

# Appendix E

## Energy and Minerals

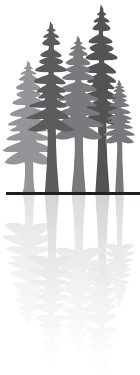


---

This appendix provides detailed background on mineral and energy developments.

### **In this appendix:**

Reasonably Foreseeable Mineral and Energy Developments in the Salem and Coos Bay Districts . . . . .	E-3
Restrictions and Requirements on Mineral and Energy Exploration and Development Activity. . . . .	E-36





# Reasonably Foreseeable Mineral and Energy Developments Summary

**TABLE E-1. FLUID MINERAL DEVELOPMENT POTENTIAL**

	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath Falls
Conventional Oil/Gas	68 wells associated with the Mist Gas Field	N/A	Zero to 114 wells	3 exploration wells	N/A	N/A
Seismic notices of intent	Expected to be confined to existing road systems; negligible effects.		Expected to be confined to existing road systems; negligible effects.	Expected to be confined to existing road systems; negligible effects.		
Road construction	0.25 mile per well @ 40 feet = 82 acres disturbance.		7 miles new road = 39 acres.	0.25 mile per well @ 40 feet = 4 acres disturbance		
Well pad	2 acres per well = 136 acres		Nested wells and services = 114 acres.	2 acres per well = 6 acres		
Collection pipe:	Assume 25% well success; 2 miles per well; 30 feet wide = 124 acres.		Collection piping will utilize road prism.	No discoveries; no pipe; no disturbance.		
Plug & abandon wells	No additional effect.		No additional effect.	No additional effect.		
Coal bed natural gas	Exploration only	N/A	N/A	37 to 77 wells	N/A	N/A
Seismic notices of intent	Expected to be confined to existing road systems; negligible effects			Expected to be confined to existing road systems; negligible effects		
Road construction				¼ mile per well @ 40 feet = 45 to 90 acres disturbance		
Well pad				Assume 4 wells per pad; 2 acres per pad = 19 to 38 acres disturbance		
Collection pipe:				Assume 50% well success; Assume most collection pipe along existing transportation system; new disturbance = 5 to 10 linear miles at 30 feet wide = 18 to 36 acres.		
Plug & abandon wells				No additional effect		
Geothermal	N/A	N/A	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**

	<b>Roseburg</b>	<b>Salem</b>	<b>Eugene</b>	<b>Coos Bay</b>	<b>Medford</b>	<b>Klamath Falls</b>
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	38	71	32	188	18 quarry & cinder sites used Intermittently.
	6 quarries expanded @ 2 acres per quarry	8 quarries expanded. Less than 2 acres per quarry.	4 quarries expanded at approximately 1 acre each.	6 quarries expanded. Less than 2 acres each quarry.	10% of quarries expanded at less than 1 acre per quarry, plus 1/10 acre per quarry for new access.	
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 <sup>a</sup>	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.	
<b>Notice to plan</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
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.
<b>Plans of Operation</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>15 (lode &amp; placer)</b>	<b>0</b>
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	
<b>Second Phase Exploration</b>						
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.	
Drill pads	5 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	10 holes, 0.1 acre per hole; on ¼ of the plans.	
<b>Mine Development</b>						
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.	



Salem District ROD and RMP

	Roseburg	Salem	Eugene <sup>a</sup>	Coos Bay	Medford	Klamath Falls
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.	
<b>Mineral Processing</b>	Done offsite	Done offsite			One acre for half of the plans.	
Silica sand deposit		One	<sup>a</sup> 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		
<b>Second Phase Expansion</b>						
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.

<sup>a</sup> 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.



# Ten-Year Reasonably Foreseeable Development Of Oil And Gas Resources Scenario For The Salem And Coos Bay Districts

## Summary

### Salem District

The Salem District is located in northwest Oregon, bound by the Pacific Ocean to the west, the Columbia River to the north, the crest of the Cascade Mountain Range to the east, and the Salem District/Eugene District boundary to the south. It encompasses lands in 13 different counties (Clatsop, Columbia, Multnomah, Tillamook, Washington, Clackamas, Yamhill, Marion, Polk, Lincoln, Benton, Linn and Lane). Most Public Domain and O&C railroad lands within the district will be available for oil and gas leasing, subject to guiding stipulations.

Estimating how much oil and gas exploration and development will occur on Federal lands managed by the Salem District during the next 10 years is based on an existing gas field designation and historical oil and gas investigations. The first exploration well was drilled near Newberg, Oregon in 1902. Conventional petroleum resources in the district have been the focus of numerous studies. Two periods of intense search occurred from 1920 to 1940, and again from 1940 to 1960. These investigations resulted in development of the Mist Gas Field, with a discovery well in 1979. Small amounts of gas, however, have been found throughout the district within projected sedimentary basins.

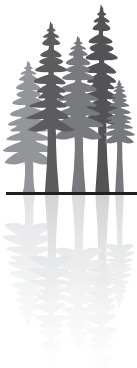
Review of Oil and Gas Occurrence Potential, Oil and Gas System and Play Analysis, Oil and Gas Production Activities, Potential for Resource Occurrence and Development, and Leasing are needed to understand the District's oil and gas potential. This information was used to project activity through 2018. Given the current incipient nature of petroleum development in Oregon (i.e., current Coalbed Natural Gas development, new exploration of the Mist Gas Field), completely new assumptions and information that impact Reasonably Foreseeable Development (RFD) scenarios may be applicable during the next 10 years and beyond.

Identified potential petroleum source sedimentary basins within the district include:

- Astoria Basin
- Nehalem Basin (or Arch)
- Tualatin Basin
- Willamette Valley
- Yaquina Basin
- Tillamook Basin

Both the Yaquina Basin and the Tillamook Basin are part of the off-shore Newport Basin. The BLM manages approximately 19,400 acres of surface estate within these basins. The amount of subsurface estate is unknown. These basins exist within the Western Tertiary Basins Geologic Province. The Mist Gas Field lies within the Nehalem Basin/Arch.

As of 1985, the estimated in-place gas reserves for the Mist Gas Field were 28.4 billion cubic feet (bcf), with total production through 1984 of 19.2 bcf. The total estimated resource in 1985 was 47.6 bcf. As of 2007, the State of Oregon Department of Geology and Mineral Industries (DOGAMI) reported that approximately 65 bcf of gas had been produced from the Mist Gas Field, with 2.7 bcf produced between 2002 and 2006. This exceeds the 1985 estimate by 17.4 bcf, indicating continued discoveries of resource.



Current non-federal lease holdings within the Salem District are focused within the Mist Gas Field. There are currently no BLM-administered surface holdings within the Mist Gas Field. However, there appears to be one BLM-administered subsurface estate within the field. The BLM-administered surface estate is located to the southeast of the current field description. Previous Mist Gas Field boundaries include approximately 980 acres of BLM-administered surface estate. Similar geology and structure exists under at least 9,000 acres of BLM-administered surface estate southeast of the Mist Gas Field, indicating that foreseeable development of the high potential area could result in approximately 10,800 acres of BLM lease offerings.

The spacing plan for the Mist Gas Field is 160 acres. The size of the pools ranges from 40 acres to 160 acres. Extension of the Mist Field onto the adjacent Federal land, as defined by wells and mapped geology could result in approximately 68 wells on BLM-administered estate. Additional conventional and non-conventional development may occur in other sedimentary basins within the district. Coal bed natural gas development is occurring within Coos County. Exploration companies are mapping coal seams throughout Oregon for other potential resource areas. Coal has been historically mapped and mined throughout the Salem District. Coal bed natural gas development, however, is not expected above exploration within the next 10 years.

## Coos Bay District

The Coos Bay District is located on the western edge of Southwest Oregon and encompasses lands in Douglas, Coos, Curry, Lane, and Josephine Counties. Conventional petroleum in the district has been the focus of numerous studies (Diller 1901 as found in Newton 1980, Niem and Niem 1990, and Ryu et al. 1996) with the projection of numerous plays and petroleum structures. The district has also been the focus of numerous industry explorations and investigations. Two speculative conventional petroleum systems have been identified within the district (Ryu et al. 1996). One coal bed natural gas play has also been identified within the district, and is currently being developed on private and Coos County lands. It is expected that most of the public domain and O&C and Coos Wagon Road lands will be available for leasing, subject to guiding stipulations.

Estimating how much oil and gas exploration and development will occur on Federal lands managed by the Coos Bay District during the next 10 years is difficult. Review of Oil and Gas Occurrence Potential, Oil and Gas System and Play Analysis, Leasing, and Oil and Gas Production Activities are needed to understand the oil and gas potential. This information was used to project activity through 2018. Where appropriate, the coal bed natural gas resource is discussed separately from conventional oil and gas.

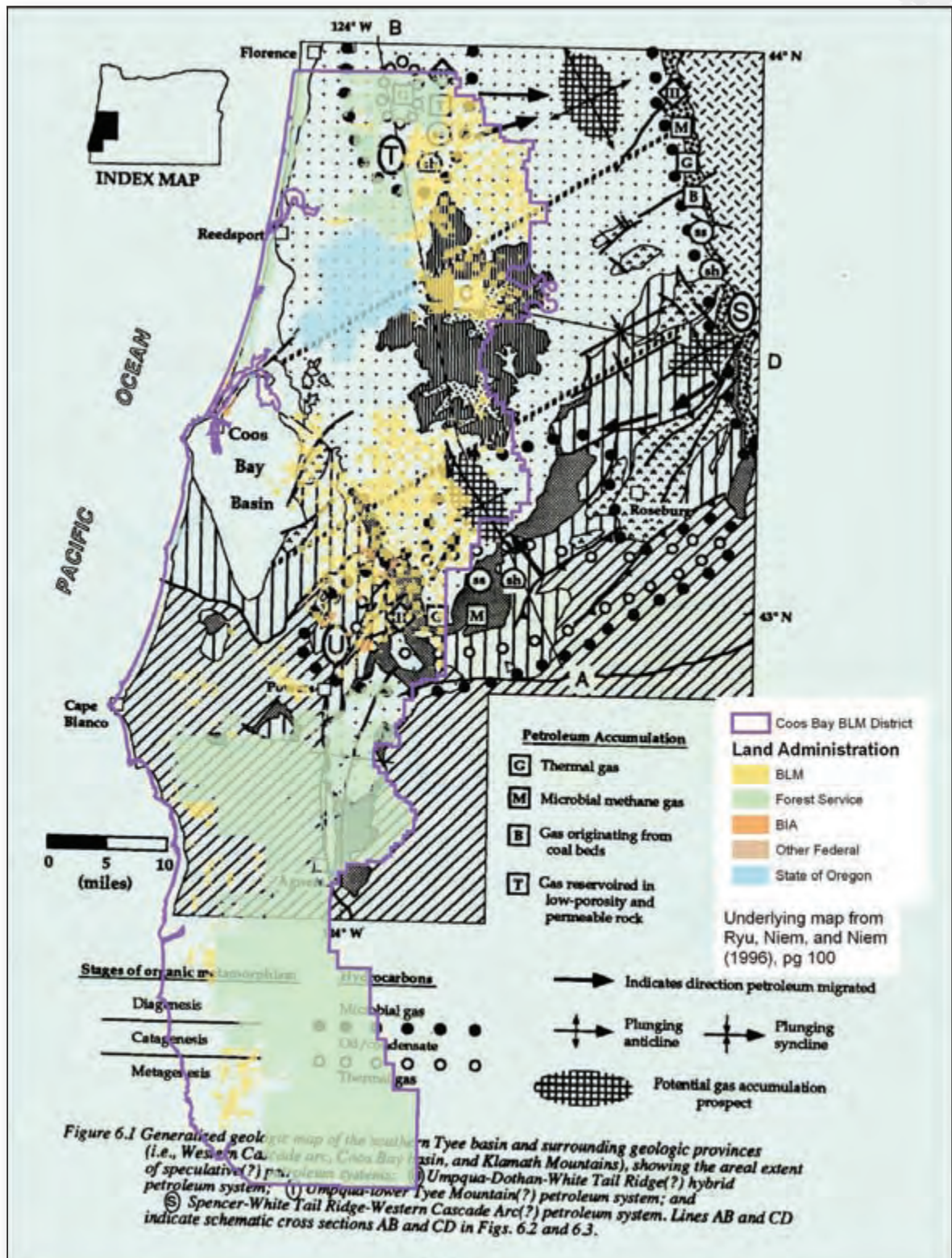
The speculative conventional petroleum systems include the Umpqua-Dothan-White Tail Ridge hybrid petroleum system and the Umpqua-lower Tye Mountain petroleum system. Both areas are contained in the southern Tye sedimentary basin (Ryu et al. 1996) (see *Figure E-1*). The Umpqua-Dothan-White Tail Ridge hybrid petroleum system is located in the mid-central portion of the district and encompasses an estimated 350 square miles; approximately 26% of which is managed by the district. The northern portion of the district contains approximately 200 square miles of the Umpqua-lower Tye Mountain petroleum system. The BLM-administered lands comprise about 20% of the area. The coal bed natural gas play is focused mainly on the Coaledo Formations of the onshore portion of the Coos Basin (see *Figure E-2*), which is an area of approximately 250 square miles located on the western edge of the district.

Although oil and gas exploration has been historically associated with these systems (Ryu et al. 1996, Newton 1980) and conventional oil and gas potential exists as identified speculative petroleum systems (Ryu et al. 1990), there is currently no known interest in exploration or development of these systems. It is anticipated, however, that the Coos Bay District could issue competitive and over-the-counter leases and authorize geophysical surveys. It is also estimated that up to three exploratory wells for conventional petroleum may be drilled during the life of this plan. Conventional exploration, coupled with coal bed natural gas exploration within coal seams beyond the Coos Basin, could increase the number of wells actually drilled.





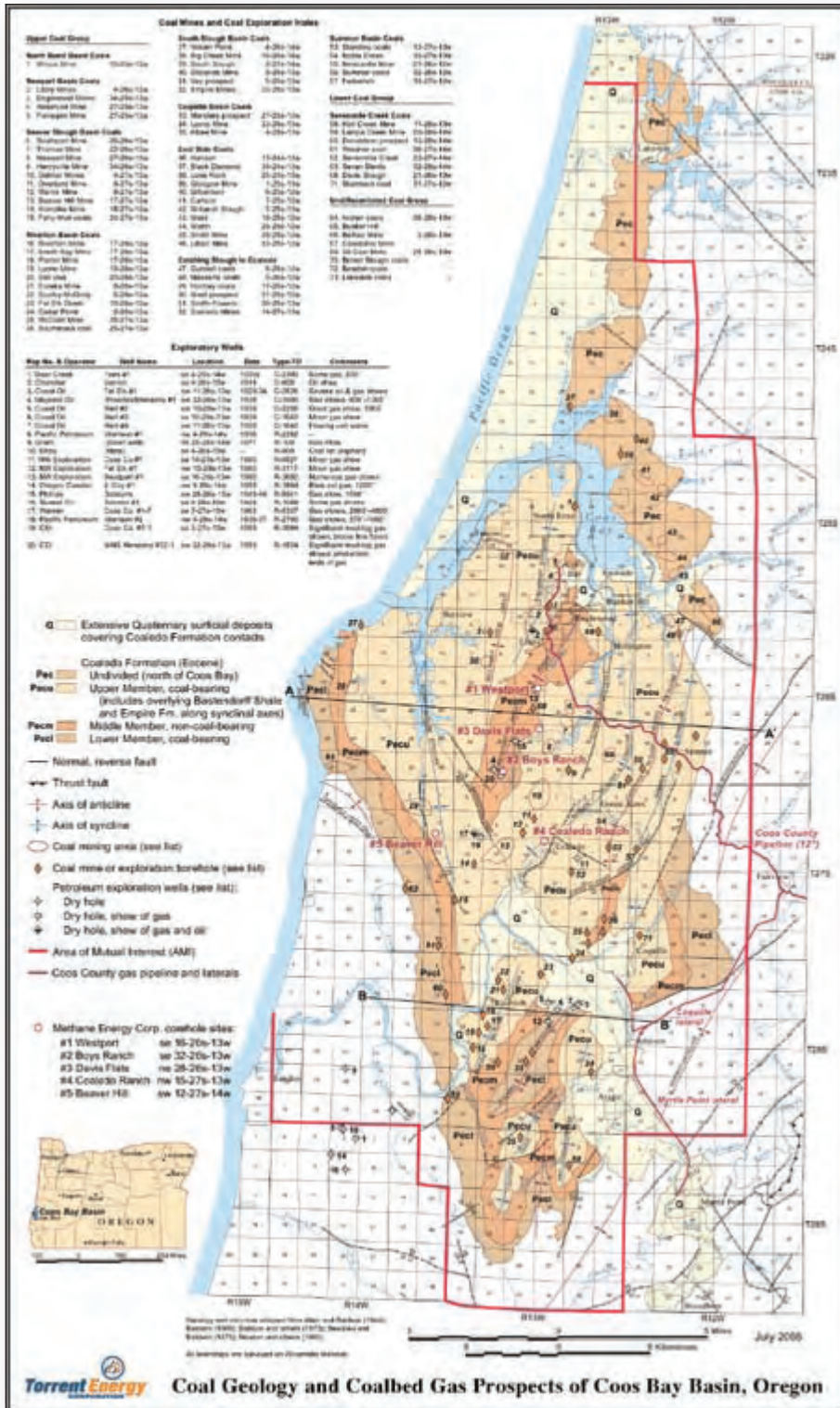
FIGURE E-1. SOUTHERN TYEE SEDIMENTARY BASIN



Source: Ryu et al. 1996



FIGURE E-2. COALEDO FORMATIONS OF THE ONSHORE PORTION OF THE COOS BASIN



Source: Torrent Energy Inc. 2005



Current non-Federal lease holdings within the district are focused within the Coos Basin area, with the intention of coal bed natural gas development. Approximately 115,000 acres of the 160,000 acres within the Coos Basin are privately held. Federally-managed mineral estate represents approximately 12.3 percent of the Basin, with BLM-administered portion of roughly 7.6 percent.

Industry has estimated an in-place gas reserve for their lease holdings at 1,166 billion cubic feet (bcf) (1.2 trillion cubic feet (tcf)) for the privately held 115,000 acres (Sproule 2006). To develop this resource, industry estimates a total build-out of between 300 and 719 wells, with 300 being most likely within the next 10 years (Halferty 2007). Based on this estimate compared to proportional acreage, the Coos Bay District could see a total development on BLM-administered lands of between 37 and 77 wells. The total Coos Basin development could range between 436 wells and 1,001 wells. To date, industry has constructed approximately 18 single and multiple well pads consisting of both exploration and production wells. Foreseeable development of the coal bed natural gas play could result in an additional 25,000 acres of BLM-administered lease offerings.

# Reasonably Foreseeable Development

## Introduction

Reasonably Foreseeable Development (RFD) describes scenarios for leasable oil and gas commodities. The purpose of these scenarios is to provide rational models that anticipate the level and type of future petroleum development activity in the planning area, and to serve as a basis for cumulative impacts analysis. The RFD describes logical historic and current development based on plausible interpretation of available information. Future trends and assumptions for hypothetical exploration and development operations are then described.

### Scope

The reasonably foreseeable developments are based on known and inferred mineral resource capability of the lands involved and apply to conditions and assumptions discussed under *Historic* and *Current Development*, as well as Future Trends and Assumptions. Possible changes in current geologic data, interpretation, and/or economic conditions would alter the reasonably foreseeable developments, resulting in deviation over time.

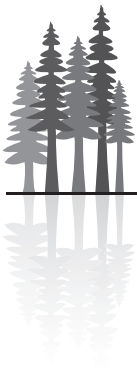
Impacts caused by oil and gas exploration and development cannot be assessed without estimating future oil and gas activity.

Estimates of future activity on the Salem District would need to take into account:

- oil and gas occurrence potential, as documented by historic research and papers
- oil and gas system and play analysis, including existing sites such as the Mist Gas Field and the potential development of new plays such as identified sediment basins and coal bed 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

Estimates of future activity on the Coos Bay District would need to take into account:

- oil and gas occurrence potential, as documented by historic research and papers
- oil and gas system and play analysis, including looking at the potential development of new plays, such as the identified petroleum systems and Coos Basin coalbed natural gas or interest in unknown discoveries



- leasing, including Federal and non-Federal activities
- oil and gas production, including economics and technology.

These factors cannot be predicted with absolute certainty, but reasonable generalizations are possible. The estimates presented here are based on past and present activities and trends, as well as future price deviations. The estimates may be lower than what actually happens if price and play development is more positive than anticipated. Likewise, if exploration in existing plays, such as the Coos Basin, is not successful and new plays are not developed and/or commodity prices are less than anticipated, estimates presented here may be exaggerated.

## Potential for Resource Occurrence and Development

Potentials for resource occurrence and resource development (Haerter 2007) 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.

## 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.

## Leasing

After initial field work, research, and subsurface mapping, which may include seismic testing and data collection, 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.

## Geophysical Exploration

Geophysical exploration is conducted in an attempt to determine the subsurface 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 involve small portable measuring units which are easily transported via light-weight off-highway vehicles, such as four-wheel drive vehicles, or aircraft. Both off-highway and on-highway travel may be necessary in these two types of surveys. Usually a three-man crew transported by one or two vehicles is required. These two survey methods can make measurements along defined lines, but it is more common to use a grid with discrete measurement stations.

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 beating of the ground surface, through the earth's surface, reflecting off some layers, thus depicting the underlying structure of the rock. The thumper and vibrator methods pound or vibrate the ground surface to create a shock wave. Usually four large trucks are used, each equipped with pads about four-feet square. The pads are lowered to the ground, and the vibrators are electronically triggered from the recording truck. After information is recorded, the trucks move forward a short distance and the process is repeated. Less than 50 square feet 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 to depths of 100 to 200 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. Under normal conditions, three to five miles of line can be surveyed daily using this method. A drilling program may include the use of heavy truck-mounted drill rigs, track-mounted air rigs, water trucks, a computer-recording truck, and several light pickups to transport people conducting the survey.

Public and private roads and trails are used where possible. However, off-highway cross-country travel is also necessary in some cases. Graders and dozers may be required to provide access to remote areas. Several trips a day are made along a seismograph line, usually resulting in a well-defined two-track trail. Drilling water, when needed, is usually obtained from private landowners, but may be acquired from sources used for fire suppression, such as pump chances and ponds.

The surface charge method utilizes charges of between one and five pounds attached to wooden laths three to eight feet above the ground. Placing the charges lower than six feet usually results in destruction of the vegetation; placing the charges higher, or on the surface of deep snow, results in little visible surface disturbance.

Advanced Three Dimensional Survey 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 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 in size and 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 may be placed and removed by helicopter. The holes are drilled to 15-foot depths and the charges exploded subsurface, leaving no surface expression. Where there is surface expression, the damage is mitigated with hand tools. In open valleys and areas with access, thumper rigs are used, as they disturb even less ground.

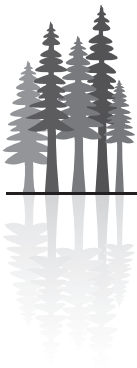
## **Drilling and Production Phase**

Notices of Staking are anticipated during the plan period. It is anticipated that the company would then submit an Application for Permit to Drill after the Notice of Staking is accepted. Private surface owner input, if split estates are involved, would be actively solicited during this stage. After an Application for Permit to Drill is approved, the operator initiates construction activities in accordance with stipulations and Conditions of Approval. 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 2006), for surface disturbance in road construction and pad development similar to landings.

## **Surface Impacts of Drilling and Production**

During the first drilling phase, the operator would move construction equipment over existing maintained roads to the point where the new access road begins.

In the second part of the drilling phase, the operator would construct the drilling pad or platform, which is anticipated to involve approximately two acres per well site. Support facilities are also anticipated to disturb about two acres per well site. The likely duration of well development, testing, and abandonment is predicted to be approximately six months to one year for each drill site.



## Plugging and Abandonment

Wells completed as dry holes are plugged according to a plan designed specifically for the down-hole conditions of each well. Plugging is 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 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, they would be reclaimed using Best Management Practices, with the road prism revegetated as required by the Authorized Officer. Pipelines will be plugged and abandoned in place to minimize new surface disturbance.

# District Specific

## Historic and Current Development

### Oil and Gas Occurrence Potential

#### Salem District

The Salem District is 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) 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). It has been of interest for petroleum exploration since the 1880s (Newton 1969, Orr and Orr 2000) with oil and gas drilling exploration beginning in 1902 with the drilling of an exploration well near Newberg (Newton 1965, Olmstead et al. 1989). Two major peaks of petroleum exploration have occurred. The first occurred between 1920 and 1940 and was very wide-spread, as there was little geologic information guiding the exploration. The second peak occurred between 1940 and 1960, investigating the deeper Oligocene and Eocene marine sediments. These explorations culminated in the discovery of the Mist Gas Field in 1979 (Olmstead et al. 1989, Olmstead and Alger 1985, Houston 1997).

Petroleum development on the Salem District has been the focus of numerous studies (Washburne 1914 in Olmstead et al. 1989, Stewart 1954 in Newton et al. 1965, Newton 1969, Olmstead et al. 1989, Niem et al. 1990, Houston 1997, and Meyer 2007). The district has also been the focus of industry explorations and investigations by companies such as Northwest Natural (Oregon Natural Gas Development), RH Exploration, Diamond Shamrock Corporation, Quintana Petroleum Corporation, Standard Oil Company of California, American Quasar Petroleum Company, ARCO Oil and Gas Company, Exxon Corporation, and The Texas Company (Texaco) (Olmstead et al. 1989).

At least 42 exploration wells, 16 water wells, and 7 seeps within the Salem District boundary and outside the 1985 Mist Gas Field boundary (see *Figure E-3 below*) have had gas shows (Olmstead et al. 1989). As of 1989, a total of at least 108 wells drilled outside of Columbia County (which holds the Mist Gas Field) and within the Salem District (Olmstead et al. 1989) have defined specific sedimentary basins of the Western Tertiary Basin Province that exist within the district (Newton 1969, Olmstead et al. 1989). These basins have been the focus of historic investigation and contain potential conventional petroleum development (Newton 1969, Niem et al. 1985, Meyer 2007).



Non-conventional systems, such as coal bed natural gas, may be a possibility and are being researched where coal is present (Wiley 2006, Pappajohn 2007, Meyer 2007).

### Coos Bay District

The Coos Bay District is part of a structural sedimentary basin system that extends onshore and offshore from the Klamath Terrains boundary (Middle Fork of the Coquille River) north to the Columbia River (extending into Washington), from the continental shelf east to the Willamette Valley. These basins have been the focus of petroleum exploration since the 1880s (Newton 1980, Orr and Orr 2000), with oil and gas drilling exploration of the district beginning in 1913 (Newton 1980). Conventional petroleum in the Coos Bay District has been the focus of numerous studies (Diller 1901 in Newton et al. 1990, Ryu et al. 1996) with the projection of numerous plays and petroleum structures. The district has also been the focus of industry explorations and investigations by companies such as AMOCO Production Company, Union Oil Company, Phillips Petroleum Company, Northwest Natural Gas Company (Newton 1980) and Methane Energy Corporation (Pappajohn 2002).

The most recent play and petroleum structure projections provide three possibilities within the District. These include portions of two potential conventional petroleum structures (Ryu et al. 1996) and a non-conventional coal bed natural gas play identified by Methane Energy Corporation (Pappajohn 2002).

### Oil and Gas Structures and Plays

A speculative petroleum system presumes a direct relationship between a particular source rock and a resulting potential petroleum (or natural gas) accumulation (Ryu et al. 1996). 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).

### Salem District

The Western Tertiary Basin Province contained within the Salem District possesses at least six identified basins or sub-basins (Newton 1969, Orr and Orr 2000, Olmstead et al. 1989). These 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

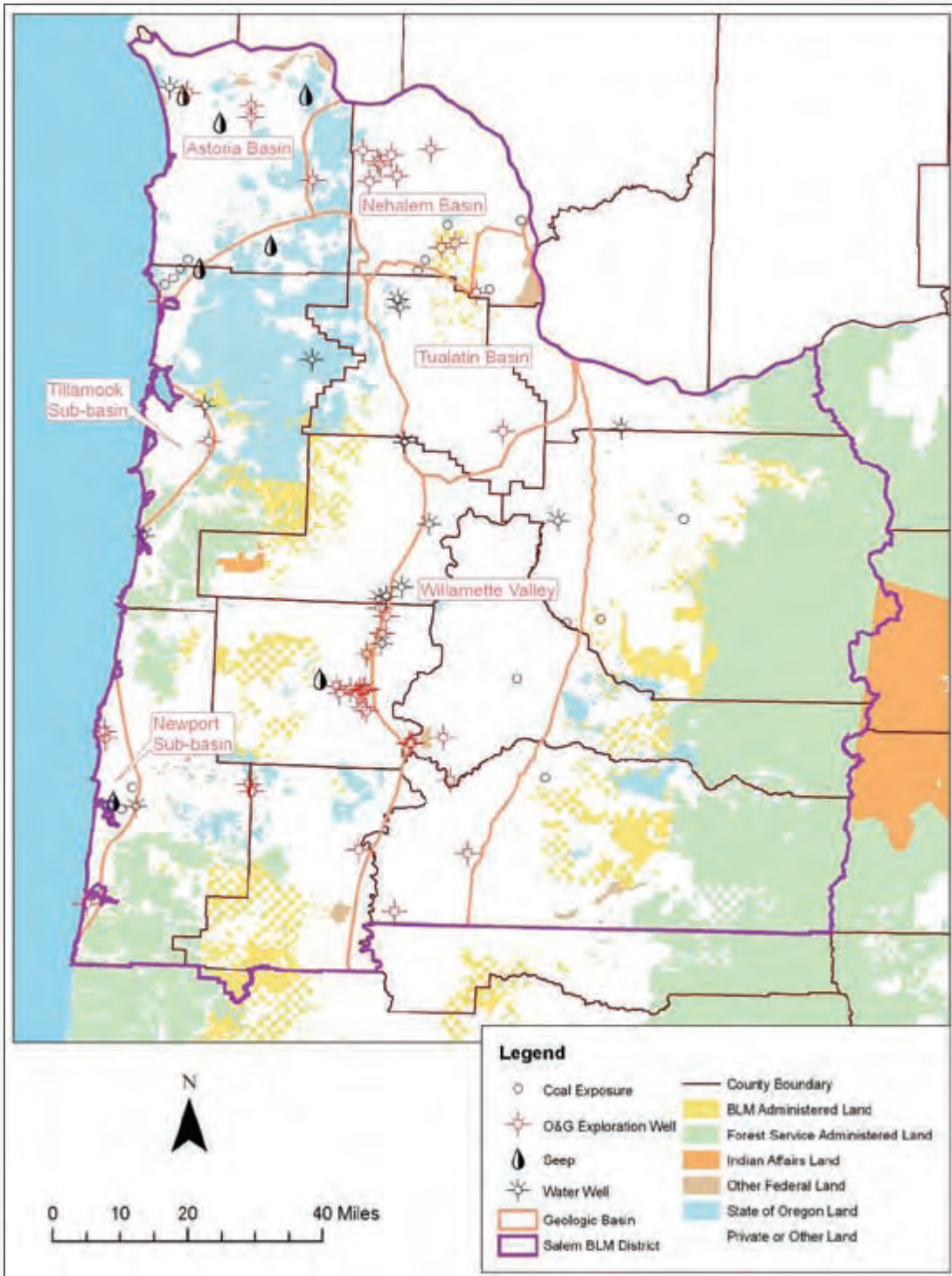
See *Figures E-3 and E-4*.

The basins structures are controlled by compression force of the sub-ducting easterly movement of the Juan de Fuca plate in relation to the overriding westerly movement of the North American Plate. The fold axes are oriented north-south (Orr and Orr 2000), and 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 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 later sedimentation creating coal beds in many areas (Newton 1969) (see *Figure E-4*). The Salem District manages a total of approximately 19,375 acres of surface estate within these basins (USDI BLM 2007).

**Tualatin Sub-Basin:** The BLM manages approximately 8,858 acres of surface estate in the Tualatin Sub-Basin (USDI BLM 2007), which is considered part of the Willamette Valley. The lower rock is Eocene shale



FIGURE E-3. BLM OREGON SALEM DISTRICT, SURFACE

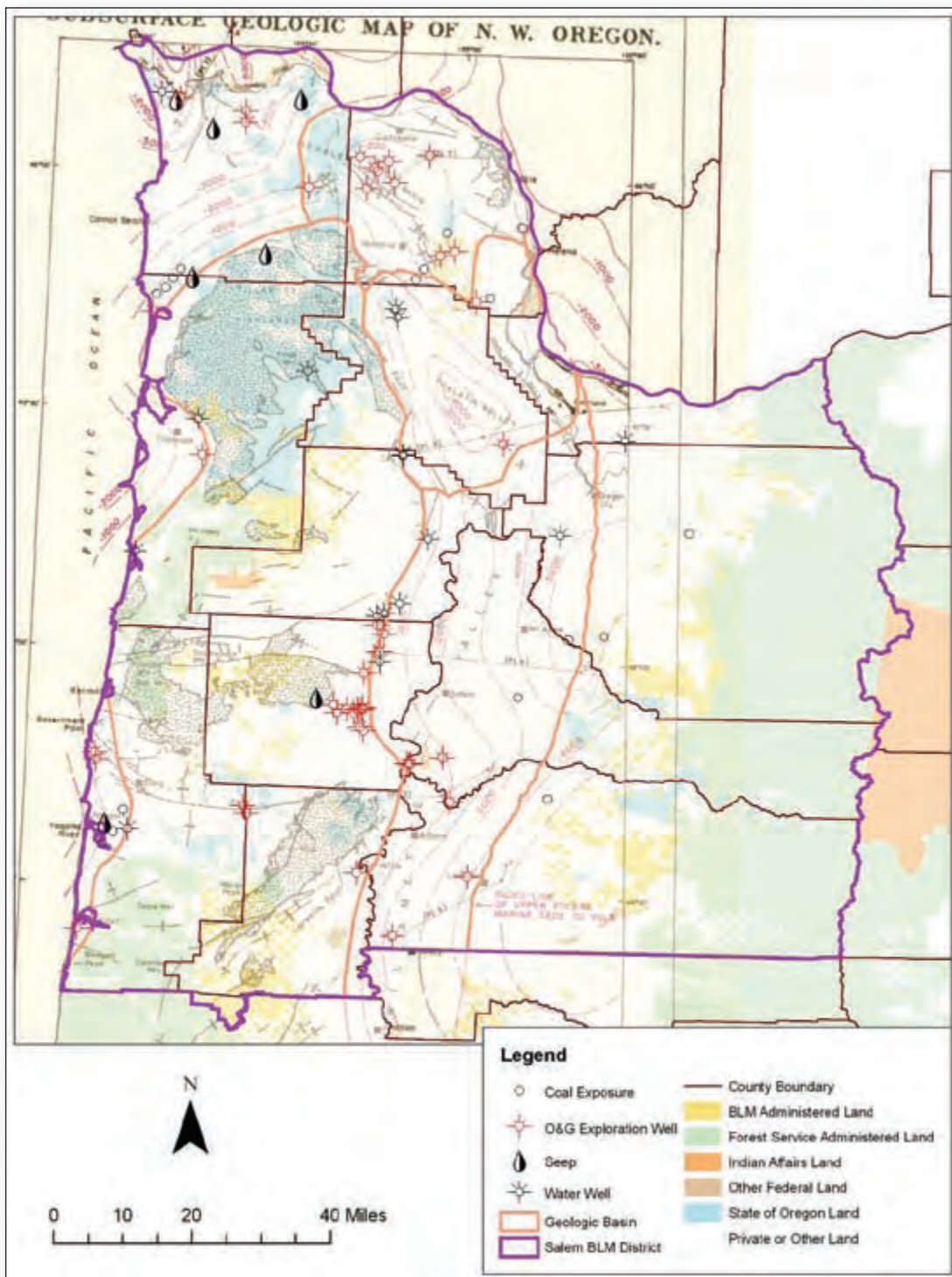


Based on Newton (1969), Ferns and Huber (1984), Olmstead et al. (1989), and USDI BLM (2007)

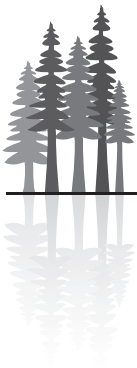




FIGURE E-4. BLM SALEM DISTRICT, SUBSURFACE



Based on Newton (1969), Ferns and Huber (1984), Olmstead et al. (1989), and USDI BLM (2007)



and sandstone intermixed with basalt. Miocene Columbia River Basalts rest unconformably on top of the sedimentary rock and are covered by gravels and silts. The Eocene rock and sands have excellent reservoir characteristics as the faulting and overlying basalts provides trap structures (Newton 1969). The Eocene Nonconformity is at a maximum mapped depth of 4,000 feet below sea level (Newton 1969) (refer to *Figure E-2*). It is thought that the Tualatin Sub-Basin is a source of petroleum for the Mist Gas Field (Olmstead and Alger 1985, Houston 1997).

**Willamette Valley:** The BLM manages approximately 644 acres of surface estate in the Willamette Valley, excluding the Tualatin Sub-Basin (BLM, 2007). The lower rock, or basement rock, is the Eocene Siletz River Volcanics or Kings Valley Siltstone. Overlying these are sandstones and siltstones of the Eocene Nonconformity, then covered by volcanics, and overlain by sandstone, limestone, and coal beds. This is capped by the Columbia River Basalts and then covered by tuff and silt. The petroleum potential Eocene rock boundary is defined to the east by the change from marine sediment to volcanic sediment (facies change) (Newton 1969) (refer to *Figure E-4*). Numerous wells with gas shows have been drilled within the valley. The eastern valley edge provides numerous possibilities for structural traps, with the marine beds providing source rock. 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 mapped depth mapped of 5,000 feet below sea level (Newton 1969).

**Newport Sub-Basin:** The BLM manages approximately 443 acres of surface estate in the Newport Sub-Basin (USDI BLM 2007), which is part of the off-shore Newport Basin (Orr and Orr 2000). As most of the basin lays off-shore, little was found to be published about on-shore portions of the specific Newport Sub-Basin. Generally, the off-shore basins consist of thicknesses up to 15,000 feet of marine sediments, predominately siltstones and shales, with some sand shows. Oil and gas shows occurred in at least three of the off-shore wells (Orr and Orr 2000). Two exploratory gas wells with shows, one seep, and one gas show in a water-well have been reported within the Newport Sub-Basin (Olmstead et al. 1989). There are also occurrences of coal (Ferns and Huber 1984) (refer to *Figures E-3 and E-4*). The Eocene Nonconformity is at a maximum on-shore mapped depth of 2,000 feet below sea level (Newton 1969) (refer to *Figure E-4*).

**Tillamook Sub-Basin:** The BLM manages approximately 25 acres of surface estate within the Tillamook Sub-Basin (USDI BLM 2007), which is also a part of the off-shore Newport Basin (Orr and Orr 2000) described above. Gas show has been associated with one exploratory well and two water wells in the Tillamook Sub-Basin (Olmstead et al. 1989). The Eocene Nonconformity is at a maximum onshore mapped depth of 2,000 feet below sea level (Newton 1969) (refer to *Figure E-4*).

**Astoria Basin:** The BLM manages approximately 39 acres of surface estate within the Astoria Basin (USDI BLM 2007). The lowest sequence of rock, considered the basement rock, is the upper Eocene Volcanics. There are a few thin beds of sandstone and mudstone that are inter-fingered with the Tillamook Volcanics. A few of these sedimentary layers have gas shows. The volcanics are overlain with the mudstone-dominated rock, with sandstone and conglomerate members. The mudstone is overlain by sandstone and siltstones. These sandstones (Cowlitz Formation) contain the Clark and Wilson Sandstone, which is the gas reservoir in the Mist Gas Field. Late Eocene mudstone and sandstone sequences then overlie the Clark and Wilson Sandstones (Niem et al. 1985, Houston 1997). A total of 49 noncommercial gas shows were recorded in eight wells developed within the basin. Gas shows, with the majority of hydrocarbon chains being methane, were recorded in all units except the Roy Creek conglomerate and sandstone, the Pittsburg Bluff Formation, and the Wickiup Mountain and Youngs Bay members of the Astoria Formation (Niem et al. 1985). The Eocene Nonconformity is at a maximum mapped depth of 5,000 feet below sea level (Newton 1969) (refer to *Figure E-4*). It is thought that the Astoria Basin is a source of petroleum for the Mist Gas Field (Olmstead and Alger 1985).

**Nehalem Basin:** The BLM manages approximately 9,366 acres of surface estate in the Nehalem Basin (USDI BLM 2007). It is in this basin that the Mist Gas Field exists (See *Figure E-5*) the only official State of Oregon Designated Gas Field. This basin has the most potential for further gas development that may impact BLM-



administered lands (Houston 1997, Houston 2007, Meyer 2007). Although the Nehalem structure is defined as a Tertiary Basin by most researchers (Olmstead et al. 1989, Olmstead and Alger 1985, Newton 1969, Houston 1997), it has also been identified as an arch in comparison to the surrounding structures of the Astoria Basin to the west and the Tualatin Sub-Basin to the east (Armentrout and Suek in Niem et al. 1985, Orr and Orr 2000). The description of the structure as an arch provides mechanism for petroleum migration from the adjoining Astoria Basin and Tualatin Sub-Basin to the collection traps of the Nehalem Arch (Niem et al. 1985). However, the structure does have a down-warp, creating a closed structural basin (Newton 1969). A great deal of geologic work has occurred within the Mist Gas Field and surrounding areas of the Nehalem Basin (Niem et al. 1985 and 1990, Olmstead et al. 1985), including Three Dimensional Survey (Meyer 2007). Specific geologic interpretation was conducted on the Bacona Quadrangle containing BLM-administered lands located ten miles southeast of the Mist Gas Field (Houston 1997) (refer to *Figure E-4*).

The Nehalem Basin consists of deltaic to shallow-marine and deep marine depositional environments, depositing thousands of feet of mud and sand. There was also intermittent volcanism (Houston 1997, Olmstead and Alger 1985). This lithified material creates the basin's stratigraphy. The oldest rock, considered the economic basement rock, is the Middle to Upper Eocene Tillamook Basalts. However, other localities show that deep-water depositions of the Yamhill Formation may underlie the Tillamook Basalts (Olmstead and Alger 1985). Houston (1997) has defined, at least in part, the Yamhill Formation as the Hamlet Formation. The mudstone of the Hamlet Formation is mature at depth and could be a source of petroleum within the Mist Gas Field. It is overlain by the Cowlitz Formation, separated by unconformity (Houston 1997, Olmstead and Alger 1985). The lowest member of the Cowlitz Formation is the Clark and Wilson Sandstone that serves as the major reservoir rock for the Mist Gas Field (Olmstead and Alger 1985) and reservoir potential outside the Mist Gas Field (Houston 1997). Coal also occurs within the sandstone (Olmstead and Alger 1985). The sandstone in the Mist Gas Field has flow rates of 10,000 to 20,000 cubic feet per day (Niem et al. 1985 in Houston 1997). However, the reservoir quality deteriorates southeast of the Mist Gas Field (Houston 1997) and BTU rates may also decline southeast of the Mist Gas Field (Meyer 2007).

Overlying Clark and Wilson Sandstone is a mudstone member of the Cowlitz Formation. This formation is a deep oceanic mudstone that acts as a seal to the Clark and Wilson Sandstone, helping form the petroleum trap (Houston 1997). After deposition of the Cowlitz Formation, the region was faulted, creating horst and graben environment, possibly forming structural traps. These fault patterns are not transferred to the younger overlying formations and, therefore, more recent faulting may not have compromised these traps. The faults truncate at the Keasey Formation-Goble Volcanics (Houston 1997 and 2007, Olmstead and Alger 1985).

Covering at least a portion of the Cowlitz Formation, and intermixed with the Keasey Formation, is the Goble Volcanics, shown as a 2,000-meter thick sequence in the exploration hole located on BLM-administered lands (see *Figure E-6*). The Keasey Formation unconformably overlies the Cowlitz Formation where the Goble Volcanics are not present, and consists of silty mudstone (Houston 1997). It is in turn covered by the sandstones, mudstones, siltstones, and volcanics of the Oligocene Pittsburg Bluff Formation (Houston 1997, Olmstead and Alger 1985). Coal seams are also found in the Pittsburg Bluff Formation (Houston 1997). The Scappoose Formation unconformably overlies the sandstone Pittsburg Bluff Formation (Houston 1997) with flows from the Miocene Columbia River Basalts as an unconformable cap rock. The Eocene Nonconformity is at a maximum mapped depth of 500 feet below sea level (Newton 1969) (refer to *Figure E-4*).

The Mist Gas Field Designation was initiated with the discovery of natural gas in 1979. The official boundaries as of 1985 consisted of 89,575 acres, approximately 140 square miles (State of Oregon 1985, Olmstead et al. 1985), including approximately 978 acres of BLM-administered surface estate. By 1999, the boundaries were reconfigured to a total acreage of 81,850 acres, approximately 128 square miles, with no BLM-administered surface estate (State of Oregon 1999, Houston 2007) (see *Figure E-7*).

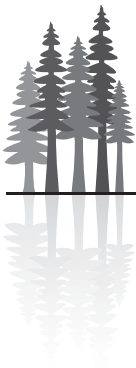
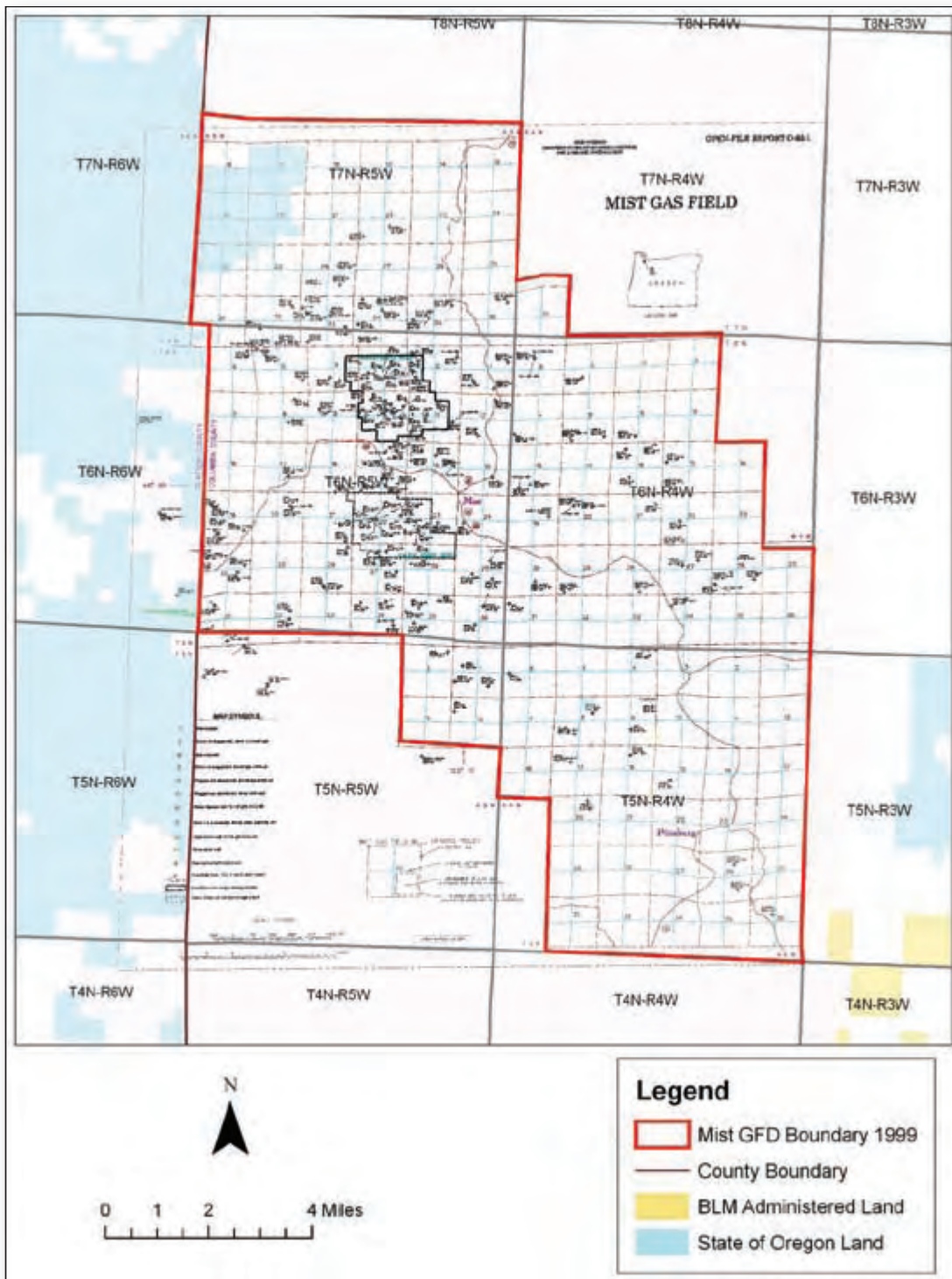


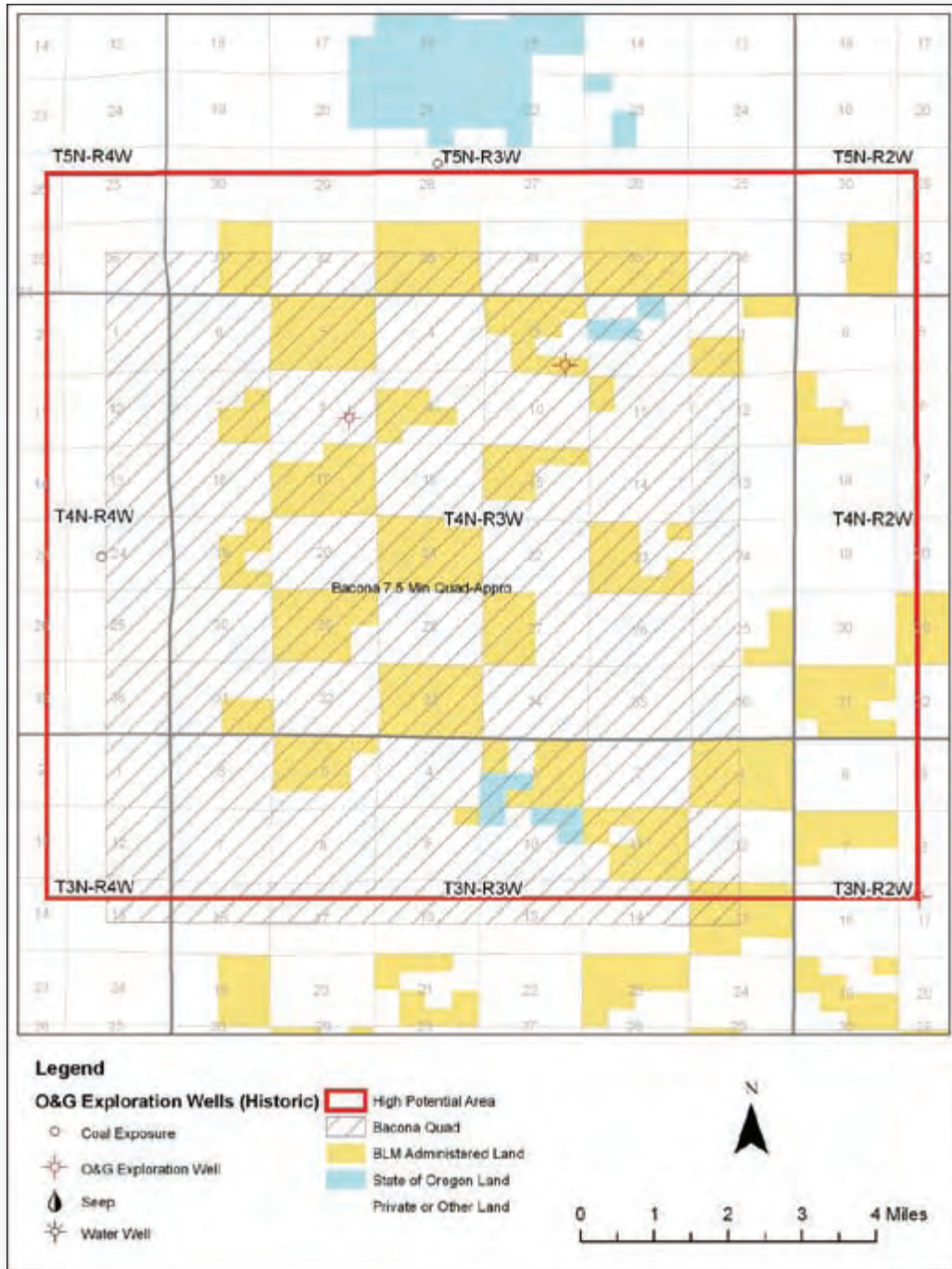
FIGURE E-5. MIST GAS FIELD, 1999 BOUNDARY



Source: DOGAMI 2003



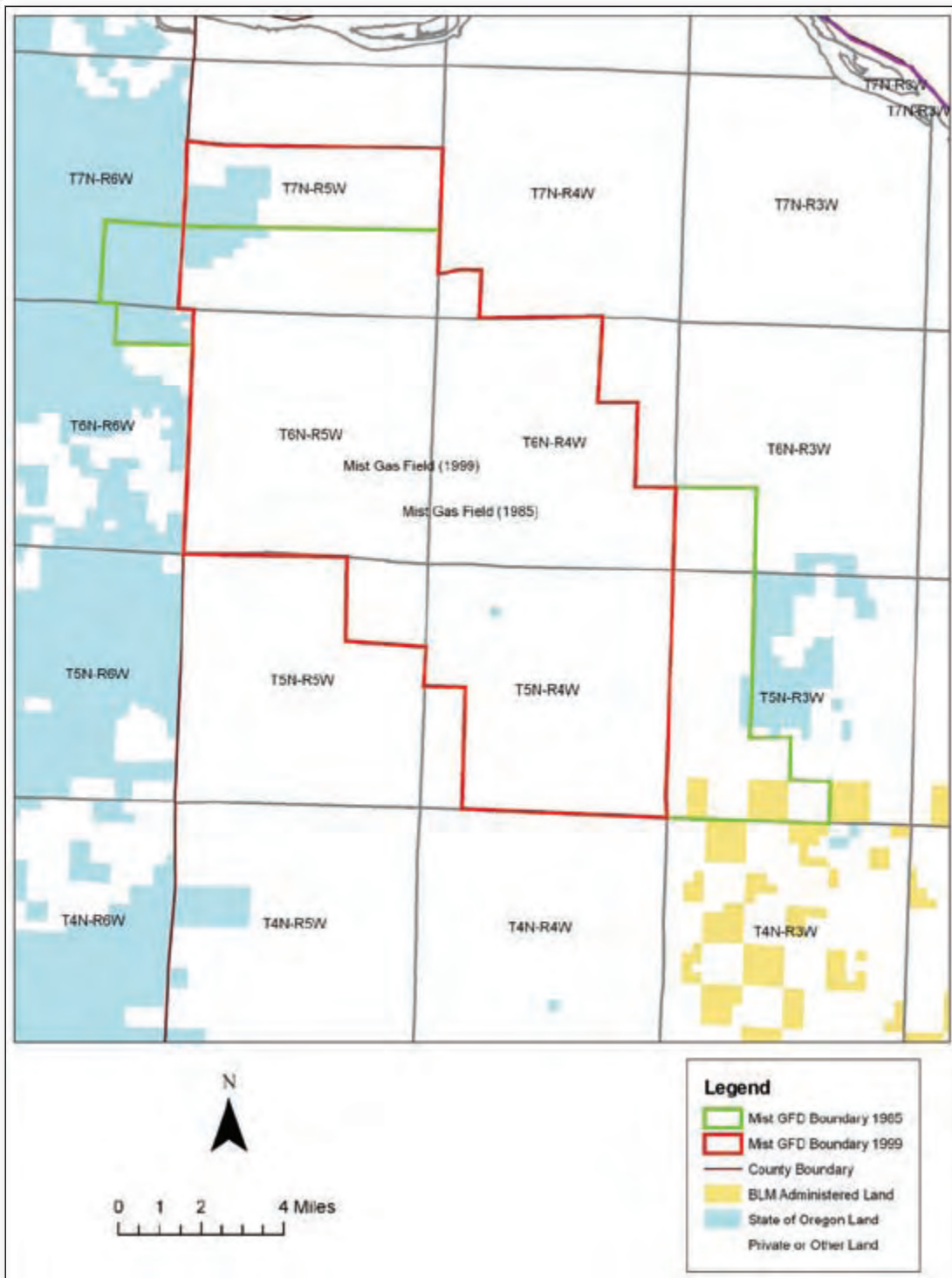
**FIGURE E-6. IDENTIFIED HIGH POTENTIAL AREA (THIS REPORT) AND BACONA GEOLOGIC QUADRANGLE**



Source: Houston 1997



FIGURE E-7. MIST GAS FIELD BOUNDARIES (1985 AND 1999)





The main target zone is the reservoir rock of the Clark and Wilson Sandstone (Olmstead and Alger 1985). To date, there have been more than 45 separate pools identified (Meyer 2007) with two gas storage reservoirs (DOGAMI 2003). Locations of additional pools are expected with the use of Three Dimensional 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. Exploration to the southeast, in the direction of BLM-administered lands, has been restricted to lower BTUs and depth of resource, not lack of product. All areas north of Vernonia, Oregon could be considered a viable extension of the Mist Gas Field (Meyer 2007).

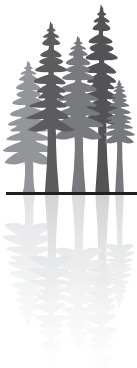
Natural Gas production at the Mist Gas Field has been consistent since its discovery in 1979. As of 2006, two companies maintained production wells, Enerfin Resources with eight producing wells, and Northwest Natural with four producing wells. Other production wells of the companies were shut in for 2006. An annual production history of the past 10 years is as follows (DOGAMI 2003 and 2007)(see *Table E-4*):

Gas production has decreased from its discovery in 1979 to the present (2006), depleting known pools. However, with the advancement of Three Dimensional Survey, it is probable that additional pools within and outside of the Gas Field Designation Boundary will be discovered and developed.

**TABLE E-4. MIST GAS FIELD 10-YEAR PRODUCTION**

<b>Year</b>	<b>Cumulative Cubic Feet All Wells (million cubic feet)</b>	<b>Cumulative Therms All Wells (therms)</b>
2006 <sup>a</sup>	402,713	2,482,713
2005	305,433	2,744,415
2004	466,756	4,180,445
2003	733,537	6,500,818
2002	837,067	6,926,533
2001	2,674,673	10,037,413
2000	1,596,159	14,426,257
1999	1,554,717	13,534,088
1998	1,262,550	11,009,121
1997	1,380,509	12,023,109
<b>10-Year Total</b>	<b>11,214,114</b>	<b>86,864,912</b>

<sup>a</sup>Update on March 20,2007 of DOGAMI data base (DOGAMI 2007)



## Oil and Gas Production

### Salem District

Annual production for 2005 for the Mist Gas Field was 305,000 thousand cubic feet (mcf) (305 million cubic feet [mmcf] with a total life production to date of 70 mmcf (DOGAMI 2007). As of 2006, the 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 the production designated to the common school fund. In total, over 500 oil and gas wells had been permitted in the field by 2003 (DOGAMI 2003). There are currently 18 producing wells, one water disposal well, 21 observation wells, and 20 gas injection/withdrawal wells operating on the site (DOGAMI 2007). Eight new Applications for Permit to Drill are being submitted to DOGAMI for additional exploration and production wells (Houston 2007).

In addition to production, the Mist Gas Field also contains two underground natural gas storage projects defined as the Flora/Bruer EFSC and the Calvin Creek EFSC (DOGAMI 2003). These storage facilities consist of six drained gas structures with a storage capacity of 12.5 bcf. As additional pools become depleted they may be converted to additional storage facilities. This is dependent on market supply and demand (DOGAMI 2006).

Water management for the Mist Gas Field is currently by deep well injection. In Oregon, discharge of produced water from onshore oil and gas activities into navigable waters is addressed in the 40 CFR, Part 435, Subparts C and E. With exceptions, produced water can be used for agriculture and wildlife propagation. Produced water discharges to streams or other surface water bodies must be authorized by a National Pollutant Discharge Elimination System (NPDES) permit issued by the Oregon Department of Environmental Quality (DEQ). Consistent with the Energy Policy Act of 2005, storm water discharges from oil and gas-related construction activities are exempt from NPDES permit coverage, except in limited instances. Injection wells used for the disposal of produced water are regulated by the Oregon DEQ Underground Injection Control program.

### Coos Bay District

There is currently no coal bed natural gas production in Oregon. However, the Coos Basin is being developed as a production resource. Sproule (2004, 2005, 2006) has estimated base, high, and low isotherm projections for the industry's 115,000-acre lease holdings within the Coos Basin, with a base (average) isotherm projected in-place gas volume of 1,166 bcf. The low isotherm projects in-place gas volume of 725 bcf, with a high isotherm projection of 1,617 bcf.

The target coal groupings are split into the Lower Coaledo, Isthmus Slough, and South Slough groups. Sproule's (2005, 2006) average estimates for gas in-place for the Lower Coaledo Group is 854 mmcf per 80 acres. Estimates for the Isthmus Slough and South Slough groups are 268 mmcf per 80 acres and 186 mmcf per 80 acres, respectively.

Site-specific calculations for volumetric in-place gas content calculated from average in-situ-isotherms were completed by Sproule (2005). Some of these estimates were conducted for sections including or adjacent to Federally managed mineral rights. See *Tables E-5, E-6, and E-7* for estimates for the three groups:



**TABLE E-5. ISTHMUS SLOUGH GROUP NEAR FEDERAL MINERAL RIGHTS**

Location	Gas Content (scf/ton)	Total Gas (millions of cubic feet)	Acres Sampled	Average Gas Per Acre (mmcf/acre) <sup>3</sup>
T. 27S, R. 13W., Sec. 11	71.4	828.521	300	2.76
T. 27S., R. 13W., Sec 14	54.1	168.327	70	2.40
T. 27S., R. 13W., Sec 15	90.4	2342.751	480	4.88
T. 27S., R. 13W., Sec 24	80.1	3115.784	640	4.87

**TABLE E-6. SOUTH SLOUGH GROUP NEAR FEDERAL MINERAL RIGHTS**

Location	Gas Content (scf/ton)	Total Gas (millions of cubic feet)	Acres Sampled	Average Gas Per Acre (mmcf/acre)
T. 26S, R. 13W., Sec. 6	148.4	665.871	308	2.16
T. 26S., R. 14W., Sec. 1	154.7	150.968	100	1.51
T. 26S., R. 14W., Sec. 3	147.6	15.254	15	1.02
T. 26S., R. 14W., Sec. 4	68.2	0.0	0	0.00
T. 26S., R. 14W., Sec.28	110.6	280.005	160	1.75

**TABLE E-7. LOWER COALEDO GROUP NEAR FEDERAL MINERAL RIGHTS <sup>a</sup>**

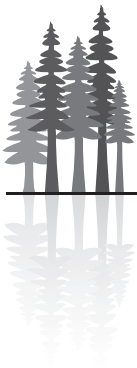
Location	Gas Content (scf/ton)	Total Gas (millions of cubic feet)	Acres Sampled	Average Gas Per Acre (mmcf/acre)
T. 27S, R. 13W., Sec. 11	158.4	2,174.382	360.8	6.03
T. 27S., R. 13W., Sec. 12	147.6	590.400	285.9	2.07
T. 27S., R. 13W., Sec. 13	146.0	0.0	0.0	0.0
T. 27S., R. 13W., Sec. 14	149.1	2,981.251	580	5.14
T. 27S., R. 13W., Sec. 24	158.4	1,140.074	640	1.78

<sup>a</sup>Most of the Lower Coaledo Isotherm Data in Sproule (2005) did not specify section location within a township. Therefore, position of Federal managed rights could not be determined in relation to the Methane Energy Corporation's cited acreage. These townships were not included in this report, but it should be noted that Federal holdings may be located near Sproule's (2005) projections.

Although, based on limited analysis (Sproule 2005), Federally managed mineral rights may contain less in-place gas volume than the average of industry's holdings, in-place gas is present in measurable volumes.

The analysis of coal bed natural gas potential is limited to the Coos Basin coals to a depth of 4,244 feet. Other coal seams occur at deeper intervals, with areas in the South Slough containing coals at depths greater than 10,000 feet. These deeper seams have not been included in the analysis (Sproule 2005). Gas content in the overlying coals may also imply migration of gas from deeper thermogenic sources as well as biogenic development in the target seams (Sproule 2004).

The Methane Energy Corporation is utilizing directional drilling of multiple wells from single pad locations. Engineering analysis (Sproule 2004) estimated a 160-acre well spacing on a 50,000-acre lease development. This would yield a maximum potential number of wells for 115,000 acres of development to approximately 719 wells.



The Methane Energy Corporation's pilot production program includes the Radio Hill, Beaver Hill, and Westport sites located in the center of the Coos Basin. Collection systems are currently being engineered for the Westport site, which will deliver production gas from the well to the Coos County Natural Gas Pipeline.

Initial results from the Radio Hill and Beaver Hill sites indicated that the coal bed natural gas was a dry gas, with little production water. This type of system is similar to Horseshoe Canyon coals of Alberta, the Hartshorne coals of the Arkoma basin, and the Fruitland coals of the south San Juan basin (Sproule 2006). However, future production of coal bed natural gas could encounter a wet gas system similar to the Powder River basin type. This could create substantial amounts of production water that will need to be managed. Initial results indicate brackish salinity in the production waters. Industry is currently reviewing injection potentials.

Examples of water management issues exist within current coal bed natural gas producing areas outside of Oregon and may be used for possible guidance of coal bed natural gas development in the District. Powder River Basin coal bed natural gas development has produced nearly four billion barrels (bbl) of water through 2006, equating to two bbl of water for every 1,000 cubic feet of gas. Operators discharge 61 percent of the water into ephemeral and perennial surface drainages, 31 percent into off-channel pits, and 5.7 percent for irrigation. Of the remainder, 1.4 percent is re-injected into the wells, and 1.2 percent is treated by ionic exchange. Only 25 percent of the shallow injection wells have been successful (Petzet 2007).

## Potential for Resource Occurrence and Development

### Salem District

Six distinct sedimentary basins or sub-basins have been the focus of petroleum explorations, the Eocene Unconformity being the primary target of exploration. In areas outside these basins, the target is above surface and eroded, creating the highlands. There has been little exploration of these areas, as any plays that might exist would be below the basement rock of Tillamook or Siletz River Basalts with low potential for occurrence and low potential for development. It is within these areas that the majority of the Salem District lands exist. It should be noted that private timber companies have been marketing the potential of all their lands in Oregon and Washington for the exploration and development of petroleum resources (Meyer 2007). Exploration has demonstrated the presence of petroleum in all six basins, although commercial development has been limited to one. Although the potential for resource occurrence in all six basins is moderate to high, the potential for resource development for five of the basins would be moderate, with little expectation for development within the 10-year life span of this scenario. The basins that would have high potential for resource occurrence, and moderate potential for resource development include:

- Newport Sub-Basin
- Tillamook Sub-Basin
- Astoria Basin (although, given the location of the Mist Gas field, development potential should be considered higher)
- Tualatin Sub-Basin (as with the Astoria Basin, development potential could be higher). However, a small portion of the Tualatin Sub-Basin may be included in the identified high potential area described below
- Willamette Basin

The Nehalem Basin, or Arch, has been the most extensively explored structure, resulting in the development of a commercially viable gas field. The basin maintains a high potential for resource occurrence and a high potential for resource development.

Based on geologic mapping showing similarities to the geology of the Mist Gas Field (Houston 1997), drilled exploration wells with petroleum shows (Olmstead et al. 1989) and discussions with DOGAMI and industry (Houston 2007, Meyer 2007), it is estimated that up to 50,200 acres containing both BLM-administered

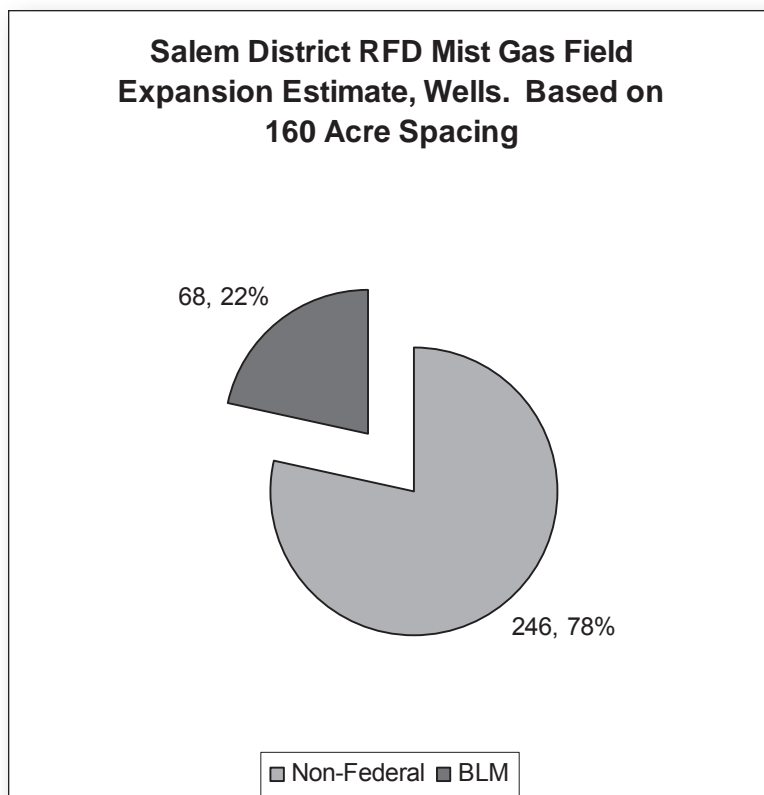


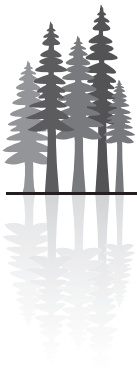
surface estate and non-federal estate could be explored and developed for petroleum in the 10-year life of this scenario. Of this acreage, the district maintains approximately 10,800 acres of BLM-administered surface estate. The remaining 39,400 acres appears to be non-federal lands.

The lands are associated with the geologically mapped Bacona Quadrangle (Houston 1997), bound to the southeast by Leaseholding Syndicate's 1925-1927 exploration hole named Dutch Canyon. The well was located at the NW $\frac{1}{4}$  of Section 17 in Township 3 North, Range 2 West. The well encountered gas at a depth of 1,850 feet. The pressure of the gas blew water and mud 20 feet above the casing. However, analysis of the gas determined that only 7.9% was methane and 91.8% was nitrogen. The identified high potential area is located southeast of the existing field (refer to *Figure E-6*). Additional petroleum development could likely occur to the northwest of the current Mist Gas Field, an area of current focus of exploration. However, there is no known BLM-administered estate in that area (USDI BLM 2007).

It is assumed that if this area containing both federal and non-federal lands were developed, it would be as an extension of the current Mist Gas Field. Therefore, the current spacing plan of one well per 160 acres would likely apply (DOGAMI 2003, State of Oregon 1999), allowing for a total of approximately 314 wells within the identified high potential area, approximately 68 of which could be on BLM-administered surface estate. The district could foresee approximately 22 percent of the expansion development, with non-federal lands carrying approximately 78 percent of the expansion development (see *Figure E-8*).

**FIGURE E-8. SALEM DISTRICT MIST GAS FIELD EXPANSION ESTIMATE, 160-ACRE SPACING**





### **Coos Bay District**

Three areas within the Coos Bay District have been identified as having petroleum potential. The two conventional petroleum structures described by Ryu et al. (1996) have a moderate to high potential for occurrence. The structures have been identified, and historic exploration has had both oil and gas shows. However, resource development potential is low to moderate. Although hydrocarbons may exist, it has not been historically economic to produce these resources. This is due to the lack of infrastructure, low price, and limited investigations.

The Coos Basin has a high potential for occurrence of coal bed natural gas. The structure has been identified and hydrocarbon shows have been documented. Although actual economic production from this play has not occurred, initial steps with the placement of infrastructure and wells as well as the Gas Field Designation process has been implemented. The potential for resource development is also high. It is likely that development will occur within the life of this plan, with private development already occurring.

### **Leasing**

#### **Salem District**

Foreseeable development of the Mist Gas Field 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.

#### **Coos Bay District**

After lands are nominated and reviewed by BLM, leases on lands where the Federal government manages the oil and gas rights are offered via oral auction on a quarterly basis. The maximum lease size is 2,560 acres at a minimum bid of \$2.00 per acre. An administrative fee of \$75 per parcel is charged, and each successful bidder must meet citizenship and legal requirements. Lands not leased at auction are then available for over-the-counter leasing for a period of two years. Leases are issued for a 10-year term and charged a 12.5% royalty on production. In the first five years of a lease, annual rental is \$1.50 per acre, and \$2.00 per acre thereafter. Leases that become productive are “held by production” and do not terminate until all wells on the lease have ceased production.

Foreseeable development of the Coos Basin coal bed natural gas play could potentially result in an additional 25,000 acres of BLM-administered lease offerings. If these offerings were sold for the 2006 average price of \$17.71 per acre, based on Federal proceeds from leasing in eastern Washington, the net receipts would approach \$500,000.

## **Future Trends and Assumptions**

### **Introduction**

#### **Salem District**

Based on history of past exploration; historic, current, and projected development of the Mist Gas Field; mapped geology; and foreseeable development potential in the planning area, activity over the next decade may be stable to increasing. Current development within the Mist Gas Field as well as petroleum developments and interest in other BLM districts in Oregon, and the increasing value of petroleum products, indicate continued interest within the Salem District. Oil and gas activity on BLM-administered mineral rights within the district is expected to consist of competitive and over-the-counter leases, geophysical surveys, and processing of Applications for Permit to Drill for approximately 68 wells.



Some exploration for coal bed natural gas in the form of coal seam investigation and mapping is predicted, but development of coal bed natural gas is not expected within the next 10 years. The supply of natural gas in the region may be augmented by one or more proposed Liquefied Natural Gas terminals. Natural gas prices are expected to rise 0.3% (2004 purchase power) by 2034 with a 0.7% increase in demand over the same period (Energy Information Administration 2007). Consequently, while the petroleum industry does experience economic and production cycles, demand and price are projected to continue to increase.

### Coos Bay District

Based on history of past drilling, current development of coal bed natural gas and foreseeable development potential in the planning area indicate activity over the next decade may be stable to increasing. Current development within the Coos Basin and the increasing value of petroleum products indicate continued interest within the Coos Bay District. Oil and gas activity on BLM-administered mineral rights within the district is expected to consist of competitive and over-the-counter leases, geophysical surveys, and processing of Applications for Permit to Drill for 50 to 80 wells.

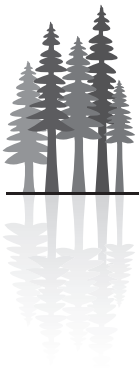
Continued exploration and development for coal bed natural gas is expected. Some exploration for conventional natural gas is also predicted. The supply of natural gas in the region has been augmented by the Coos County Natural Gas Pipeline. A liquefied natural gas terminal and an associated second natural gas pipeline are being proposed. These systems provide export opportunities for natural gas produced in the district. Natural gas prices are expected to rise 0.3% (2004 purchase power) by 2034, with a 0.7% increase in demand over the same period (Energy Information Administration 2007). Therefore, although the petroleum industry does experience fluctuations in economic and production cycles, demand and price are projected to continue to increase.

The speculative conventional petroleum systems are the Umpqua-Dothan-White Tail Ridge hybrid petroleum system and the Umpqua-Lower Tye Mountain petroleum system, located in the northern portion of the Coos Bay District are contained in the southern Tye sedimentary basin (Ryu et al. 1996) (refer to *Figure E-1*).

*System 1:* The Umpqua-lower Tye Mountain petroleum system is located in the center of the Smith River Sub-Basin. The system may include a tight-gas sandstone reservoir. According to Ryu *et al.* (1996), gas could migrate along faults, forming small accumulations in the lower Tye Mountain sandstones. Mudstones within the member would serve as additional seals within the traps. An unconventional over-pressured tight-gas mudstone reservoir is possible in the Umpqua Group of the Smith River area. Deep wells within the system have encountered over-pressured zones at approximately 7,000-foot depth. Characteristics of the zone are sufficient to generate thermogenic wet-gas (Ryu *et al.* 1996). The approximate area of this system within the district is 200 square miles. The BLM-surface management consists of approximately 20 percent of that area.

*System 2:* The Umpqua-Dothan-White Tail Ridge Hybrid Petroleum System is in the southern portion of the Tye Basin, with a southern boundary defined by the Tye Basin-Klamath Mountain contact. According to Ryu *et al.* (1996), the system may contain dry gas from both biogenic methane (similar to coal bed natural gas) and deeply buried conventional petroleum sources. It is possible the created gas migrates to accumulation zones which are located east of the Coos Bay District, extending into the BLM Roseburg District. It is also possible that the entire structure projects under the Klamath Mountains (Ryu *et al.* 1996). The approximate area of this system within the district is 350 square miles. The BLM-surface management consists of approximately 26% of that area.

*System 3:* The third opportunity is the coal bed natural gas play within the Coos Basin. This is the play that is currently producing the most interest and activity. The focus of production is within the Coaledo Formations mapped by Newton (1980). During deposition and compaction of the organic material which ultimately becomes coal, large quantities of methane are generated. Methane gas produced from coal may have lower energy content than conventional natural gas (USDI BLM 2001).



The approximate area of the coal bed natural gas play is 250 square miles, with producing Lower Coaledo Formation coals currently being sought at depths up to 4,500 feet. The Coos Basin is a folded structural basin, one of a series of onshore and offshore basins along the northwest coast, ranging from the Klamath Mountains north to the Columbia River in Oregon, and from the Columbia River north to the Puget Sound in Washington. The basins are located from the continental shelf offshore, east to the Willamette Valley. Sedimentary deposits including coals, sandstones, siltstones, and shales are within these structural basins (Orr and Orr 2000).

The Coos Basin structure is controlled by compression force of the subducting easterly moving Gordia subplate and Juan de Fuca plate in relation to the overriding westerly moving North American Plate. The fold axes are oriented north-south, plunging northward. The Coaledo Formation-Flournoy Formation contact generally defines the basin boundaries to the north, east, and south. The basin is thought to extend offshore to the west. The basin's rock sequence consists of sedimentary layers of sandstone, siltstone, and shales, with coal seams (Newton 1980). Surface exposures of the basin's coal seams have been economically mined since the 1800s (Orr and Orr 2000).

Current development of the coal bed natural gas resource is being conducted by Methane Energy Corporation which has completed numerous exploratory and production wells in the Coos Basin. The company has projected an "Area of Mutual Interest" incorporating the Coos Basin, an area of approximately 160,000 acres (see Figure E-9).

The Methane Energy Corporation maintains approximately 115,000 acres of non-federal mineral lease rights, with an estimated in-place volume of 1.2 trillion cubic feet (Sproule 2006). Of the estimated 45,000

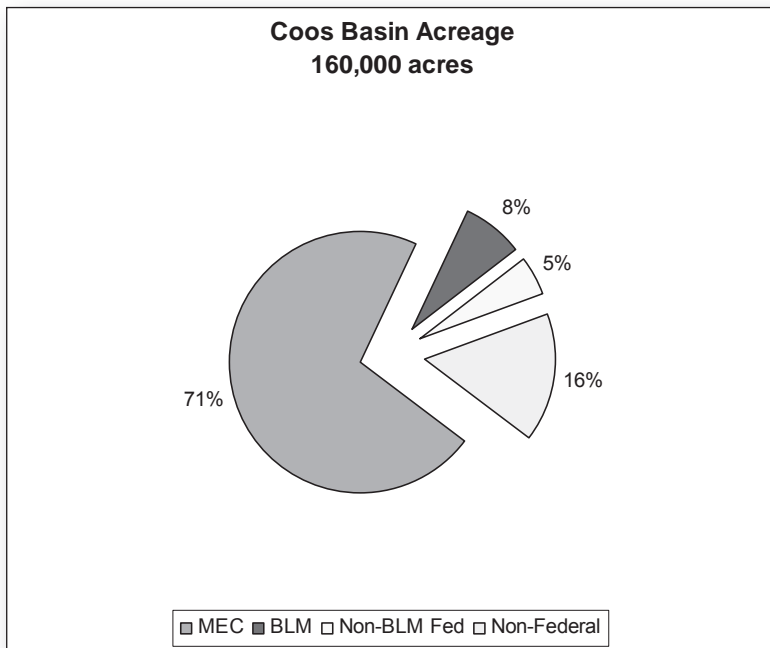


FIGURE E-9. COOS BASIN ACREAGE IN AREA OF MUTUAL INTEREST



acres not yet controlled by lease agreements, the Federal Government manages approximately 19,694 acres or approximately 44 percent (see *Figure E-10*). Federal mineral rights account for approximately 19,694 acres of the basin area, and BLM-administered subsurface mineral rights (split and non-split estate) account for approximately 12,228 acres of the basin area. The remaining lands consist of non-federal and non-leased estate in private, city, county, and state ownership.

The State of Oregon Department of Geology and Mineral Industries (DOGAMI) initiated a public meeting process to establish a Gas Field Designation for the Coos Basin. The first public meeting was conducted January 29, 2007. There is only one other Gas Field Designation in Oregon, which is the Mist Gas Field in northwest Oregon. The Gas Field Designation is required to fulfill state requirements to establish well spacing designations and control drainage. It may also increase competition, as more development companies may be interested in the resource after such a designation. The proposed Gas Field Designation is likely to incorporate the boundaries defined in Methane Energy Corporation's "Area of Mutual Interest". The boundary of the Gas Field Designation is simple to alter, needing only evidence of gas potential (additional formation mapping or shows of gas within a well). The designation will incorporate BLM and Forest Service lands, as well as other federal jurisdictions (Houston 2005).

All coal seams in western Oregon could produce coal bed methane. However, the potential is completely unknown, as these resources have not been investigated. Potential could exist within the coal seams of the Umpqua Group, as well as their correlating formations north through the coast range. If coal bed methane is producible in the Coos Basin, exploration could occur within these other speculative formations (May 2005).

## Geophysical Exploration

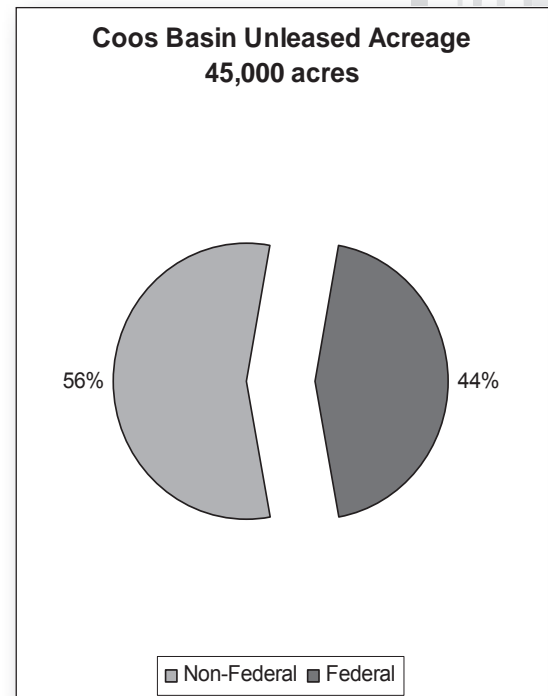
### Salem District

Advanced Three Dimensional Survey is utilized within the Mist Gas Field. 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 levels (Meyer 2007).

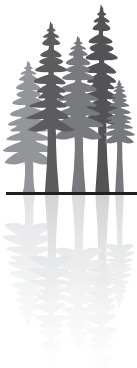
## Surface Impacts of Geophysical Explorations

### Salem District

It is anticipated that the foreseeable geophysical activity in the identified high potential area would consist of the currently used the Three Dimensional Survey. The total area of the identified potential expansion is 81 square miles, or approximately 50,200 acres. Using the Three Dimensional Survey spacing of shots, it is anticipated that complete investigation of the area could utilize 22,950 shots. With pad ground disturbance of 12 square feet, the total disturbance area could be up to 6.3 acres. The Salem District manages



**FIGURE E-10. COOS BASIN UNLEASED ACREAGE**



approximately 22% of the area of interest, so potential surface impacts to BLM-administered lands by Geophysical Explorations are expected to be approximately 1.4 acres. This disturbance is created exclusively with hand tools and based on experience in the Mist Gas Field, is completely reclaimed in five years or less (Meyer 2007). Disturbance will be less where pre-existing roads and/or landings can be used.

### **Coos Bay District**

Geophysical exploration techniques are not commonly utilized in coal bed natural gas production, but may be utilized in developing conventional petroleum plays within the Coos Bay District. It is anticipated that the foreseeable geophysical activity in the planning area will consist of seismic reflection surveys, utilizing existing roads. Surface impacts would involve temporary blockage of the roads by the large trucks used to gather the data, but this type of equipment is not expected to damage the roads.

The small explosive method is also anticipated to be used on approximately 20 miles of line. Surface disturbance is expected to consist of drilling 4 to 12 holes per mile of line. Each drill hole would impact about 200 square feet, but 90 percent of these holes would be drilled on existing landings, spur roads, or timber haul roads. Altogether, 7,200 square feet (approximately 0.2 acre) of existing road surface would temporarily be impacted by drilling activities and low power blasting.

Blasting would not be powerful enough to impact any surface resources or improvements. It is anticipated that four drill holes would be made on currently undeveloped areas. Drill holes would impact about 200 square feet each, and short spur roads 100 feet by 25 feet wide constructed to each drilling location another 2,500 square feet each. Total surface disturbance for the anticipated four drill holes would be approximately 0.25 acre. Total surface disturbance for blasting and drilling combined is expected to total approximately 0.5 acre. An increase in conventional petroleum development would increase these estimates.

## **Drilling and Production Phase**

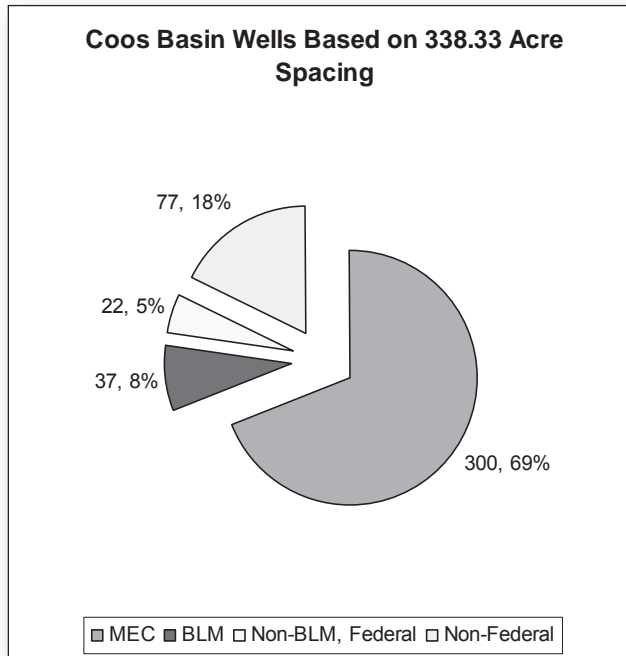
### **Salem District**

Based on past oil and gas drilling in Oregon, it is projected that three conventional petroleum exploratory “wildcat” wells would be drilled within the Salem 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 increase this estimate. Development within the identified high potential area would be directed by Three Dimensional Survey as opposed to wildcatting (Meyer 2007).

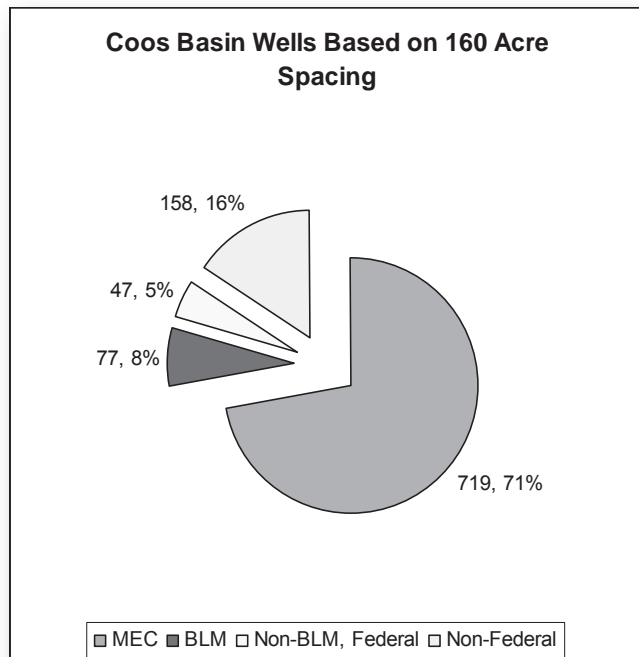
### **Coos Bay District**

The Methane Energy Corporation estimates of development for coal bed natural gas for their current leases range from 300 to 719 wells. Based on well spacing assumptions (Sproule 2004) of 160 acres per well, Coos Basin development could eventually involve 436 to 1001 wells. As previously described, spacing rules will be developed during the DOGAMI Gas Field Designation process. If all remaining Federal and non-federal leasable land was open for surface occupancy, well development on federally-managed lands (BLM, USFS, and BIA) could range between 59 and 124 wells. Both highs and lows are extremes (see *Figures E-11 and E-12*).

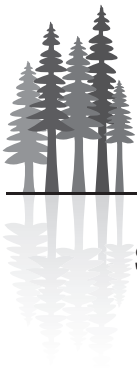




**FIGURE E-11, COOS  
BASIN WELLS BASED  
ON 338-ACRE SPACING**



**FIGURE E-12. COOS  
BASIN WELLS BASED  
ON 160-ACRE SPACING**



## Surface Impacts of Drilling and Production

### Salem District

The Mist Gas Field has maintained production since 1979. More than 500 wells have been permitted, although 60 wells are currently in operation. Abandoned well sites have been reclaimed and surface disturbance mitigated. Consequently, the current surface disturbance is limited to 60 wells. Development of the identified high potential area or development of an unknown field could add an additional 314 wells, with 68 wells on BLM-administered lands. It is anticipated that all gas production would be transported by pipelines, most of which would be located within road rights-of-way. It is estimated that up to 20 miles of pipelines could be sited outside road rights-of-way. All well service requirements would be provided by established companies.

Pipelines totaling 20 miles in length within a 30-foot wide right-of-way would disturb about 72.5 acres. Due to the checkerboard public land ownership in this area, it is estimated that only 22 percent or 16 acres would be on lands administered by the BLM.

Given the existing infrastructure of the Mist Gas Field, timber management of other lands within the district, the amount of existing roads within the identified high potential area, use of Three Dimensional Survey to optimize directional drilling, the ability to place multiple wells on a single pad (Meyer 2007), and development scenarios of other BLM Oregon districts, 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 0.25-mile of access road for each pad to remove the facilities from active roadways. Based on the ability to cluster wells, an assumption for calculation of four wells per pad was used. Therefore, it is estimated that no more than 20 miles of new road construction would be needed in full development. This would be moderate duty access road with a surface 18 to 20 feet wide, anticipated to be constructed on both private and BLM-administered lands. The clearing width would average 40 feet including ditches, utilities, pipelines, cuts, and fills. The total acreage impacted would total approximately 97 acres for all lands within the Salem District, approximately 22 acres of which would involve BLM-administered lands. Roads not retained for other resource management purposes would be reclaimed at the end of the project.

Total disturbance of both BLM-administered lands and other lands for wells, support services, pipeline and new road construction is expected to be approximately 1,426 acres or 2.8% of the total high 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 will also reduce initial disturbance. After initial construction, well sites pad areas will 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.

### Coos Bay District

It is estimated that the productive life span of a single well within the coal bed natural gas could range to greater than 14 years. Total lifespan of the field would be determined on the type of phased development and exploration of the previously untested deeper resources greater than 4,000 feet. All gas production would be carried by pipelines. Most, if not all, pipeline will be contained within road rights-of-way. It is estimated that up to 40 miles of pipeline could occur outside a road right-of-way. Additional conventional petroleum structures totaling 550 square miles have also been identified within the Coos Bay District.

Based on potential for resource development (described above) and utilizing access road built for well accessed timber development (most likely for the BLM-administered parcels within the Coos Basin), it was estimated that between five to no more than 10 miles of moderate duty access road with a surface 18 to 20



feet wide is anticipated to be constructed. The surface disturbance width would average 40 feet including ditches, utilities, pipelines, cuts, and fills. The acreage impacted by new road building would total between approximately 24.25 acres and 48.5 acres for the Coos Bay District. Roads not incorporated into other resource management would be reclaimed at the end of the project.

Altogether, the total disturbance for the wells, support services, and new road construction on BLM-administered mineral estate is expected to range between 194.25 acres (1.6% of BLM-administered area: 37 wells) to 404.25 acres (3.3% of BLM-administered area: 77 wells). 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.

A pipeline 40 miles in length with a right-of-way width of 30 feet would disturb about 145 acres. Due to the checkerboard public land ownership in this area, it is estimated that only 50 percent of that acreage would be on public lands administered by the BLM. Altogether, it is estimated that about 73 acres of BLM-administered land would be impacted from pipeline construction. The total surface disturbance of field development and production on BLM-administered land would range between 291.5 acres and 525.75 acres.

Total field development disturbance within the district, both Federal and non-Federal, could range between 2,289 acres (338.33-acre well spacing) and 5,255.25 acres (160-acre well spacing). Communitization and Unitization agreements (both State and Federal) can drastically reduce surface disturbance for both Federal and non-Federal lands. These cooperative agreements allow the sharing of wells, pads, and infrastructure; combining uses; and minimizing the need for new development.

## Limitations

### Salem District

The acreage estimates used for BLM-administered surface estate are based on current GIS layers. The accuracy of this information has not been verified by Master Title Plat Maps. The GIS coverage for subsurface estate within the District is incomplete. Therefore, the existence and location of BLM-administered subsurface estate on the Salem District is unknown.

A brief review of the Master Title Plat Maps was completed within and near the 1985 Mist Gas Field boundaries. Federal subsurface estate identified on the Master Title Plat Maps was not recorded on the GIS layers. Most of the Master Title Plat Maps identified federal subsurface parcels outside the Mist Gas Field boundaries. Due to the incompleteness of the GIS layers, especially within subsurface estate, the potential of BLM-administered subsurface estate was not addressed in this report.



# 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 Salem 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.

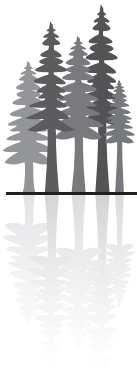
## **Application for Permit to Drill (APD)**

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 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

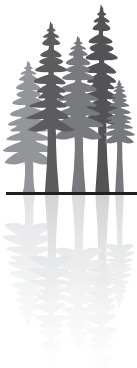
Resources: Botany and Wildlife

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.

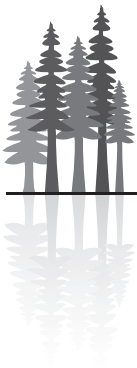
Modification: The boundaries of the stipulated area may be modified by the Authorized Officer, if the ACEC or Environmental Education Area (EEA) boundaries are changed.

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, gullyng, 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.

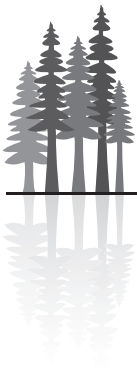
*Modification:* The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include Deferred Timber Management Areas.

*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**

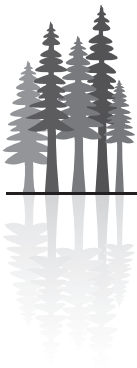
State law prohibits the use of plastic pipe for claim staking in Oregon. The BLM policy requires all existing plastic pipe monuments to have all openings permanently closed. Upon loss or abandonment of the claim, all plastic pipe must be removed from the public lands. When old markers are replaced during 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.



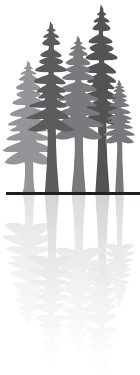


---

## 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

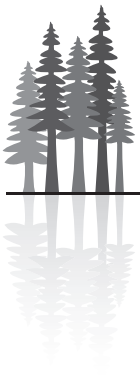


---

This appendix provides detailed data about lands, realty, and access in the Salem BLM District.

**In this appendix:**

Land Tenure Adjustment Criteria .....	F-3
Land Withdrawals and Land Tenure Zone 3 Lands .....	F-5
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 would result in a material reduction in the number of acres of O&C land 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.

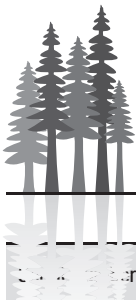


# Land Withdrawals and Land Tenure Zone 3 Lands

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

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

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 23947	PL 96-199	T. 10 S., R. 11W., SEC. 30	100	Yaquina Head	BLM, USCG	A	C
OR 8920	PLO 5372	T. 8 S., R. 6 W., SEC 33	80	Little Sink	BLM	B	C
OR 37275	PL 98-328	T. 7 S., R. 3 E. SEC 12-14;		Table Rock Wilderness	BLM	A	C
OR 37275	PL 98-328	T. 7 S., R. 4 E. SEC 7-12, 15-22		Table Rock Wilderness	BLM	A	C
ORE 05555	BO of 7/12/1957	T. 15 S., R. 7 W., SEC. 7	40	Air Navigation ANS-58-1, Prairie Mtn.	FAA	B	C
ORE 03060	PLO 989	T. 3 S., R. 5 E., SEC 26-28	600	Fish Hatchery & Eagle Creek	USFWS	B	C
ORE 015487	PLO 3609	T. 4 S., R. 3 E., SEC. 13	320	Seed Orchard/ Walter Horning	BLM	B	C
ORE 016183	PLO 3869	T. 3 S., R. 7 W., SEC 32	35	Recreation site/ Alder Glenn	BLM	B	C
ORE 016183	PLO 3869	T. 14 S., R. 7 W., SEC 25,26	40	Recreation site/ ALSEA FALLS	BLM	B	C
ORE 016183	PLO 3869	T. 9 S., R. 3 E., SEC 7	80	Recreation site/ CANYON CREEK	BLM	B	C
ORE 016183	PLO 3869	T. 12 S., R. 3 E., SEC 3	80	Recreation site/ DOGWOOD	BLM	B	C
ORE 016183	PLO 3869	T. 9 S., R. 3 E., SEC 9	120	Recreation site/ ELKHORN VALLEY	BLM	B	C
ORE 016183	PLO 3869	T. 9 S., R. 2 E., SEC 25	160	Recreation site/ FISHERMEN'S BEND	BLM	B	C
ORE 016183	PLO 3869	T. 3 N., R. 3 W., SEC 21	20	Recreation site/ LITTLE BEND	BLM	B	R
ORE 016183	PLO 3869	T. 7 S., R. 6 W., SEC 4 & 9		Recreation site/ MILL CREEK	BLM	B	C
ORE 016183	PLO 3869	T. 14 S., R. 9 W., SEC 13	40	Recreation site/ MISSOURI BEND	BLM	B	C
ORE 016183	PLO 3869	T. 3 S., R. 4 E., SEC 11	160	Recreation site/ NORTH FORK EAGLE CREEK	BLM	B	C
ORE 016183	PLO 3869	T. 4 N., R. 3 W., SEC 7	30	Recreation site/ SCAPONIA	BLM	B	C
ORE 016183	PLO 3869	T. 11 S., R. 4 E., SEC 19	80	Recreation site/ YELLOWBOTTOM	BLM	B	C
OR 6363	PLO 5136	T. 12 S., R. 7 W., SEC 28	40	Administrative site/AMARYS PEAK	USFS	B	C
OR 50856	PLO 7215	T 3 S., R., 10 W., SEC 30		Protect lands/ PACIFIC COAST HWY	BLM	B	C
OR 50856	PLO 7215	T 4 S., R., 10 W., SEC 19,29		Protect lands/ PACIFIC COAST HWY	BLM	B	C
OR 50856	PLO 7215	T 5 S., R., 10 W., SEC 5,6,20		Protect lands/ PACIFIC COAST HWY	BLM	B	C
OR 50856	PLO 7215	T 8 S., R., 11 W., SEC 3		Protect lands/ PACIFIC COAST HWY	BLM	B	C



**Salem District ROD and RMP**

Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 50856	T. 9 S., R., 11 W., SEC 4		Protect lands/ PACIFIC COAST HWY	BLM	B	C
OR 50856	T. 13 S., R., 11 W., SEC 28		PROTECT LANDS/ PACIFIC COAST HWY	BLM	B	C
OR 50856	T. 14 S., R., 12 W., SEC 35		PROTECT LANDS/ PACIFIC COAST HWY	BLM	B	C
OR 18842	FPC ORDER of 11/17/1924 T. 2 S., R. 4 E., SEC 1	24	ELECTRIC POWER GENERATOR/ SANDY RIVER –MARMOT DAM BULL RUN PROJ/ PP 477	FERC	B	C
OR 18842	FPC ORDER of 11/17/1924 T. 2 S., R. 5 E., SECS 13 & 15	24	ELECTRIC POWER GENERATOR/ SANDY RIVER –MARMOT DAM BULL RUN PROJ/ PP 477	FERC	B	C
OR 18884	FPC ORDER of 1/18/1957 T. 4 S., R. 4 E., SEC 13	100	ELECTRIC POWER GENERATOR/ CLACKAMAS/ PP 2195	FERC	B	C
OR 18884	FPC ORDER of 1/18/1957 T. 4 S., R. 5 E., SEC 7	97	ELECTRIC POWER GENERATOR/ CLACKAMAS/ PP 2195	FERC	B	C
OR 19146	SO of 2/26/1927 T. 7 S., R. 3 E., SEC 1,5,11-13,15,22-24		POTENTIAL PWR DEVELOPMENT/ MOLALLA RVR PSC 170	BLM	D	R
OR 19146	SO of 2/26/1927 T. 7 S., R. 4 E SEC 4,8,9,29		PSC 170	BLM	D	R
OR 19147	SO of 2/26/1927 T. 8 S., R. 8 W., SEC 35	957	POTENTIAL PWR DEVELOPMENT/ SILETZ RVR/ PSC 171	BLM	D	R
OR 19166	SO of 1/3/1938 T. 5 N., R. 6 W., SEC 6 T. 5 N., R. 7 W., SEC 10	10 40	POTENTIAL PWR DEVELOPMENT/ NEHALEM RVR/ PSC 304	BLM	D	R
OR 19166	SO of 1/3/1938 T. 3 N., R. 8 W., SEC 18	21	POTENTIAL PWR DEVELOPMENT/ NEHALEM RVR/ PSC 304	BLM	D	R
OR 19183	DO of 11/9/1950 T. 14 S., R. 8 W., SEC 15,19, 21,29 T. 15 S., R. 8 W., SEC 7 T. 15 S., R. 9 W., SEC 1	240 76 40	POTENTIAL PWR DEVELOPMENT/ ALSEA RVR/ PSC 413	BLM	D	R
OR 19038	EO of 7/2/1910 T. 3 N., R. 8 W., SEC 10,18	61	POTENTIAL PWR DEVELOPMENT/ NEHALEM RVR PSR 89/	BLM	D	R
OR 19039	EO of 12/30/1909 T. 6 S., R. 3 E., SEC 18 T. 7 S., R. 3 E., SEC 14, 20,24	80 276	POTENTIAL PWR DEVELOPMENT/ MOLALLA RVR/ PSR 94	BLM	D	R
OR 19074	EO of 10/23/1914 T. 12 S., R. 1 W.,	11	POTENTIAL PWR DEVELOPMENT/ SANTIAM RVR/ PSR 458	BLM	D	R
OR 19113, OR 19014	EO of 12/12/1917, SO of 12/12/1917 VARIOUS	6,149	POTENTIAL PWR DEVELOPMENT/ ALSEA, NEHALEM, SCAPPOOSE & TRASK RVRS/ PSR 659, WPD 14	BLM	D	R
OR 19115, OR 19014	EO of 12/12/1917, SO of 12/12/1917 VARIOUS	10,370	POTENTIAL PWR DEVELOPMENT/ CLACKAMAS RVR/ PSR 661, WPD 14	BLM	D	R
OR 19118	EO of 12/12/1917, VARIOUS	1,143	POTENTIAL PWR DEVELOPMENT/ EAGLE CREEK, SO. YAMHILL, MOLALLA AND n. SANTIAM RVRS/ PSR 664/	BLM	D	R
OR 19127 OR 19014 OR 19016	EO of 2/19/1920 SO of 12/12/1917, SO of 12/24/1919 VARIOUS	1,900	POTENTIAL PWR DEVELOPMENT/ CLACKAMAS, NESTUCCA, SANDY, SANTIAM RVRS/ PSR 730, WPD 14 & WPD 16	BLM	D	R





Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 1572	PLO 4305	T. 14 S., R. 7 W., SEC 25	132.5	REC SITE / ALSEA FALLS	BLM	B	C
OR 3660	PLO 4537	T. 2 S., R. 7 E., SEC 31	280	REC SITE / WILDWOOD	BLM	B	C
OR 3660	PLO 4537	T. 8 S., R. 4 E., SEC 31	160	REC SITE / SALMON FALLS	BLM	B	C
OR 3660	PLO 4537	T. 14 S., R. 9 W., SEC 13	10	REC SITE / MISSOURI BEND	BLM	B	C
OR 19116	EO of 12/12/1917	T. 1 S., R. 6 W., SEC 28	80	PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSR 662	BLM	D	C
OR 19116	EO of 12/12/1917	T. 3 S., R. 6 W., SEC 8,18	188	PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSR 662	BLM	D	C
OR 19116	EO of 12/12/1917	T. 1 S., R. 7 W., SEC 26	160	PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSR 662	BLM	D	C
OR 19116	EO of 12/12/1917	T. 3 S., R. 7 W., SEC 24,26, 28, 32	1,003	PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSR 662	BLM	D	C
OR 19116	EO of 12/12/1917	T. 1 S., R. 8 W., SEC 21,22, 28, 29, 30		PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSR 662	BLM	D	C
OR 19187	DO of 1/21/1958	T. 12 S., R. 3 E., SEC 10,17, 19, 20, 27, 30		PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSC 442	BLM	D	C
OR 19187	DO of 1/21/1958	T. 12 S., R. 4 E., SEC 19		PROTECT WATER POWER AND RESERVOIR POTENTIAL/ PSC 442	BLM	D	C
OR 44742	PL 100-557	T. 11 S., R. 3 E., SEC 23-26, 35, 36		PROTECTION UNDER WILD & SCENIC RIVERS ACT / QUARTZVILLE CREEK W&SR	BLM		C
OR 44742	PL 100-557	T. 12 S., R. 3 E., SEC 2,3,9, 10		PROTECTION UNDER WILD & SCENIC RIVERS ACT / QUARTZVILLE CREEK W&SR	BLM		C
OR 59658	PLO 7685	T. 11 S., R. 3 E., SEC 25,26, 35		PROTECTION OF RECREATION VALUES / QUARTZVILLE CREEK	BLM	B	C
OR 59658	PLO 7685	T. 12 S., R. 3 E., SEC 2,3,9, 10		PROTECTION OF RECREATION VALUES / QUARTZVILLE CREEK	BLM	B	C

DO: Director Order  
 EO: Executive Order  
 SO: Secretarial Order  
 BO: Bureau Order  
 DO: Director Order  
 PL: Public Law  
 PLO: Public Land Order  
 PSR: Power Site Reserve  
 PSC: Power Site Classification  
 R&PP: Recreation and Public Purposes  
 WPD: Water Power Designation  
 FPC O: Federal Power Commission  
 FO: Federal Energy Regulatory Commission Order

**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:**  
 Continue-C Revoke-R

\*\*\* 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 portions of the cited sections are withdrawn is available at the 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 SALEM DISTRICT\***

Township	Range	Section	Subdivision	Acres	Status	Location # on Map 2A/2B/2C
3 N	1 W	9	Lot 8	1.24	Ot	1
3 N	8 W	10	NWNE	40.00	PD	2
3 N	8 W	11	Lot 2	0.01	PD	3
5 N	6 W	6	Lot 9	2.12	PD	4
5 N	7 W	10	SWNE	40.00	PD	5
7 N	4 W	6	Lot 7	0.03	PD	6
1 S	3 W	7	Lot 1	0.18	OC	7
1 S	3 W	8	Lot 1	0.05	PD	8
2 S	2 E	4	Lot 2	0.04	PD	9
2 S	2E	9	Lot7	0.11	Ot	10
2 S	3 E	23	Lots 8, 12	6.25	OC	11
2 S	3 E	25	Lots 7, 8	1.69	OC	12
2 S	3 W	13	N/2SW	80.00	OC	13
2 S	3 W	23	N/2NE, NENW	120.00	OC	14
2 S	4 W	31	Lot 1	1.30	OC	15
3 S	2 E	7	Lot 1	0.87	OC	17
3 S	4 W	33	Lot 4	0.11	OC	18
3 S	9 W	20	NWNE	40.00	PD	19
3 S	9 W	28	SWSE	40.00	PD	20
3 S	9 W	33	NWNE	40.00	PD	21
3 S	10 W	30	Lot 15	0.45	PD	22
4 S	1 E	21	Lot 1	0.49	OC	23
4 S	2 E	11	NENE, SWNE, E/2SW, NWSE	200.00	OC	24
4 S	2 E	15	NWSE	40.00	OC	25
4 S	2 E	33	Lot 1	0.10	OC	27
4 S	3 E	9	SWNE, NWSE	80.00	OC	28
4 S	3 E	19	UN Lot	47.31	OC	29
4 S	3 E	21	E/2NE, SWNW, N/2SW	200.00	OC	30
4 S	3 E	29	E/2NE	80.00	OC	31
4 S	3 E	31	S/2NE, NWSE	120.00	OC	32
4 S	1 W	22	UN Lot	0.50	PD	33
4 S	3 W	2	Lot 1	0.25	PD	34
4 S	3 W	34	Lots 1, 2	4.40	PD	35
4 S	10 W	28	Lot 3	0.53	PD	36
5 S	3 W	4	Lot 1	1.16	PD	37
5 S	5 W	13	Lot 3	0.05	OC	38
5 S	5 W	31	Lot 1	3.57	OC	39
5 S	5 W	34	Lot 1	0.93	PD	40
5 S	5 W	35	Lot 1	8.00	OC	41
6 S	3 W	2	Lot 2	0.20	PD	42
6 S	3 W	5	Lot 1	2.00	OC	43
6 S	1 E	13	E/2NW, SWNW	120.00	OC	44
6 S	1 E	25	NWNE, SENW	80.00	OC	45
6 S	10 W	35	SENE	40.00	PD	46
7 S	1 E	1	SESW	40.00	OC	47
7 S	3 W	29	Lot 3	5.42	OC	49
7 S	6 W	34	SWSE	40.00	OC	50



Township	Range	Section	Subdivision	Acres	Status	Location # on Map 2A/2B/2C
8 S	1 E	3	SWNW, SW	200.00	OC	51
8 S	1 E	27	NESW	40.00	OC	52
8 S	1 E	35	Lots 1,2, NWNW, S/2	400.22	OC	53
8 S	4 W	24	M&B	1.54	Ot	54
8 S	4 W	25	M&B	8.00	Ot	55
8 S	10 W	20	WNWNW	20.00	PD	56
8 S	11 W	3	Lot 8	4.73	PD	57
9 S	1 W	21	Lot 7, NWNE	84.21	OC	58
9 S	3 W	21	Lot 3	0.08	Ot	59
9 S	3 W	24	UN Lot	1.40	PD	60
9 S	3 W	32	Lot 2	4.60	PD	61
9 S	4 W	9	Lot 5	1.16	OC	62
9 S	4 W	14	Lot 9	0.17	PD	63
9 S	9 W	19	Por Lot 29	10.00	PD	65
9 S	9 W	33	Lot 17	20.00	PD	66
9 S	9 W	34	W/2NWSW	20.00	PD	67
9 S	10 W	26	SWNW	40.00	PD	68
9 S	10 W	36	POR Lots 5, 6	10.00	PD	69
9 S	11 W	1	Lot 6	1.46	PD	70
9 S	11 W	4	SWSW	40.00	PD	71
10 S	2 W	8	Lot 1	6.13	PD	72
10 S	3 W	24	Lot 6	0.90	PD	73
10 S	4 W	11	Lot 5	1.52	OC	74
10 S	5 W	19	Lots 1-4, NE, E/2NW, E/2SW	480.00	OC	75
10 S	5 W	23	Lot 4	0.79	OC	76
10 S	6 W	22	Lots 2, 3	15.70	PD	77
10 S	7 W	18	SWNE, SESW, W/2SE	160.00	PD	78
10 S	10 W	2	Lot 20	20.00	PD	79
11 S	8 W	6	NESW, NWSE, SESE	120.00	PD	83
11 S	9 W	31	Lot 2	43.25	PD	84
11 S	10 W	12	N/2NE, NWSW, NESE	160.00	PD	85
11 S	10 W	14	Lot 1	2.87	PD	86
11 S	10 W	23	NESE	40.00	PD	88
11 S	10 W	24	SWSW	40.00	PD	89
11 S	10 W	25	Lot 1	37.22	PD	90
11 S	10 W	35	SESE	40.00	PD	91
12 S	4 E	30	SESW	40.00	PD	93
12 S	4 E	31	Lot 1, NENW	84.81	PD	94
12 S	1 W	34	Lot 10	11.45	PD	95
12 S	2 W	13	Lot 6	7.04	Ot	96
12 S	6 W	35	Lot 3	0.20	Ot	98
12 S	8 W	6	Lot 7	40.18	PD	99
12 S	8 W	7	Lots 1, 2	79.04	PD	100
12 S	9 W	29	E/2NE, SESE	120.00	PD	101
12 S	9 W	32	E/2NE, SWNE	120.00	PD	102
12 S	9 W	34	NENW	40.00	PD	103
12 S	9 W	35	NENW, S/2SW	120.00	PD	104
12 S	10 W	6	SWSE	40.00	PD	105



**Salem District ROD and RMP**

Township	Range	Section	Subdivision	Acres	Status	Location # on Map 2A/2B/2C
12 S	10 W	14	NENE	40.00	PD	106
12 S	11 W	10	Lots 3, 4	76.16	PD	107
12 S	11 W	17	Lot 5	38.84	PD	108
13 S	3 E	9	NENE	40.00	PD	109
13 S	2 E	24	N/2NE, SENE	120.00	PD	110
13 S	2 W	21	NWNE	40.00	OC	111
13 S	4 W	30	Lot 5	8.49	PD	112
13 S	5 W	29	Lot 1	0.84	OC	113
13 S	9 W	10	E/2NE, NESE	120.00	PD	114
13 S	9 W	13	NWNW	40.00	PD	115
13 S	11 W	3	SWSE	40.00	PD	116
13 S	11 W	28	Lot 9	7.60	PD	117
13 S	11 W	33	NESE	40.00	PD	118
14 S	5 W	25	Lot 1	0.26	OC	119
14 S	11 W	3	Lots 1, 2, 25	111.50	PD	120
14 S	11 W	4	Lots 29, 30	84.30	PD	121
14 S	11 W	5	Lot 10	40.62	PD	122
14 S	11 W	6	Lot 16	40.00	PD	123
14 S	11 W	10	Lots 1, 11-13, 17	210.21	PD	124
14 S	11 W	15	NESE	40.00	PD	125
14 S	12 W	35	SENE	40.00	PD	126
15 S	5 W	6	Lot 5	1.46	PD	127
<b>Total Zone 3 Lands</b>				<b>5491.21</b>		

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

\*Not all locations are shown on Maps 2A/2B/2C due to small size or because they are outside the map extent.

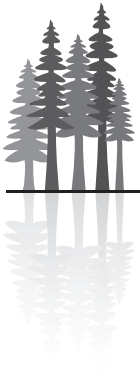


# Inventory of Communication Sites

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

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

Location # on Figure 5 in the RMP	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
1	Bald Mountain	OR049380,OR 48311	3S	6W	29	NW¼SW¼	45° 17' 00"	123° 25' 50"
1a	Blind Cabin Ridge	OR052734	1S	5W	31	NW¼NE¼	45° 26' 47"	123° 20' 59"
2	Brightwood	OR 044996, OR 54285, OR 054287, OR 060816, OR 61084	2S	6E	14	SE¼NW¼	45° 24' 50"	122° 02' 15"
3	Dixie Mountain	OR005491	2N	2W	27	NW¼NE¼	45° 42' 00"	122° 55' 00"
4	Goat Mountain	OR034944,OR 38793	5S	4E	14	SW¼SW¼	45° 07' 52"	122° 17' 16"
5	High Heaven	OR018080, OR 000172	3S	5W	33	NW¼SE¼	45° 15' 53"	123° 18' 33"
5a	Lookout Point	OR048232	1S	5E	13	SW¼SE¼	45°28' 52"	122° 08' 11"
6	Mt. Horeb	OR002086, OR 33887	9S	4E	17	NE¼NE¼	44° 47' 35"	122° 20' 21"
7	Prairie Mtn.	OR 14807	15S	7W	7	LOT 11	44° 16' 48"	123° 35' 05"
8	Prairie Mtn. East	OR042998	15S	7W	4	SE¼SE¼	44° 16' 37"	123° 36' 31"
9	Prairie Mtn. West	OR039808	15S	7W	7	LOT 12	44° 16' 47"	123° 35' 22"
10	Prospect Hill	OR046839	8S	4W	25	LOT 2	44° 51' 14"	123° 07' 19"
11	Snow Peak	OR047462	11S	2E	5	LOT 12	44° 39' 30"	122° 36' 15"
13	Trask Mountain	OR047588	2S	6W	29	NE¼NW¼	45° 22' 17"	123° 27' 18"
14	Yellowstone Mountain	OR013666	11S	3E	32	SW¼NW¼	44° 34' 04"	122° 28' 57"



# Appendix G

## Recreation

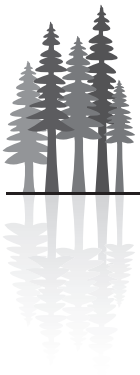


---

This appendix provides supplemental material for the recreational section of the Salem 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 for OHV emphasis areas.

Maps associated with these interim OHV management guidelines are available at the Salem 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 25* for a list of individual closed areas, *Table 26* for OHV designation areas, and *Table 27* for OHV emphasis areas for the Salem District.

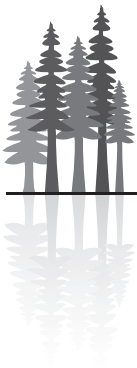
The BLM road maintenance levels that pertain to limitations on types of off-highway vehicle use are described below.

- **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, and are functionally classified as a resource road.
- **Level 3** – This level is assigned to roads where management objectives require the road 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 road. 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 roads may be closed or have limited access due to snow conditions) and for roads that 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.

## Salem District

### OHV Designations:

- Limited to designated roads and trails: 274,600 acres
- Limited to designated roads: 85,165 acres
- Closed: 40,050 acres



### **Description**

Includes all BLM-administered lands within the Salem District. See additional interim guidelines for the Upper Nestucca OHV Emphasis Area.

### **Limited Area Management Guidelines**

- Limited OHV areas are managed in accordance with all applicable federal and state off-highway vehicle regulations.
- Motor vehicle use will be limited to administrative, commercial, and passenger vehicle traffic where not specifically signed or gated.
- 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 their use limited under seasonal or administrative restrictions. These restrictions may include, but are not limited to, fire danger, wet conditions, special requirements for wildlife species, protection of 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 centerline of roads or up to 15 feet from centerline of trails.
- Limitations apply to all Class I all-terrain vehicles (ATVs), Class II 4-wheel drives (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 completion of the transportation management plan, maps and brochures will be available to the public at the main office illustrating designations, describing specific restrictions, and defining opportunities.

### **Process for Selecting a Final Road and Trail Network**

Route designations have been completed for the Upper Nestucca 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 Record of Decision.

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.

## **Upper Nestucca OHV Emphasis Area**

**Acres:** 9,579

**OHV Designation:** Limited to designated roads and trails

**Niche:** Located 20 miles northwest of McMinnville, Oregon, this area provides riders of Class I all-terrain vehicles (ATVs) and Class III (motorcycles) with OHV-riding experiences along a designated road and trail network.

### Management Guidelines

- Designated trails and maintained roadways are limited to Class I and Class III motor vehicle use within the boundaries of the OHV emphasis area.
- All Class I and Class III vehicles must be equipped with approved spark arresters, an Oregon ATV sticker for the appropriate vehicle class, and must meet posted noise requirements.
- Class II vehicle use is only authorized on Level 3 and Level 4 roadways.
- Motorized use on the trail system may be restricted during summer months due to fire hazard conditions.
- Areas and trails may be permanently or temporarily closed for administrative use, extreme wet conditions, construction/reconstruction requirements, or other environmental concerns.

### **Process for Ongoing Public Collaboration/Outreach**

The principal venue for public collaboration on the trail system is through local partnership with the Applegate Rough Riders Motorcycle Club. A trail map is available to the public at the Salem District Office and Tillamook Field Office. The trail system is marked on the ground with regulatory and directional signage.

### **Process for Selecting a Final Road and Trail Network**

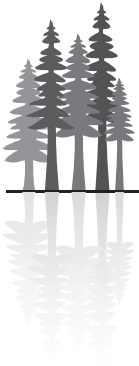
Route designations have been completed through the Upper Nestucca Motorcycle Trail System Environmental Assessment (EA OR 086-97-05). Adaptive management is used to adjust the system for timber management, user needs, and resource protection.

### **Road and Trail Construction and Maintenance Standards**

Construction and maintenance are completed in accordance with the design features identified in the Monitoring and Maintenance Plan for the Upper Nestucca OHV Trail System. Trail maintenance will be a priority within this OHV emphasis area to ensure a quality riding experience for trail users and to conserve natural resource values.

### **Process for Selecting a Final Road and Trail Network**

Final route designations for the Salem District will be accomplished in a comprehensive, interdisciplinary travel and transportation management plan scheduled to be complete no later than five years after the date of the Record of Decision.



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.



---

# Planning Frameworks for Special Recreation Management Areas

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

## Alsea Falls

### **Primary Market Strategy: Community**

Niche: Overnight camping, picnicking, hiking and mountain biking, horse-back riding, and leisurely driving opportunities in a coastal mountain setting.

Management Objectives: Manage the area to provide overnight camping, hiking, mountain biking, and equestrian opportunities in a coastal mountain setting.

### **Targeted Outcomes**

Activities: Camping, hiking, picnicking, viewing natural landscapes, mountain biking, equestrian trail riding, and resting at a stop along a national backcountry byway

Experiences: Sense of achievement by developing personal skills and abilities; savoring the total sensory experience of a natural landscape; enjoying the closeness of family; relishing group affiliation and togetherness; bringing back pleasant memories; enjoying getting some needed physical exercise or rest; and escaping from personal-social, physical, or family pressures for awhile

Benefits: Improved mental health and health maintenance; restored body from fatigue, improved capacity for outdoor physical activity, improved fitness and health; greater family bonding, opportunity for a more well-rounded childhood development; enhanced lifestyle; and greater retention of distinctive natural landscape features.

### **Perscribed Setting Character**

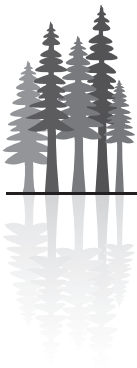
Physical: Primarily front country and middle country landscaping varies from un-modified forest to highly modified timber actions throughout the SRMA and along the byway

Social: Accommodates 16 families with up to 100 people in the campground and 22 families and up to 150 people in the picnic area when at full capacity. Encounters are highly expected during the high-use season. A group size of up to 10 in the rest of Alsea Falls Area SRMA with a less likelihood of encounters

Administrative: Brochures are available. Agency presence lessens as remoteness increases, mostly non-motorized recreation in and around the recreation site. The remaining portion of the Alsea Falls Special Recreation Management Area is limited to mapped designated roads and trails. Resident summer staff and camp hosts during the open season. Site is closed during the low-use season of October through April, while allowing walk-in day use access during that time. Rules are clearly posted throughout the park.

### **Activity Planning Framework**

Management: Continue to provide for a developed camping and day use experience and associated facilities with an emphasis on maintaining a front and middle country recreation setting in the special recreation management area.



Marketing: Use information and interpretation to lessen visitor conflicts and resource impacts in the recreation area and special recreation management area.

Monitoring: Monitor visitor satisfaction.

Administrative: Apply administrative actions as needed to maintain safe and enjoyable recreation experience and to conserve and restore the natural setting.

## Fishermen's Bend

### **Primary Market Strategy: Community**

Niche: Offers a wide variety of safe and high-quality family and group facilities and outdoor recreational opportunities in a forested setting along the scenic North Santiam River, within 30 miles of larger rural communities and densely populated urban communities.

Management Objectives: To provide highly developed, clean, safe, enjoyable, and accessible facilities and outdoor recreation opportunities in a forested setting. To provide outdoor nature study programs and activities for children and adults.

### **Targeted Outcomes**

Activities: Individual and group camping and picnicking, non-motorized boating, fishing, nature study, water-play, biking, walking, and athletic field sports.

Experiences: Enjoying closeness of family and friends and group affiliation and togetherness; enjoying easy access to natural landscapes; participating in outdoor events; getting some needed physical exercise, getting some needed physical rest; and releasing or reducing built-up mental tensions.

Benefits: Improved mental health and health maintenance; stronger ties with family and friends; greater appreciation for parks and how managers care for them; and positive economic contribution to nearby rural communities.

### **Prescribed Setting Character**

Physical: The overall physical setting is rural with a relatively natural appearing mature conifer forest setting along the scenic North Santiam River. The level of development and visitor amenities is high with paved roads, developed campsites (water, sewer and electrical hook-ups), cabins, flush restrooms with showers, accessible trails, and a boat ramp. Large group camping and picnic facilities are present with athletic fields, playgrounds, and basketball courts. Nature study facilities include a nature center and interpretive nature trail.

Social: High density with family, friends, and group interactions.

Administrative: Park staff presence high with seasonal staff and volunteer hosts staying onsite and conducting frequent fee compliant checks and maintaining park facilities and cleanliness. Rules are clearly posted throughout site. Nature study programs and activities for both children and adults are provided on a weekly basis.

### **Activity Planning Framework**

Management: Continue to manage the park's facilities for a high level of facility maintenance, safety, cleanliness, and accessibility. To the extent possible, maintain the park's desirable mature forest and native vegetation. Expand site use for environmental educational activities, especially in the shoulder season.



Marketing: Work with interested groups to provide visitor information both on and off site.

Monitoring: Continue recreation staff/law enforcement patrols, resource monitoring, and seek input from visitors.

Administrative: To provide high-quality visitor service and to ensure compliance with park rules and resource protection, continue to use efficient mix of seasonal and volunteer staff to provide onsite management presence. To participate in partnerships that help meet management objectives.

## Little North Santiam River

### Primary Market Strategy: Community

Niche: Offers a wide variety of safe and high-quality outdoor recreational opportunities in a forested setting along the scenic Little North Santiam River, within 40 miles of larger rural communities and densely populated urban communities. Rugged and remote backcountry experiences are available in the Elkhorn Creek Wild and Scenic River (WSR).

Management Objectives: To provide a wide range of outdoor recreation opportunities and protect Elkhorn Creek WSR. To provide facilities, river access and administrative control that support resource protection, visitor safety, health, and enjoyment. To provide recreation visitor with education, information and interpretation designed to encourage stewardship and minimize user impacts and conflicts.

### Targeted Outcomes

Activities: Swimming, camping, picnicking, fishing, hiking, hunting, and recreational mining

Experiences: Enjoying closeness of family and friends and group affiliation and togetherness; enjoying easy access to natural landscapes; participating in outdoor events and getting some needed physical exercise; getting some needed physical rest and reducing built-up mental tensions; and enjoying more strenuous exercise and escaping crowds.

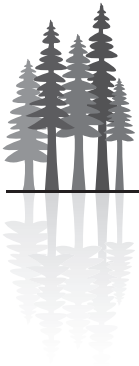
Benefits: Improved mental health and health maintenance, stronger ties with family and friends, greater appreciation for parks and how managers care for them, personal growth and development with greater self-reliance associated with improved outdoor skills, and positive economic contribution to nearby rural communities.

### Prescribed Setting Character

Physical: Modifications such as paved roads, utilities, houses, a golf course, and forest management are frequently observable along county roads and the Little North Santiam River. The BLM-administered lands along the Elkhorn Creek Wild and Scenic River are much more rugged and remote with little to no observable modifications.

Social: Moderate to high levels of visitor interaction occurs in most of this special recreation management area with very low to no encounters expected along in the Elkhorn Creek Wild and Scenic River.

Administrative: Park staff presence high with seasonal staff and volunteer hosts staying onsite and conducting frequent fee compliant checks and maintaining park facilities and cleanliness. Rules are clearly posted in sites and areas. Much less agency presence and signage for Elkhorn Creek Wild and Scenic River.



### **Activity Planning Framework**

Management: Continue to manage park's facilities for a high level of facility maintenance, safety, cleanliness, and accessibility. To the extent possible, maintain desirable mature forest and native vegetation at parks.

Marketing: Work with interested groups to provide visitor information both on and off site.

Monitoring: Continue recreation staff/law enforcement patrols, resource monitoring, and seek input from visitors.

Administrative: Provide high-quality visitor service and to ensure compliance with park rules and resource protection, continue to use efficient mix of seasonal and volunteer staff to provide onsite management presence. Participate in partnerships that help meet management objectives.

## **Molalla River/Table Rock**

### **Primary Market Strategy: Community**

Niche: Offers a wide variety of settings and recreation activities within 10 miles of a large rural community and 60 miles of large urban populations. Uplands provide year round non-motorized trail opportunities and the Molalla River is popular for summer fishing, swimming, and rafting. The Table Rock Wilderness offers more remote opportunities with scenic overlooks, mountain meadows and forested non-motorized trails.

Management Objectives: To provide the facilities and visitors services needed for resource protection and a wide spectrum of outdoor recreational and nature study opportunities in a variety of natural settings from rural to primitive and social settings from highly interactive to more remote. To provide a variety of visitor information media and support to special events that promote "Leave No Trace" use practices, public land stewardship, and partnerships.

### **Targeted Outcomes**

Activities: Hiking, biking, equestrian use, camping, picnicking, swimming, fishing, boating, hunting, and natural resource education

Experiences: Enjoying closeness of family and friends and group affiliation and togetherness; enjoying having access to hands-on outdoor natural resource educational facilities and activities; and getting some needed physical rest; reducing built-up mental tensions; and escaping everyday responsibilities for a while in both developed and remote areas.

Benefits: Improved mental health and health maintenance; stronger ties with family and friends; personal growth and development with greater self-reliance associated with improved outdoor skills; and positive economic contribution to nearby rural communities.

### **Perscribed Setting Character**

Physical: The entire area is characterized by a forested setting of various ages. The Molalla River is more developed where timber management, roads, designated campsites, vaulted restrooms, and signs are frequently observable. Aquila Vista Environmental Education Site has trails, shelters, and a vaulted restroom for use in outdoor natural resource educational programs by schools and other groups. The uplands along the Molalla River are less developed with gravel roads and single-track trails and minimal signage; the Table Rock Wilderness is more primitive with trailhead parking, signs, and single-track trails.





Social: Encounters with others along the Molalla River is more frequent and intensive than in the uplands along the trail system with the most remote area being within the wilderness.

Administrative: Regular patrols and visitor contact are made by agency recreation staff and law enforcement along the Molalla River with lower levels of agency presence in the uplands.

### **Activity Planning Framework**

Management: Continue to provide agency presence and facility management for resource protection and a variety of recreation opportunities. Consider new facility and program development as needed.

Marketing: Work with interested groups to provide visitor information both onsite and off site.

Monitoring: Continue recreation staff/law enforcement patrols, resource monitoring, and seek input from visitors.

Administrative: Complete a management plan for this special recreation management area to help identify future facility and program needs. Participate in partnerships that help meet management objectives.

## **Nestucca River**

### **Primary Market Strategy: Community**

Niche: Developed overnight camping, water-based day use recreation, and scenic driving opportunities.

Management Objectives: With increasing public use of the Nestucca River corridor, it is necessary to manage the recreation resource to not only accommodate increased use but to protect or enhance recreation, watershed, and wildlife values present.

### **Targeted Outcomes**

Activities: Camping, picnicking, swimming, fishing, and scenic driving.

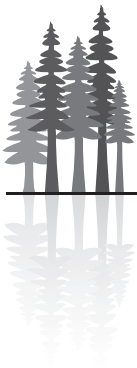
Experiences: Relaxation; family and group bonding; escape from personal and social pressures; and opportunity to enjoy the sights and sounds nature has to offer.

### Benefits:

- Personal – Better mental health and health maintenance; and restored sense of self.
- Psycho-physiological – Enhanced feeling of freedom and refinement.
- Household and Community – Greater family bonding; opportunity for more well-rounded childhood development; learning and passing on of outdoor skills; and fulfilling the desire of simple living.
- Economic – Positive contribution to regional economic stability.

### **Perscribed Setting Character**

Physical: Four semi-developed campgrounds. Three with paved roads and parking surfaces and one walk-in site. The campgrounds border the Nestucca River, which is a free-flowing State Scenic Waterway through the Oregon Coast Range. The Nestucca Back Country Byway parallels the river, winding through steep canyon walls of the coast range. It is within a mature forest dominated primarily by Douglas fir.



Social: Medium visitor density. The campgrounds are approximately 5 acres in size each and range between 5 and 11 sites per campground. The larger campgrounds at full capacity can accommodate 11 families.

Administrative: Self-service fee booth at information kiosk. Regularly patrolled during summer months by law enforcement and other agency staff. Rules are clearly posted at fee station/information kiosk.

### **Activity Planning Framework**

Management: Continue to provide for a semi-developed camping experience and associated facilities, with an emphasis on maintaining a front country recreational setting.

Marketing: Use visitor information to disperse recreation use throughout the recreation season to reduce crowding during peak-use periods and to enhance the overall visitor experience. Use information and interpretation to lessen visitor conflicts and resource impacts in the recreation area. Inform visitor how user fees are being used in the operation of the recreation area. Solicit feedback from users and user groups on how they would like to see their fees used in the future.

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 environment (i.e., visitor services, law enforcement presence, restoration, permitting, and fees).

## **Sandy River/Mt. Hood Corridor**

### **Primary Market Strategy: Destination**

Niche: Only 40 miles from the Portland metropolitan area, this SRMA offers a scenic corridor with a unique mix of both high-quality developed recreation and interpretive facilities and river greenway open space. Key features include the Sandy and Salmon Wild and Scenic Rivers (WSR), Wildwood Recreation Site, and the Barlow National Historic Trail.

Management Objectives: At developed sites provide clean, safe, enjoyable, and accessible facilities and outdoor recreational opportunities in a forested setting, and in undeveloped areas provide less developed open space for a variety of outdoor recreation and nature study opportunities. To provide recreation visitor with education, information, and interpretation designed to encourage stewardship and minimize user impacts and conflicts.

### **Targeted Outcomes**

Activities: Hiking, swimming, biking, fishing, non-motorized boating, individual, nature study, picnicking, scenic driving, historic study, and hunting

Experiences: Enjoying closeness of family and friends and group affiliation and togetherness; enjoying easy access to natural landscapes and getting some needed to strenuous physical exercise; enjoying having access to hands-on outdoor natural resource educational facilities and activities; and getting some needed physical rest and reducing built-up mental tensions.

Benefits: Improved mental health and health maintenance; stronger ties with family and friends; and positive economic contribution to nearby rural communities.



### **Prescribed Setting Character**

Physical: Modifications such as paved roads, utilities, houses, businesses, and some forest management are readily observable along U.S. Highway 26. Wildwood Recreation Site is a highly developed park located along the Salmon Wild and Scenic River, in a forested setting that features an interpretive watershed and fisheries trail with a unique instream fish-viewing window, an interpretive wetlands boardwalk, flush restrooms, and group facilities. The Sandy River and uplands offer less developed areas.

Social: Wildwood has more frequent and intensive interaction with some groups. Less developed areas along the Sandy River have less intensive interaction and may include low to moderate encounters with other visitors.

Administrative: Park staff presence high with seasonal staff and volunteer hosts staying onsite and conducting frequent fee compliant checks and maintaining park facilities and cleanliness. Rules are clearly posted in sites and areas.

### **Activity Planning Framework**

Management: Manage park facilities for a high level of facility maintenance, safety, cleanliness, and accessibility. To the extent possible, maintain park's desirable mature forest and native vegetation. Continue to support environmental education activities. As needed, address management issues on less developed areas.

Marketing: Work with interested groups to provide visitor information both onsite and off site.

Monitoring: Continue recreation staff/law enforcement patrols and work with volunteers to meet resource monitoring needs and to seek input from visitors.

Administrative: Complete a plan for this special recreation management area to help identify future facility and program needs. Participate in partnerships that help meet management objectives.

## **Yaquina Head Outstanding Natural Area**

### **Primary Market Strategy: Destination**

Niche: Access to a unique coastal headland setting with historic lighthouse and ocean-front settings for traditional recreation uses, resource appreciation, education, and interpretation.

Management Objectives: Promote the conservation and development of the area's scenic, natural, and cultural resource values; protect the area's wildlife habitat; and make use of the area for education, scientific study, and public recreation activities.

### **Targeted Outcomes**

Activities: Access to the ocean for bird watching, whale and harbor seal watching, nature study, tide pooling; visiting an historic lighthouse; hiking; interpretive programs, and environmental education.

Experiences: Learning about and enjoying nature; enjoying the closeness of family; relishing group affiliation and togetherness; enjoying having easy access to natural landscapes; exercise and physical fitness; escaping everyday responsibilities for a while; learning more about wildlife and the marine environment; and learning more about Northwest coastal maritime history.



Benefits: Improved mental health and health maintenance; personal development and growth; supporting a more outdoor-oriented lifestyle; improved opportunity to view wildlife; improved fitness and health; greater family bonding; more well-rounded child development; enhanced lifestyle; access to low cost recreation opportunities; positive contributions to local economic stability; maintenance of distinctive recreation setting character; greater community ownership of recreation and natural, cultural and heritage resources; and greater protection of wildlife habitats.

### **Prescribed Setting Character**

Physical: Developed recreation and interpretive site with paved roads and parking lot surfaces and a large interpretive center on a marine coastal headland. Landscape varies from ocean-front beach and tide-pool environment, to unmodified coastal forest, to urban park-like settings. The overall physical setting character is rural.

Social: High visitor density (approximately 340,000 visitors annually).

Administrative: Controlled access entrance station. Patrolled daily by agency staff. Rules and regulations are clearly posted throughout the park. High presence of regulatory and interpretive signs. High degree of visitor control.

### **Activity Planning Framework**

Management: Continue to provide for a high-quality day-use interpretive experience and maintain the associated facilities with an emphasis on maintaining a rural recreation setting.

Marketing: Use interpretation to increase visitor awareness of coastal marine wildlife habitat and maritime history; disperse use throughout the season to reduce crowding at peak periods as a way to enhance the overall visitor experience and to lessen visitor conflicts and resource impacts.

Monitoring: Monitor visitor satisfaction on a periodic basis to determine the appropriateness of management activities, signage, fees, etc.

Administrative: Apply administrative actions as needed to maintain a safe and enjoyable recreation experience and to conserve and restore the natural and historical setting.

## **Yellowstone**

### **Primary Market Strategy: Community**

Niche: Features the scenic Quartzville Creek Wild and Scenic River, which is easily accessed by the paved Quartzville National Back Country Byway Road. A unique feature includes large stands of old-growth forest.

Management Objectives: Provide a wide range of outdoor recreation opportunities and protect the Quartzville Creek Wild and Scenic River. Provide facilities, river access, and administrative control that support resource protection and visitor safety, health, and enjoyment. Provide recreational visitors with education, information, and interpretation designed to encourage stewardship and to minimize user impacts and conflicts.

### **Targeted Outcomes**

Activities: Hiking, biking, camping, picnicking, swimming, fishing, boating, hunting, scenic driving, recreational mining, and mining history.



Experiences: Enjoying closeness of family and friends and group affiliation and togetherness; enjoying easy access to natural landscapes; enjoying having access to hands-on outdoor natural resource educational facilities and activities; getting some needed physical rest; reducing built-up mental tensions; enjoying more strenuous exercise; and escaping crowds.

Benefits: Improved mental health and health maintenance; stronger ties with family and friends; personal growth and development with greater self-reliance associated with improved outdoor skills; and positive economic contribution to nearby rural communities.

### **Prescribed Setting Character**

Physical: The entire area is characterized by a forested setting of various ages, but with old-growth forest dominating BLM-administered lands. Lands along the Quartzville Creek Wild and Scenic River are more developed, including three developed recreation sites and other modifications including paved roads, designated river campsites, and visitor signs. The uplands in the northern part of the special recreation management area are less developed, with gravel roads and very little evidence of human activities except past timber management activities.

Social: The social setting along Quartzville Creek has more frequent and intensive interaction with some group interaction. The uplands have less intensive use and lower encounters.

Administrative: Regular patrols and visitor contact are made by agency recreation staff and law enforcement along the Quartzville Creek with low levels of agency presence in uplands.

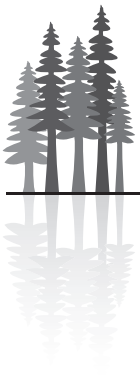
### **Activity Planning Framework**

Management: Continue to manage recreation sites for a high level of facility maintenance, and sites and the corridor for visitor safety, cleanliness, and resource protection. To the extent possible, maintain desirable mature forest and native vegetation at parks.

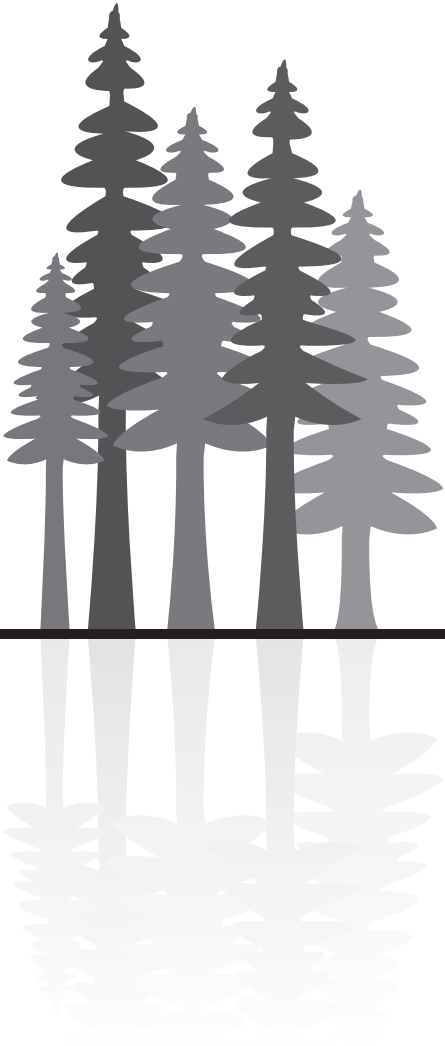
Marketing: Work with interested groups to provide visitor information both onsite and off site.

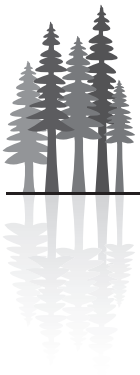
Monitoring: Continue patrolling with recreation and law enforcement staff, continue monitoring resources, and continue seeking input from visitors.

Administrative: Provide high-quality visitor service and ensure compliance with park and corridor rules and resource protection. Continue to use efficient mix of seasonal and volunteer staff to provide park and corridor management presence. Participate in partnerships that help meet management objectives.



# 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.



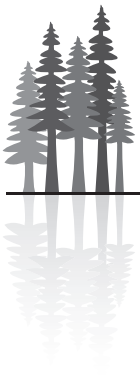
- sustained yield capacity ..... The volume of timber that can be offered for sale each year from an area based upon the consistent volume of timber that a forest can produce continuously. Also see annual productive capacity.
- sustained yield unit ..... A BLM district.
- take ..... An Endangered Species 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.



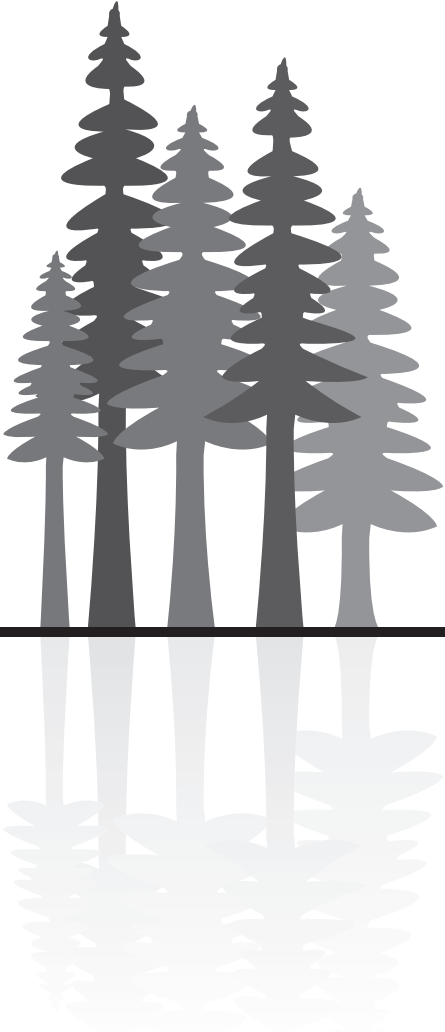
- uneven-aged management . . . . . A combination of actions that simultaneously maintains continuous tall forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes.
- uneven-aged stand . . . . . A stand with three 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.

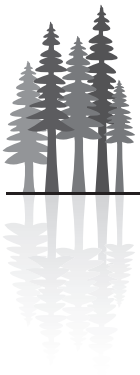


- 
- wildland/urban interface ..... The area in which structures and other human developments intermingle with undeveloped wildland.
  - windthrow ..... A tree or trees uprooted or felled by the wind.
  - young stage ..... Characterized by the predominance of density-dependent tree mortality and, in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



# Index









<b>A</b>	Adaptive management .....	20, 21, B-5, B-6, G-5
	Air quality .....	7, 42, B-10
	Allowable sale quantity .....	7, 9, 12, 14, 18, 24, 40, 41, A-5, B-10
	Annual program summary .....	B-3
<b>B</b>	Bald eagle .....	7, 35, 64, 65, D-5, D-6, D-7, D-8
	Best Management Practices .....	7, 62, B-8, C-1, E-13, E-14
	Biomass .....	41, 46, 47, 60, B-9, B-16, B-17, C-25
<b>C</b>	Clean Water Act .....	3, 8, 10, 11, 22, C-3
	Communication sites .....	6, 50, 51, F-1, F-11
	Critical habitat .....	6, 8, 9, 10, 13, 14, 15, 16, 21, 44, 49, 50, 64, B-11, B-15, E-39
<b>D</b>	Deferred Timber Management Area .....	6, 7, 14, 29, 31, 3, 40, 47, 61, B-10, E-43
<b>E</b>	Endangered Species Act .....	3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 21, 23, 44, 64, B-11, B-15, E-40
<b>F</b>	Fire regime .....	48
	Fire resiliency .....	17, 19
	Fire severity .....	11, 19
<b>G</b>	Geothermal energy .....	43, E-3, E-37, E-38, E-39
<b>H</b>	Hardwood stands .....	42, D-5
	Harvest land base .....	7, 14, 35
	High intrinsic potential .....	39, B-16
<b>I</b>	Instream restoration .....	39, B-16, C-23, C-49, C-49, C-50
<b>L</b>	Land tenure zones .....	49, 50, F-1, F-3
	Land use allocations .....	3, 4, 5, 14, 15, 29, 35, 38, 39, 40, 42, 48, 61, 66, A-3, B-8, F-4
	Large wood .....	9, 17, 38, 39, B-16, C-28
	Late-Successional Management Area .....	16, 29, 31, 35, 36, 37, 40, B-7, B-16, E-44
<b>M</b>	Marbled murrelet .....	9, 10, 13, 14, 15, 17, 20, 21, 35, 36, 64, B-7, D-5, D-6, D-7, D-8
	Monitoring .....	3, 7, 20, 21, 22, 29, A-3, A-4, B-1, C-4, E-48, G-5, G-8
	Mt. Hood Corridor .....	31, 34, 52, 56, 61, D-8, G-12
<b>N</b>	National Landscape Conservation System .....	16, 29, 31, 34, 49
	Northern spotted owl .....	9, 10, 15, 16, 19, 35, 36, 64, B-7, D-5, D-6, D-8
<b>O</b>	O&C Act .....	3, 8, 11, 21, 23, 28, 64
	Off-highway vehicles .....	7, 11, 23, 55, 56, 57, 58, 59, B-18, C-18, C-36, C-37, D-3, E-12, G-3
	Oregon Smoke Management Plan .....	42
<b>P</b>	Peak flow .....	6, 9, 10, 18, 41, C-32



**R** Reasonably Foreseeable Mineral Development ..... E-3  
Research natural area ..... 35, 43, 49, 50, B-10, D-3  
Rights-of-way ..... 49, 50, 66, A-5, E-34, E-35, E-37  
Riparian Management Areas ..... 7, 16, 23, 29, 31, 38, 39, 40, 48, B-8, B-16, C-5, E-43, E-44

**S** Salvage harvest ..... 37, 38, 39, 41, B-7, C-32  
Source water watersheds ..... 22, C-3, C-32, C-34, C-35, C-47  
Special status species ..... 7, 12, 13, 17, 35, 38, 44, 64, B-11, E-38, E-39  
Stand replacement disturbance ..... 36, 37, 40  
Stream temperature ..... 9, 10, 21, C-5, C-20

**T** Temporary use permits ..... 50, E-49  
Timber Management Areas ..... 6, 7, 14, 18, 29, 31, 39, 40, 41, 61, B-10, B-17  
Timber Production Capability Classification (TPCC) ..... 35  
Traditional use sites ..... 45, E-46  
Travel management plans ..... 57, B-18, G-4

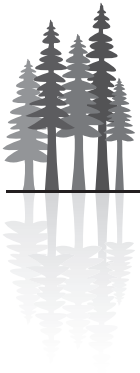
**U** Utility corridors ..... 50, 51

**V** Visual resource management classes ..... 17, 50, 61, 62, B-13, E-42, E-43

**W** Water quality ..... 11, 15, 17, 21, 22, 34, 38, 62, B-8, C-3, E-42, E-45  
Wildland urban interface ..... 39, 47, B-12  
Wind energy ..... 46

**Y** Yaquina Head Outstanding Natural Area ..... 34, 43, 52, 57, 61, D-4, D-9, F-5, G-13





A  
New Map of  
**TEXAS OREGON**  
AND  
**CALIFORNIA**

WITH THE REGIONS ASHMAN,  
DESCRIBED  
GIVEN BY THE GREAT AMERICAN  
**PHILADELPHIA**  
Published by S. Augustus Mitchell  
RECEIVED OF SAMUEL BENTON SMITH.  
1846

United States Department of the Interior  
Bureau of Land Management  
Salem District Office  
1717 Fabry Rd. SE  
Salem, Oregon 97306

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300



BLM/OR/WA/PL-09/010+1792

PRIORITY MAIL  
POSTAGE AND FEES PAID  
Bureau of Land Management  
Permit No. G-76

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 - Salem District**

SPINE TEXT