventional motorized vehicles (e.g., sedans and Recreational vehicles) and watercraft (primarily non-motorized).

Social: Visitor encounters common, but some chance for privacy.

Administrative: Regular BLM staff patrols during high-use season (May- September). Interagency maintenance agreement continued to address routine maintenance needs of some developed sites.

Activity Planning Framework

Management: Manage for continued water-based recreation activities. Incorporate interpretive/educational opportunities to strengthen visitor understanding and appreciation of the natural environment. Maintain river access opportunities.

Marketing: Continue to work with other agencies and private partners to promote responsible recreational use of the river corridor.

Monitoring: Monitor for visitor compliance, capacity, and satisfaction. Draw upon university resources for periodic surveying.

Administrative: Provide visitor services and law enforcement presence.

Row River Trail**Primary Market Strategy: Destination**

Niche: Opportunities for hard surface, non-motorized trail recreation.

Management Objectives

- Provide a broad spectrum of resource-dependent recreation opportunities to meet the needs and demands of public land visitors.
- Foster interagency efforts to improve service to the visiting public.
- Maintain high-quality recreation facilities to meet public needs and enhance the image of the agency.
- Improve public understanding and support of the Bureau by effectively communicating the agency's multiple use management programs to the recreation visitor.

Targeted Outcomes

Activities: Bicycle riding, walking, and horseback riding.

Experiences: Physical activity in a rural setting.



Benefits: Exercise; appreciation of natural surroundings; feelings of accomplishment.

Prescribed Setting Character

Physical: Rural - Adjacent to heavily traveled paved county road.

Social: Rural - Small group size, but encounters with others are commonplace; traffic noise prevalent.

Administrative: Rural - A substantial amount of information is provided along the trail; BLM presence daily during the high-use season.

Activity Planning Framework

Management: Continue to provide hard-surface, non-motorized riding opportunities; provide trailheads with parking lots and basic amenities. Provide interpretive signage along the trail.

Marketing: Include Row River Trail on printed and web-based media generated by BLM; work with partners to promote the trail.

Monitoring: Monitor for visitor compliance and satisfaction

Administrative: Provide visitor services and law enforcement presence. Maintain OHV closure on trail.

Shotgun Creek

Primary Market Strategy: Destination

Niche: Opportunities for organized group events, swimming, picnicking, and hiking.

Management Objectives

- Provide resource-based, nonmotorized recreation activities.
- Promote organized group gatherings.
- Maintain facilities that offer convenience to visitors.
- Minimize visitor conflicts between groups.

Targeted Outcomes

Activities: Group events, picnicking, hiking, competitive sport activities

Experiences: Physical activity, comport in a developed setting

Benefits: Exercise, companionship, appreciation of natural surroundings

Prescribed Setting Character

Physical: Natural forested setting containing facilities/amenities typical of those found in urban recreation sites, including opportunities for competitive sporting events.

Social: Small to large group accommodations offered. Opportunity to observe/affiliate with others.

Administrative: BLM staff and volunteer presence daily. Low cost/low maintenance fee collection procedures established.



Activity Planning Framework

Management: Provide group event and nonmotorized trail opportunities.

Marketing: Distribute print and internet-based media; partner with independent newspaper media to promote recreation site.

Monitoring: Monitor for visitor compliance and safety.

Administrative: Provide high level of visitor services from May-October; collect recreation use fees from May-October; maintain OHV closure; administer group shelter rental program.

Upper Lake Creek

Primary Market Strategy: Destination

Niche: Regionally important opportunities for fishing, horseback riding, camping, and nonmotorized boating.

Management Objectives

- *Roaded natural*: Protect natural and scenic qualities of the Upper Lake Creek Special Recreation Management Area around Hult Reservoir while allowing for rustic recreation facility development.
- *Semi-primitive motorized*: Maintain existing semi-primitive setting, natural appearing environment, and allow for development of multiple use nonmotorized trails.

Targeted Outcomes

Activities

- *Roaded natural*: Fishing, camping, boating (lake), hiking, horseback riding.
- *Semi-primitive motorized*: Hiking, horseback riding, and OHV use on designated roads.

Experiences: Enjoyment of natural settings and scenic values.

Benefits: Offer comfort in an outdoor setting; improved health and safety of visitors; and enhanced appreciation of natural settings.

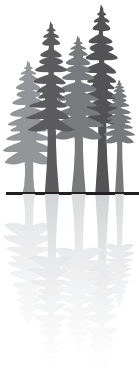
Prescribed Setting Character

Physical

- *Roaded natural* – Adjacent to all-weather paved road, small dam, bridge, and fish ladder readily apparent.
- *Semi-primitive motorized* – Roads available for motorized vehicle use are generally graveled surface, relatively high density of roads.

Social

- *Roaded natural* – Relatively small group size, but mostly within sight and sound of others; high traffic level on paved road.
- *Semi-primitive motorized* – Small group size, less likely to encounter others.



Administrative

- Roaded natural – Rules posted; BLM presence on most summer weekends.
- Semi-primitive motorized: Occasional regulatory signage; some BLM presence.

Activity Planning Framework

Management: Provide for rustic day use and overnight facilities as described in the Upper Lake Creek Resource Management Plan (2005).

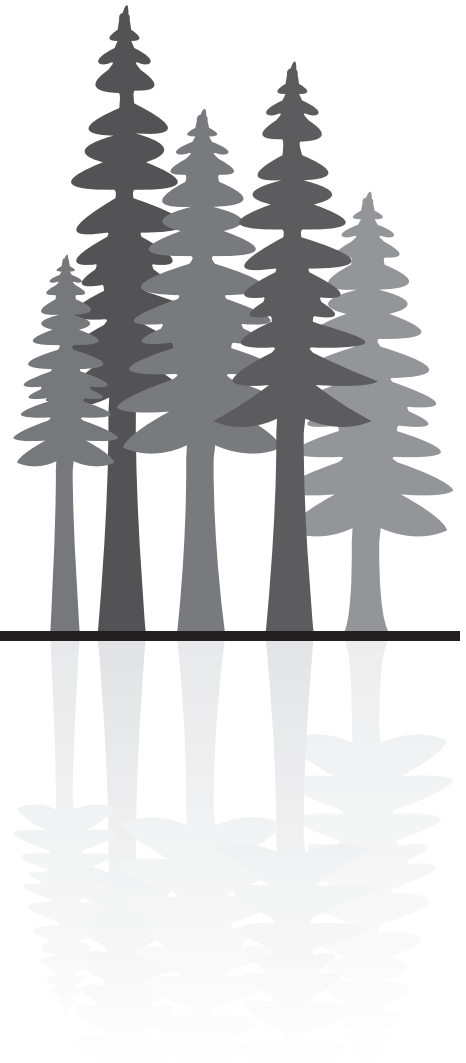
Marketing: Provide visitor use and experience opportunity information through a variety of media including web-based, brochures, and onsite information.

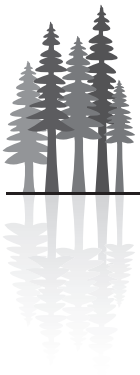
Monitoring: Monitor visitor satisfaction.

Administrative: Apply administrative actions as needed to maintain a safe and enjoyable recreation experience, and to conserve and restore the natural setting (e.g., visitor services, law enforcement, and volunteer organizations for trail maintenance).

Appendix H

West Eugene Wetlands Plan







Summary of the West Eugene Wetlands Plan

The West Eugene Wetlands area encompasses about 3,000 acres, including numerous wetlands that wind along major waterways through the Eugene area. Approximately 1,340 acres of the wetlands are BLM land. Management of these wetlands is guided by the West Eugene Wetlands Plan (WEWP) through a unique partnership of state and federal agencies, including the Bureau of Land Management, and private organizations.

The West Eugene Wetlands Partnership currently has nine member organizations. Each signed a “Statement of Partnership” that outlines a mission and broad goals and objectives. Collaboration and cooperation comprise the heart of the partnership. The nine members are:

- City of Eugene
- U.S. Bureau of Land Management
- The Nature Conservancy
- U.S. Army Corps of Engineers
- Oregon Youth Conservation Corps
- U.S. Fish and Wildlife Service
- McKenzie River Trust
- Willamette Resources and Educational Network
- Long Tom Watershed Council

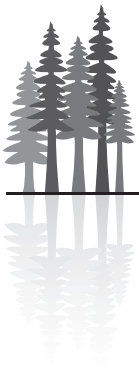
The West Eugene Wetlands Plan was the result of coordinated efforts that involved property owners, interested citizens, and representatives of the development community, environmental groups, and state and federal agencies. These various entities:

- Held community outreach meetings.
- Conducted inventories of wetlands habitat value.
- Mapped wetland boundaries.
- Determined functions of the different wetlands.

Based on the information gathered, the partners identified specific goals and developed policies important for a system of restored and enhanced wetlands. Of major importance was designing a collaborative plan that would strike a balance between development needs and environmental values. These goals and policies provided the framework for the West Eugene Wetlands Plan. The partners dedicate resources within their respective budgets, and with attention to their own missions and legal requirements, to carry out this plan.

An overall goal for the West Eugene Wetlands is to:

- Protect rare plants.
- Provide an open space greenway along the area’s major streams.
- Provide for water quality improvements that meet increased federal requirements.
- Help protect people and property from flooding.



The West Eugene Wetlands Partnership collaborates to implement the goals and policies originally established by the West Eugene Wetlands Plan, including:

- Plans and implements wetland and stream restoration and enhance projects.
- Coordinates the West Eugene Wetlands Mitigation Bank to provide certified wetland mitigation bank credits to satisfy mitigation requirements for local development projects.
- Maintains a native seed collection program to provide seed of locally native wetland, riparian and upland species to use in restoration projects.
- Conducts vegetation and hydrological monitoring of restoration sites.
- Plans and implements land acquisition.
- Plans recreational facilities, such as multi-use paths, overlooks, and parking structures to access the wetlands.
- Implements recreation and educational programming about the wetlands.
- Fosters scientific research.

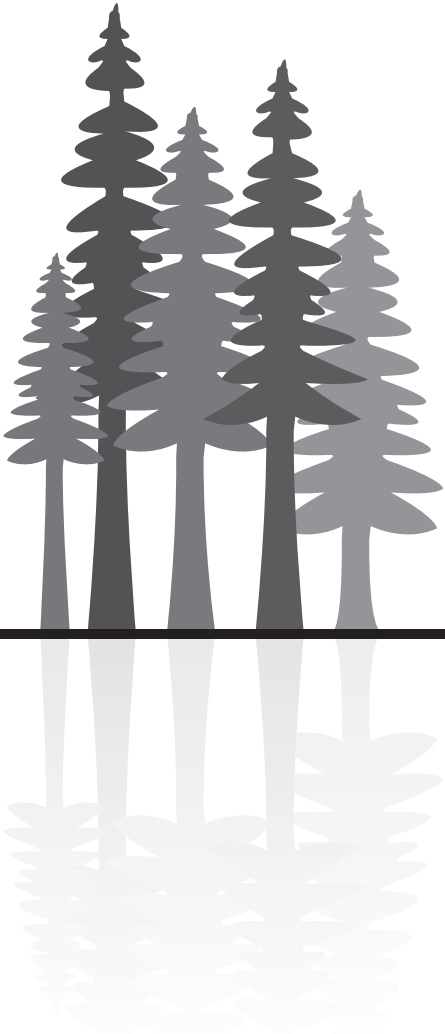
Besides the goals and policies, the West Eugene Wetlands Plan identifies individual wetland sites and recommended actions for each. Basically, the recommended actions are ideas on how to implement the policies, and therefore are not land management actions nor are they mandatory, but serve as guidance. Among the recommended actions are some for creating wetlands that filter pollution from storm runoff, ways to purify storm water, and mitigation opportunities to compensate for the loss of lower-valued wetlands displaced by development. Recommendations are reviewed, studied, and revised over time, giving the Plan a dynamic structure. The recommended actions may or may not be implemented in the form stated in the West Eugene Wetlands Plan. Rather, they are evaluated in light of their ability to address the plan's goal and policy direction while considering consistency with community aspirations, financial options, and legal requirements. Additionally, the West Eugene Wetlands Plan lists future public improvement projects that directly and indirectly affect the study area.

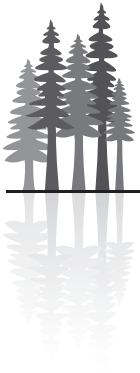
In general, the West Eugene Wetlands Plan:

- Strives to integrate environmental protection with economic development, within the framework of state and federal wetland programs.
- Proposes a variety of techniques for spreading the costs of recommendations out among several funding sources, over a period of time, to make the system affordable to the Eugene community.
- Facilitates addressing Federal and state requirements at the local level, which reduces time in the permitting process.
- Provides for coordination of community resources to assist in development of lower-value wetlands, while combining federal, state, and local resources to protect, restore and enhance the remaining wetlands.

The complete West Eugene Wetlands Plan, with implementation details, is available online at www.eugene-or.gov.

Glossary







- 3P fall, buck, and scale sampling. A sampling method that determines the volume and value of merchantable timber. The method starts with visual estimation of a stand using the 3P sampling method (i.e., PPP, or, probability proportional to prediction), which operates under the assumption that the probability of a tree being sampled is proportional to its predicted occurrence in a stand. The estimation is verified by cutting down a sampled tree (fall), cutting it into merchantable log lengths (buck), and measuring the logs (scale) noting indicators for defects and log grades. For managed second-growth stands, 3P sampling is generally used to develop volume tables from which stand volumes may be extrapolated. For uneven-aged stands, typically containing larger and often more defective timber, 3P sampling is useful in determining the net volume (recovery).
- 303(d) Water Quality Listing. Impaired waters that do not meet water quality standards, identified by DEQ, as required by the Clean Water Act.
- acre A measure of surface land area in U.S. customary units that is 43,560 square feet, which is 1/640 of a square mile (or approximately 0.4 hectares). If square, it is nearly 209 feet on each side.
- active stream channel The inundated area of bed and banks of a stream, from larger streamflow of one to two years.
- activity fuel Debris (wood chips, bark, branches, limbs, logs, or stumps) left on the ground after management actions, such as logging, pruning, thinning, or brush cutting, versus debris left after storms or fires.
- adaptive management. A forest management methodology that continually monitors, evaluates, and adjusts decisions and management actions to improve implementation and to ensure that the goals and objectives of resource management plans are being met.
- Adaptive Management Area A Northwest Forest Plan term that denotes a land use allocation (or landscape unit) whose lands are designated for development and for testing technical and social approaches for achieving desired ecological, economic, and other social objectives.
- adverse modification. An Endangered Species Act term that is not specifically defined by the act but is generally accepted to denote a direct or indirect alteration of habitat that appreciably diminishes the value of an area with respect to the survival, or in some instances the recovery, of a listed species. In most instances, this standard is considered the same as, or is nearly identical, to the jeopardy standard.
- age classification A system that categorizes trees, forests, stands, or forest types by intervals of years. Age classifications differ around the U.S. by forest type (wet, dry, evergreen, deciduous, or succulent). For this analysis, the interval is usually 10-year increments.
- aggregated retention See variable-retention harvest system.



- allowable sale quantity/annual productive capacity These terms are synonymous. The timber yield that a forest can produce continuously under the intensity of management outlined in the RMP from those lands allocated for permanent forest production.
- alternative One of several proposed management actions that have been studied and found to meet the goals and objectives of a project's purpose and need and, as a result, is suitable to aid decision-making.
- anadromous fish Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Includes species such as salmon and steelhead. Also see salmonid.
- analysis The scientific evaluation of the environmental impacts of proposed planning decisions. The BLM employs many types of analysis (e.g., surface, linear, raster, contiguity, and topological overlay) with a variety of data sets (e.g., inventory and GIS) and tools (e.g., physical, quantitative, data, and spatial modeling).
- analytical assumption A judgmental decision that is based on the science and relationships of natural systems assumed to be true and from which conclusions can be drawn to supply the missing values, relationships, or societal preferences needed for proceeding with an analysis of alternatives.
- angular canopy density A measure of shade provided by riparian vegetation. It is the density of the canopy, expressed as a percent, measured along the path of incoming solar radiation between the sun and a stream.
- animal unit month (AUM) The amount of forage necessary to sustain one cow (or its equivalent) for one month.
- annual productive capacity An O&C Act term denoting the volume of timber that is determined will grow in one year in a given area. Also see allowable sale quantity (ASQ), offer, and sustained yield capacity.
- Aquatic Conservation Strategy A Northwest Forest Plan methodology designed to restore and maintain the ecological health of watersheds and aquatic ecosystems, consisting of four components: riparian reserves, key watersheds, watershed analysis, and watershed restoration.
- aquatic habitat Habitat for vertebrate and invertebrate wildlife species and vascular and non-vascular plants occurring in free water (e.g. lakes, ponds, streams, rivers, springs and seeps).
- area A generic forestry term that refers to the surface land included within specific boundaries and usually allocated for a specific purpose, such as a late-successional management area, a timber management area, a traditional use area, a recreational use area, or a wilderness area. Contrast with block.
- Area of Critical Environmental Concern (ACEC) Land where special management attention is needed to protect life, to provide safety from natural hazards, or to prevent irreparable damage to important values (historic, cultural, or scenic), resources (fish and wildlife), or processes (natural systems).



Area of Mutual Interest.	A defined mapped area, identified by industry, of potential petroleum development.
assessment area	A subdivision of a sustained yield unit (BLM district) that has been divided by physiographic provinces.
at-risk species.	Species that are determined by a detailed assessment to be in danger of becoming locally or completely extinct.
at-risk community.	A group of homes or structures that exist within the vicinity of federal lands or a wildland/urban interface for which a significant threat to human life or property exists as a result of a wildland fire.
authority	The right and power to make decisions and give orders such as the United States Congress exerts when passing legislation (e.g. the O&C Act and the Endangered Species Act).
awarded timber sales.	A sale where the government has accepted a bid from a qualified high bidder, thereby binding the government and granting specific rights to the purchaser.
backcountry byways	A road segment designated as part of the National Scenic Byway System.
basal area	The cross-sectional area of a single stem, of all stems of a species in a stand, or of all plants in a stand (including the bark) that is measured at breast height (about 4.5 feet up from the ground) for larger plants (like trees) or measured at ground level for smaller plants.
baseline	The starting point for the analysis of environmental consequences, often referred to as the Affected Environment. This starting point may be the condition at a point in time (e.g., when inventory data is collected) or the average of a set of data collected over a specified number of years. Also see analysis, environmental consequences, and inventory data.
beneficial use	In general, any reasonable use of a resource for a purpose consistent with the laws and best interests of the people of a state. In water use law, such uses include, but are not limited to: instream, out of stream, and ground water uses; domestic, municipal, and industrial water supplies; mining, irrigation, and livestock watering; fish and aquatic life; wildlife watering; fishing and water contact recreation; aesthetics and scenic attraction; hydropower; and commercial navigation.
Best Management Practices (BMPs).	BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).



- biological assessment A biological assessment is a document that evaluates potential effects of a proposed action to listed and proposed species and designated and proposed critical habitat and determines whether any such species or habitats are likely to be adversely affected by the action. It is used in determining whether formal consultation or conferencing with the U.S. Fish and Wildlife Service or National Marine Fisheries Service is necessary (50 CFR 402.12[a])
- biological opinion An opinion by the U. S, Fish and Wildlife Service or the National Marine Fisheries Service as to whether or not a federal action is likely or not to jeopardize the continued existence of listed species, or would result in the destruction of or adverse modification of critical habitat. The opinion may contain reasonable and prudent alternatives, a statement of anticipated take of listed animals, and conservation recommendations for listed plants.
- biomass Unmerchantable and waste plant materials used as a source of renewable combustible fuel. Also includes non-sawlog material ground up into fiber and used in secondary wood products.
- block A term that denotes an area of land that has been approved for special management, such as a northern spotted owl reserve or a fire suppression area. Contrast with area.
- board foot A unit of measure for unfinished solid wood used by the lumber industry that is typically expressed as bf or bd. ft. and equals the volume contained in a 1-inch thick, 12-inch long, and 12-inch wide board.
- Bureau Strategic Species A special status species category established by the Oregon/ Washington BLM that includes animal, plant and fungi species that are of concern in the two states. The special status species policy (BLM 6840) does not apply to these species, and no analysis of them is required in NEPA documents. Field units are required to collect occurrence field data and maintain records. Also see Bureau sensitive species.
- Bureau of Land Management (BLM) A federal agency within the U.S. Department of the Interior that is responsible for administering 261 million surface acres of federally owned lands in accordance with all applicable laws to sustain the health, diversity, and productivity of those lands. Most of the acreage is in Alaska and the western states.
- Bureau Sensitive Species A special status species category established by the BLM that includes those plant and animal species eligible for status as federally listed, federal candidate, state listed, or state candidate (plant) species; on List 1 of the Oregon Natural Heritage Database or approved for this category by the BLM state director; or included under agency species conservation policies. Also see Bureau strategic species.



- candidate species Plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
- canopy The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result.
- canopy closure The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeter and commonly expressed as a percent of total ground area.
- catchment An area drained by a stream. For research, a very small experimental watershed, often times less than 100 acres.
- channel migration zone The extent of lateral movement of a river across a floodplain toward the convex side of an original curve.
- checkerboard land ownership pattern A land ownership pattern in which square-mile sections of federal lands are typically intermixed, on the basis of alternating sections, with adjoining private lands. The O&C lands of western Oregon are an example of checkerboard ownership. This ownership pattern resulted from the revestment back to the federal government of lands granted by the federal government to early railroad companies. The checkerboard ownership pattern of the O&C lands creates additional access, management, and perception issues. Also see O&C Act.
- clearcut A timber harvesting method that removes essentially all trees in an area, whether merchantable or not, producing a fully exposed microclimate for development of a new age class.
- coarse woody debris That portion of trees that has naturally fallen or been cut and left in the woods. Usually refers to pieces at least 20 inches in diameter. Also see coarse woody debris classes.
- coarse woody debris classes There are four classes used to describe coarse woody debris. The classes range from Class I (which has the least decay, intact bark, and a hard log) to Class IV (i.e., the coarse woody debris has decayed to the point of nearly being incorporated into the forest floor).
- commercial forest land base Forest lands declared suitable for producing timber and having a minimum level of productivity of 20 cubic feet/acre/year. Contrast with harvest land base.
- commercial thinning Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting. See thinning.
- Congressionally Reserved Areas
(Congressional Reserves) Areas established by an Act of Congress or Executive Order, such as national parks, wild and scenic rivers, national recreation areas, wilderness, and national monuments.



- connectivity block A Northwest Forest Plan term denoting a corridor that links areas of northern spotted owl habitat. Contrast with connectivity/diversity block.
- connectivity / diversity block A subdivision of the matrix land use allocation in the current Resource Management Plans that serves as a corridor for linking late-successional and old-growth forests to facilitate the movement, feeding, and breeding of late-successional and old-growth species. These blocks are managed to maintain between 25 and 30 percent of late-successional forest within them. Contrast with connectivity block.
- conservation Conservation, when applied to special status species, is the methods and procedures used to improve the plant and animal species biology, improve their habitat condition, and reduce threats to their continued existence.
- conservation agreement A non-binding document of agreement between agencies that outlines conservation goals necessary to reduce, eliminate, or mitigate specific threats to species at risk, and provides general guidance on species management.
- conservation strategy A management plan for a species, group of species, or ecosystem that prescribes standards and guidelines that if implemented provide a high likelihood that the species, groups of species, or ecosystem, with its full complement of species and processes, will continue to exist well-distributed throughout a planning area.
- Consultation A formal review between the U.S. Fish and Wildlife Service or National Marine fisheries Service and another federal agency when it is determined that an action by the agency may affect critical habitat or a species that has been listed as threatened or endangered to ensure that the agency's action does not jeopardize a listed species or destroy or adversely modify critical habitat.
- cooperators and cooperating agencies Those individuals and agencies that provide qualified information to a federal agency, such as the BLM, to use in formulating resource management actions and analyzing environmental consequences. The Council on Environmental Quality regulations that implement requirements of the National Environmental Policy Act define a cooperating agency as any agency that has jurisdiction by law or special expertise for proposals that are covered by the National Environmental Policy Act (40 CFR 1501.6). BLM planning regulations [43 CFR 1610.3-15(b)] further provide that eligible Federal agencies, state and local governments, and federally recognized Indian tribes may also participate as cooperating agencies.
- Coos Bay Wagon Road (CBWR) lands The public lands that were granted to the Southern Oregon Company for construction of a military road, but subsequently reverted by the United States and later incorporated into the O&C Act.



- corridor. A strip of land that links areas in a fragmented landscape to facilitate the passage of animals, plants, people, energy, or materials between habitat or service areas. Examples are biological, recreation, transportation, and utility corridors. Biological corridors are reserved from substantial disturbance. Also see connectivity block and connectivity/ diversity block.
- critical habitat An Endangered Species Act term denoting a specified geographic area occupied by a federally listed species, and on which the physical and biological features are found that are essential to the conservation and recovery of that species and that may require special management or protection.
- crown. The upper part of a tree that has live branches and foliage.
- crown bulk density A measure of the fuel in a forest's canopy that is usually calculated by dividing the canopy volume by the weight of the needles, leaves, and smaller branches (or calculated using the height-to-crown base, tree height, and basal area values). Contrast with crown density.
- crown density. A measure of the density of a tree's crown that is calculated from the amount, compactness, and depth of the foliage in the tree's crown. Contrast with crown bulk density.
- crown fire Fire that moves through the crowns of adjacent trees independent of any surface fire. Crown fires can often move faster and ahead of ground fires.
- culmination of mean annual increment (CMAI) The age in the growth cycle of a tree or stand at which the mean annual increment (MAI) for volume is at its maximum. At culmination, MAI equals the periodic annual increment (PAI).
- cumulative effect The impact on the environment that results from incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.
- decompaction Mechanical ripping and/or tillage of roadbeds, landings and other compacted areas for the purposes of increasing infiltration and aeration.
- density management The cutting or killing of trees to increase spacing for promoting the acceleration of the growth of remaining trees, improvement of stand vigor, or attainment of late-successional characteristics. Also see thinning, precommercial thinning, and commercial thinning.
- determination of NEPA adequacy (DNA) An interim step in BLM's internal analysis process, which documents that a proposed action is adequately analyzed in an existing environmental impact statement [EIS] or environmental assessment [EA]. Where applicable, the determination also documents conformance with an approved land use plan. (BLM NEPA Handbook, 516 DM 11).



- diameter at breast height The diameter of the stem of a tree measured at 4.5 feet above the ground level on the uphill side of the stem. Also see quadratic mean diameter.
- dispersal habitat (spotted owl). Forest habitat that allows northern spotted owls to move (disperse) across the landscape; typically characterized by forest stands with average tree diameters of greater than 11 inches, and conifer overstory trees having closed canopies (greater than 40 percent canopy closure) with open space beneath the canopy to allow owls to fly.
- dispersed retention See variable-retention harvest system.
- disturbance (natural) A force that causes significant change in structure and/or composition through natural events such as fire, flood, wind, and earthquake, or through mortality caused by insect or disease outbreaks.
- disturbance, stand replacement. A force that removes most or all existing trees in a forest stand through natural events such as fire, flood, earthquake, or mortality caused by insect or disease outbreaks.
- dominant use A land use that is the primary purpose for the land use designation; for instance, wildlife habitat on National Wildlife Refuges or timber production on O&C lands. Contrast with multiple use.
- effective shade The proportion of direct beam solar radiation reaching a stream surface to total daily solar radiation.
- envelope curve. A line drawn on a figure with dependent and independent variables for a collection of hydrologic studies, showing the best fit of the extent of maximum response.
- environmental consequences. The direct, indirect and cumulative effects of a proposed action or alternative on existing conditions in the environment in which the action(s) would occur. Also see baseline.
- environmental impact statement A detailed document, required under the National Environmental Policy Act of 1969, of a federal project's environmental consequences, including adverse environmental effects that cannot be avoided, alternatives to the proposed action, the relationship between local short-term uses and long-term productivity, and any irreversibly or irretrievable commitment of resource.
- equivalent clearcut area Method of estimating changes in streamflow response from the amount and distribution of forest cover in a watershed.
- even-aged management A silvicultural system that creates forest stands primarily comprised of a single age or having a very narrow range of ages.
- even-aged stand. A stand of trees comprised of a single age class in which the range of tree ages is usually $\pm 20\%$ of rotation.



- evolutionary significant unit A population or group of populations considered “distinct,” and hence a “species” for purposes of the Endangered Species Act, representing an evolutionarily significant unit (ESU) of the biological species. A population must satisfy two criteria to be considered an ESU. It must be reproductively isolated from other conspecific population units, and it must represent an important component in the evolutionary legacy of the species. Isolation does not have to be absolute, but must be strong enough to permit evolutionarily important differences to accrue in different population units. The second criterion is met if the population contributes substantially to the ecological/genetic diversity of the species as a whole. (NOAA Technical Memorandum NMFS F/NWC-194).
- facies A characteristic of a rock unit that reflects a common origin or time.
- fifth-field watershed One of the classifications of watersheds used by the United States Geological Survey that identifies some of the smallest watersheds and is useful for assessing water-related issues; generally 20 to 200 square miles in size. For details about the classification of drainage areas, see <http://water.usgs.gov/GIS/huc.html>. Also see watershed.
- fine sediment Fine-grained soil material, less than 2mm in size, normally deposited by water, but in some cases by wind (aeolian) or gravity (dry ravel).
- fire control, direct Any treatment applied directly to burning fuel, such as wetting, smothering, or chemically quenching the fire or by physically separating the burning from unburned fuel.
- fire control, prescribed. Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met prior to ignition.
- forest An ecosystem characterized by stands of trees varying in characteristics such as species composition, structure, age class, and associated processes, and commonly including meadows, streams, fish, and wildlife.
- flood Streamflow overtopping streambanks, or rising water that covers land not normally under water.
- floodplain Level lowland bordering a stream or river onto which the flow spreads at flood stage.
- forage. All browse and herbaceous matter available to grazing animals, including wildlife and domestic livestock.
- Forest Ecosystem Management Assessment Team (FEMAT) The 1993 presidentially assigned team of scientists, researchers, and technicians from seven federal agencies that created the report that was used as the basis for the Northwest Forest Plan.
- forest land. Land at least 10 percent stocked by forest trees of any size, and including land that formerly had such tree cover and that will be naturally or artificially regenerated.



- Forest Operations Inventory (FOI) An intensive inventory that provides managers with information regarding the age, species, stand location, size, silvicultural needs, and recommended treatment of stands based on individual stand conditions and productivity.
- fuel loading The dry weight of all accumulated live and dead woody and herbaceous material on the forest floor that is available for combustion, and which poses a fire hazard.
- genetic gain Average improvement of a specific trait in a population of progeny over the average of the parental population (for example, height growth increase).
- green tree A live tree.
- green tree retention A stand management practice in which live trees are left within harvest units to provide a legacy of habitat components over the next management cycle.
- group selection harvest See selection cutting.
- growth and yield modeling Simulated projections of forest stand growth and development, from which timber volume estimates and other stand attributes expected to be produced per unit area under a certain set of conditions are derived. Also see modeling.
- forest habitat An area containing the forest vegetation with the age class, species composition, structure, sufficient area, and adequate food source to meet some or all of the life needs (such as foraging, roosting, nesting, breeding habitat for northern spotted owls) of specific species.
- habitat-capable forests (spotted owl) Forested stands that are capable of developing into suitable habitat specifically for the northern spotted owl.
- harvesting The process of onsite cutting and removing of merchantable trees from a forested area.
- harvest land base Those lands that are available for timber harvesting on a programmed sustained basis. Generally, a harvest land base does not include managed or other reserved lands, nonforested lands, or areas that the timber production capability classification inventory has determined are not capable of sustaining timber production. Also see timber production capability classification.
- hydrophilic vegetation Vegetation having a strong affinity for water.
- hydroregion An area of similar climate and stream runoff processes.
- incidental take An Endangered Species Act term denoting the taking of a species that is listed as threatened or endangered inadvertently, rather than purposely, while carrying out otherwise lawful activity. Also see take.



- incorporated by reference Documents referenced in the final environmental impact statement that are provided by the individual subject matter experts, are maintained as a part of the administrative record housed at a centralized location, and are available upon request.
- intensively managed timber stands. Forest stands that are managed to obtain a high level of timber volume and quality per unit area by using growth-enhancing practices, such as precommercial thinning, commercial thinning, and fertilization.
- intrinsic potential A stream's inherent ability to provide high-quality habitat for salmonids.
- inventory data Information collected by the use of objective sampling methods designed to quantify the spatial distribution, composition, and rates of change of forest parameters within specified levels of precision. Note: Inventories may be made of all forest resources including trees and other vegetation, fish and wildlife, etc. Also see baseline.
- jeopardy The endangerment of the continued existence of a species that is listed as threatened or endangered under the Endangered Species Act. Also a finding made through consultation by a federal agency under the Endangered Species Act regarding an action proposed by the agency that may cause such endangerment.
- key watershed. A Northwest Forest Plan term that denotes a watershed that contains habitat for potentially threatened species, stocks of anadromous salmonids, or other potentially threatened fish, or is an area of high-quality water and fish habitat. Also see watershed.
- land use allocation. A designation for a use that is allowed, restricted, or prohibited for a particular area of land, such as the matrix, adaptive management, late-successional reserve, or critical habitat land use allocations.
- landscape A broad expanse of terrain, up to the watershed scale of 10,000 to 20,000 acres, which spans several ecosystems irrespective of ownership or other political boundaries.
- late-successional forest A forest that is in its mature stage and contains a diversity of structural characteristics, such as live trees, snags, woody debris, and a patchy, multi-layered canopy.
- Late-Successional Management Area A designated area outside of the harvest land base that is actively managed to protect or enhance conditions of late-successional forest base.
- Late-Successional Reserve A Northwest Forest Plan term that denotes a land use allocation and has been reserved from programmed timber harvesting and designated to maintain existing or future mature old-growth, or late-successional habitat.
- load The amount of material entering a system, such as point source and nonpoint source pollutants. Typically measured as pounds per day and significant in relation to the volume and circulation of the water or air mass in question. Also see point source and nonpoint source.



- long term A period of time used as an analytical timeframe; starts more than 10 years after implementation of a resource management plan, depending on the resource being analyzed. Also see short term.
- mass wasting The sudden or slow dislodgement and downslope movement of rock, soil, and organic materials.
- Matrix A Northwest Forest Plan term that denotes a land use allocation for federal lands located outside of reserves, withdrawn areas, and late-successional areas. For the purpose of this final environmental impact statement, this term applies only to the No Action Alternative.
- mature stage Generally begins as tree growth rates stop increasing (after culmination of mean annual increment), and as tree mortality shifts from density-dependent mortality to density-independent mortality.
- mean annual increment (MAI) The total cumulative quantity produced over time of some attribute of a tree or stand growth (for example, wood volume divided by the total age of the tree or stand).
- merchantable Trees or stands having the size, quality and condition suitable for marketing under a given economic condition, even if not immediately accessible for logging
- minerals, leasable Generally found in bedded deposits and include oil, gas, coal, chlorides, sulfates, carbonates, borates, silicates, and nitrates of potassium (potash) or sodium and related products; sulfur; phosphate and its associated and related minerals; asphalt; and gilsonite.
- minerals, locatable..... Includes both metallic minerals (gold, silver, lead, copper, zinc, nickel, etc.) and nonmetallic minerals (fluorspar, mica, certain limestone and gypsum, tantalum, heavy minerals in placer form and gemstones) in land belonging to the United States that are open to citizens of the United States for exploration, discovery, and location which conveys the exclusive right to extract the locatable minerals upon receiving all required authorizations in accordance with regulations at 43 CFR 3802 for lands in wilderness review and 3809 for other public lands.
- minerals, salable Include but are not limited to: petrified wood and common varieties of sand, stone, gravel, pumice, pumicite, cinder, clay, and rock.
- modeling..... A scientific method that operates by a structured set of rules and procedures to simulate current conditions and predict future conditions. Also see analysis.
- multi-layered canopy Forest stands with two or more distinct tree layers in the canopy.



- multiple use A Federal Land Policy and Management Act term that denotes "... the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." (U.S. Code, Title 43, Chapter 35, Subchapter I, § 1702 (c)) Contrast with dominant use.
- National Marine Fisheries Service A federal agency under the United States Department of Commerce that is responsible for working with others to conserve, protect, and enhance anadromous fish and their habitats.
- natural fire regime class A general classification of how fire would behave over time in the absence of human intervention.
- nonconformity A physical expression of a period of time of non-deposition between rock units, usually indicated by erosion characteristics, bed tilting, or missing strata of an intervening time period.
- nonpoint source pollution Water or air pollutants where the source of the pollutant is not readily identified and is diffuse, such as the runoff from urban areas, agricultural lands, or forest lands. Also see point source.
- Northwest Forest Plan A 1994 common management approach for the 19 national forests and 7 BLM districts located in the Pacific Northwest ecological region and jointly approved by the Secretary of Agriculture and the Secretary of the Interior.
- nutrient cycling Circulation of elements (such as carbon or nitrogen) between vegetation/organic material and soil, water and air.
- ordinary high water line Fluctuations of water in a stream or waterbody, from higher runoff of one or two years, that establish a line on the shore which is typically identified by physical characteristics.
- overstory That portion of trees forming the uppermost canopy layer in a forest stand and that consists of more than one distinct layer.
- partial harvest For the purpose of defining management action in Alternative 3, partial harvest is a timber harvesting method that removes a substantial portion of the stand basal area (50-70%) on a harvest interval that mimics the historic average return interval for a moderate or mixed-severity fire.



- periodic annual increment (PAI) The difference in stand volume at two successive measurements, divided by the number of years between measurements. PAI is an approximation to current annual increment, which is not directly measurable.
- petroleum shows A visual appearance of hydrocarbon (gas, oil, asphalt, etc.) in an exploration well, water well, coal prospect, natural spring, or seep.
- petroleum system A relationship of source rock and the resulting petroleum accumulation.
- physiographic province A region of the landscape with distinctive geographical and biological features. When physiographic provinces subdivide sustained yield units (i.e., BLM districts), assessment areas are created.
- plan conformance The determination that a management action is consistent with the terms, conditions, decisions, and is within the anticipated environmental consequences, of an approved resource management plan.
- plant communities. A group of populations that coexist in space and time and interact with one another (conifer and hardwood forest lands, oak woodlands, juniper woodlands and rangelands, chaparral, shrub-steppe lands, grasslands, serpentine, riparian vegetation, cliffs, rock outcrops, talus and overslopes, dune systems, meadows, wetlands, springs, fens, ponds, and vernal pools).
- play The existence of a trap that is detectable with geological, geophysical, or geochemical technology.
- point source An origin of water or air pollutants that is readily identified, such as the discharge or runoff from an individual industrial plant or cattle feedlot. Also see nonpoint source.
- precommercial thinning (PCT). The practice of reducing the density of trees within a stand by manual cutting, girdling, or herbicides to promote growth increases or maintain growth rates of desirable tree species. The trees killed are generally unmerchantable and retained on the treated area.
- preferred alternative A National Environmental Policy Act term that denotes the alternative in a draft Environmental Impact Statement that is preferred by the proposing agency.
- progeny test site A test area for evaluating parent seed trees by comparing the growth of their offspring seedlings.
- proper functioning condition The state of a riparian wetland area having the vegetation, landform, and large woody debris that are necessary for the species, habitat, and natural processes of an area.
- prospect A drillable trap that is located within a play.
- public domain lands Original holdings of the United States that were never granted or conveyed to other jurisdictions or never reacquired by exchange for other public domain lands.



public land	Land that is owned and controlled by some governmental entity (federal, state, county, or other municipality).
quadratic mean diameter	The average diameter, at breast height, of the tree that is of average basal area in a stand. Also see basal area and diameter breast height.
reclamation.	Land treatment to “bring back” vegetation or functions of the land that minimize water degradation, damage to aquatic life or wildlife, flooding, erosion, and other adverse effects from surface mining operations. The process may involve backfilling, grading, resoiling, revegetation, decompaction, stabilization, or other measures.
record of decision (ROD).	A document required by the National Environmental Policy Act, that is separate from, but associated with, an environmental impact statement. The ROD publicly and officially discloses the responsible official’s decision on which alternative assessed in the EIS will be implemented.
recovery plan	A plan for the conservation and survival of an endangered species or a threatened species listed under the Endangered Species Act for the purpose of improving the status of the species to the point where listing is no longer required.
recruitment habitat	A stand that is capable of becoming habitat for a designated species within a designated period of time.
regeneration	(n.) Tree seedlings or saplings existing in a stand. (v.) The process of re-establishing trees on a tract of forest land where harvest or some natural event has removed the existing trees.
regeneration harvesting	Any removal of trees intended to assist regeneration already present or make regeneration possible.
relative density.	A means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum that is based on tree size and species composition. Relative density is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter. Also see basal area and quadratic mean diameter.
replacement habitat.	A stand of equivalent habitat value to a designated species that is made available as a replacement for habitat that is lost within the same population boundary.
resource management plan (RMP).	A BLM planning document, prepared in accordance with Section 202 of the Federal Land Policy and Management Act that presents systematic guidelines for making resource management decisions for a resource area. An RMP is based on an analysis of an area’s resources, their existing management, and their capability for alternative uses. RMPs are issue oriented and developed by an interdisciplinary team with public participation. Also see adaptive management.
restoration	Land treatments intended to bring back a former condition or function.



riparian area	A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it. This includes floodplains, woodlands, and all areas within a horizontal distance of approximately 100 feet from the normal line of high water of a stream channel or from the shoreline of a standing body of water.
road decommissioning	Stabilization of unneeded or low use roads. Depending on the restoration objective, the series of actions may involve one or several of the following: closure, restoring natural stream crossings and self-maintaining road surface drainage, erosion control, and vegetative treatments (planting), surface decompaction, and sidecast pullback or road obliteration.
road improvement	Activities on an existing road that improves its original design standard. A typical improvement would add culverts and/or crushed aggregate to a natural dirt surface road.
road obliteration	Removing a roadbed back from the landscape and restoring the natural topography.
road pullback	Removal of unstable fill materials placed on the outside edge of the road prism.
road stormproofing	Road surface work that upgrades drainage condition on roads that will remain open for travel, but will receive infrequent maintenance. Measures intended to prevent and control erosion and sediment delivery into stream channels, and reduce risk of road failure.
rotation	The planned number of years between establishment of a forest stand and its regeneration harvest.
salmonid	Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Includes species such as salmon and steelhead. Also see anadromous fish.
salvage cutting	Removal of dead trees or of trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost.
seed orchard	A plantation of clones or seedlings from selected trees; isolated to reduce pollination from outside sources, weeded of undesirables, and cultured for early and abundant production of seed.
sedimentary basin	A geologic structural downwarp that has been filled with eroded rock from surrounding uplands. Both marine (filled with sediment deposited in oceans) and terrestrial (filled with inflowing rivers) basins exist.
selection cutting	A method of uneven-aged management involving the harvesting of single trees from stands (single-tree selection) or in groups up to four (4) acres in size (group selection) without harvesting the entire stand at any one time.



- shelterwood cutting A regeneration method under an even-aged silvicultural system. With this method a portion of the mature stand is retained as a source of seed and/or protection during the regeneration period. The retained trees are usually removed in one or more cuttings.
- short term. A period of time used as an analytical timeframe and that is within the first 10 years of the implementation of a resource management plan. Also see long term.
- silvicultural prescription A planned series of treatments designed to change current stand structure to one that meets management goals.
- silvicultural system A planned series of treatments for tending, harvesting, and re-establishing a stand. The system name is based on the number of age classes managed within a stand (e.g., even- aged, two-aged, uneven-aged).
- single-tree selection harvest. See selection cutting.
- site class. A classification of an area's relative productive capacity for tree growth; commonly expressed in terms of the heights of the largest trees in a stand at a common "index" age, usually 50 or 100 years-old. Site classes are numbered from 1 (most productive) to 5 (least productive).
- site potential tree height. The average maximum height of the tallest dominant trees (200 years or older) for a given site class. Also see site class.
- snag Any standing (upright) dead tree.
- sold timber sale A timber sale for which a qualified purchaser has been established, through auction or negotiation, but where the BLM has yet to approve and consummate the timber sale contract. See awarded timber sales.
- source water watershed. A watershed area providing untreated water, used for drinking water.
- special forest products Those plant and fungi resources that are harvested, gathered, or collected by permit, and have social, economical, or spiritual value. Common examples include mushrooms, firewood, Christmas trees, tree burls, edibles and medicinals, mosses and lichens, floral and greenery, and seeds and cones, but not soil, rocks, fossils, insects, animal parts, or any timber products of commercial value.
- special status species Those species that are listed under the Endangered Species Act as threatened or endangered (including proposed and candidate species); listed by a state as threatened, endangered or candidate species; and listed by the BLM as sensitive species. Under the BLM Special Status Species policy (BLM 6840), the BLM State Director has created an additional category called Bureau Strategic Species (see glossary Bureau strategic species).
- stand An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.



- stand establishment stage The developmental stage extending from stand initiation until stands have reached canopy closure and density-dependent tree mortality begins.
- standards and guidelines Northwest Forest Plan rules for managing the different land use allocations. For the purpose of the final environmental impact statement, this term applies only to the No Action Alternative.
- stream, intermittent Drainage feature with a dry period, normally for three months or more, where the action of flowing water forms a channel with well-defined bed and banks, supporting bed-forms showing annual scour or deposition, within a continuous channel network.
- stream order A classification system used to define stream size; based on the hierarchy of tributaries principle. Working downstream from the upper extent of stream channels in a watershed, two unbranched first-order stream channels join to form a second order, and two like second orders join to form a third order, and so on.
- stream, perennial Permanent channel drainage feature with varying but continuous year-round discharge, where the base level is at or below the water table.
- structurally complex stage Stage at which stands develop characteristics approximating “old-growth” stands described in many analyses associated with the Northwest Forest Plan.
- structural legacies The large trees, down logs, snags, and other components of a forest stand that are left after harvesting for the purpose of maintaining site productivity and providing structures and ecological functions in subsequent stands.
- structural stage classifications of forests A scheme used to define the structural stages of forests. It uses four broad classifications (stand establishment, young, mature, and structurally complex) and multiple subclassifications to distinguish differences within classifications.
- stumpage The price paid for timber on the stump. A timber purchaser pays stumpage to the BLM and then incurs the cost of logging and hauling the logs to the mill.
- suitable habitat A stand that has the structures (physical and biological features) necessary to meet the biological requirements of a particular species.
- sustainability Sustainability can be defined as using, developing, and protecting resources in a manner that enables people to meet current needs and provides that future generations can also meet future needs, from the joint perspective of environmental, economic and community objectives.
- sustained yield The volume of timber that a forest can produce continuously at a given intensity of management; the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources without impairment of the productivity of the land.



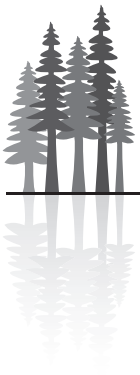
- sustained yield capacity The volume of timber that can be offered for sale each year from an area based upon the consistent volume of timber that a forest can produce continuously. Also see annual productive capacity.
- sustained yield unit A BLM district.
- take An Endangered Species Act term that denotes the act of or the attempt to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a species listed as threatened or endangered. Also see incidental take.
- terrain A tract or region of the earth's surface or grouping of rock considered as a separate physical feature.
- thinning A silvicultural treatment made to reduce the density of trees primarily to improve tree/stand growth and vigor, and/or recover potential mortality of trees, generally for commodity use. Also see density management, precommercial thinning, and commercial thinning.
- timber Forest crops or stands, or wood that is harvested from forests and is of a character and quality suitable for manufacture into lumber and other wood products rather than for use as fuel.
- timberland Forested land capable of producing crops of industrial wood at a rate of at least 20 cubic feet/acre per year and is not withdrawn from timber production. (Some forest lands are not classified by the FIA [U.S. Forest Service Inventory and Analysis] as timberland because they are either unproductive or by law are off limits to harvesting [e.g., national parks and wildernesses]).
- timber production capability classification (TPCC) An analytical tool that inventories and identifies sites as capable of sustaining intensive timber management without it degrading their productive capacity. This tool evaluates a site's soil depth, available moisture, slope, drainage, and stability to determine site capacity for timber management activity. Sites that prove incapable of sustaining intensive timber management are typically not included in the harvest land base. Also see harvest land base.
- trap A geologic structure that allows petroleum to accumulate and be preserved.
- two-aged stand A stand of trees comprised of two distinct age classes separated in age by more than $\pm 20\%$ of rotation.
- two-aged system A silvicultural system that regenerates and maintains stands with two age classes. The resulting stand may be two-aged, or trend towards an uneven-aged condition as a consequence of both an extended period of regeneration establishment and the retention of reserve (green live) trees that may represent one or more age classes.
- understory Portion of trees or other woody vegetation that forms the lower layer in a forest stand, and that consists of more than one distinct layer.



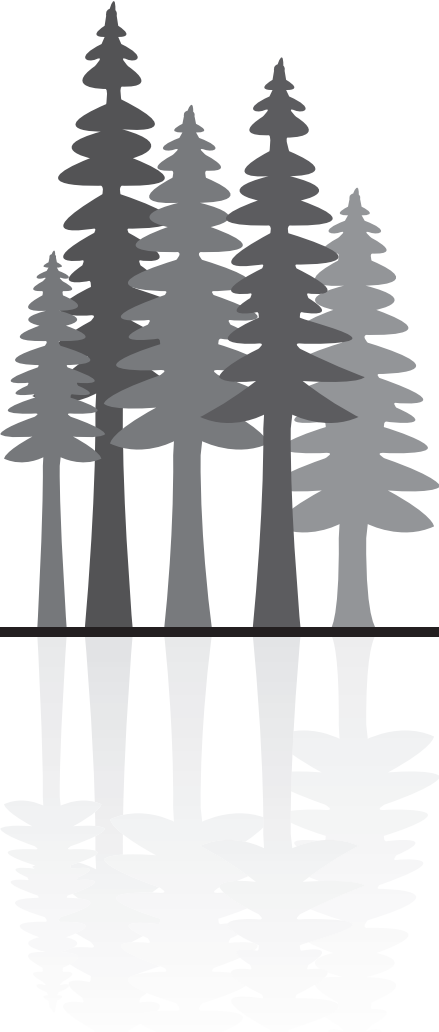
- uneven-aged management A combination of actions that simultaneously maintains continuous tall forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes.
- uneven-aged stand A stand with three or more distinct age classes, either intimately mixed or in small groups.
- United States Fish and Wildlife Service (USFWS) A federal agency under the United States Department of the Interior that is responsible for working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats.
- United States Forest Service (USFS) A federal agency under the United States Department of Agriculture that is responsible for administration of the nation's national forests.
- variable-density thinning (VDT) A thinning method where two or more densities of retained trees are used to promote stand heterogeneity through the development of multi-layered canopies. Provision of conditions conducive to the initiation and growth of regeneration is often an objective of VDT to encourage understory development.
- variable-retention harvest system An approach to harvesting that is based on retaining structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand for integration into the new stand to achieve various ecological objectives. Note: The major variables in variable retention harvest systems are types, densities, and spatial arrangement of retained structures: 1) aggregated retention is retention of structures as (typically) small intact forest patches within the harvest unit; 2) dispersed retention is retention of structures or biological legacies in a dispersed or uniform manner.
- watershed All of the land and water within the boundaries of a drainage area that are separated by land ridges from other drainage areas. Larger watersheds can contain smaller watersheds that all ultimately flow their surface water to a common point. Also see fifth- field watershed and key watershed.
- wetland (jurisdictional) A wetland determination, using the Army Corps of Engineers current interagency rules, based on presence of defined wetland vegetation, soils and hydrology.
- wetland (natural) Unaltered land with natural presence and duration of water, sufficient to support wetland vegetation
- wildfire Any nonstructural fire, other than prescribed burns, that occurs on wildland.
- wildfire, uncharacteristic A wildfire that burns with unusual intensity and size. They are a particular concern in drier ecosystems such as sagebrush-grasslands, dry Douglas-fir, dry grand fir and ponderosa pine forests in the West where combustible fuels have accumulated.
- wildland Lands that are not dedicated to such uses as agricultural, urban, mining, or parks.

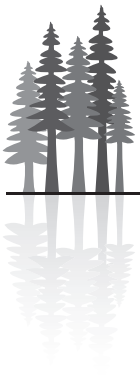


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- wildland/urban interface The area in which structures and other human developments intermingle with undeveloped wildland.
- windthrow A tree or trees uprooted or felled by the wind.
- young stage Characterized by the predominance of density-dependent tree mortality and, in high density stands, a small range of tree diameters.



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A detailed topographic map of a mountainous region, likely the Sierra Nevada, serves as the background. The map features contour lines, a network of roads, and various geographical features. The title is centered over the map.

Record of Decision and Resource Management Plan

Bureau of Land Management - Eugene District

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