Final Environmental Impact Statement

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

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

Volume IV

WESTERN OREGON PLAN REVISIONS

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

BLM

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

October 2008

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

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Appendix N Areas of Critical Environmental Concern

This appendix provides detailed information about Areas of Critical Environmental Concern.

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Areas of Critical Environmental Concern 484

Areas of Critical Environmental Concern

This section contains detailed information about Areas of Critical Environmental Concern (ACEC). Two tables are included. *Table N-1*, which shows Areas of Critical Environmental Concern by alternative, includes information about the categories of Relevant and Important Values and any management direction that applies to the area. *Table N-2* contains more specific information about the Relevant and Important Values for each ACEC.

The ACECs denoted by the darker gray shading are those that were not further analyzed for designation under the action alternatives because they did not meet relevance and importance criteria and/or do not need special management attention. Management direction for these areas is the management direction in the current plans, and would only be applied under the No Action Alternative. Four of these areas have other special designations that make ACEC designation unnecessary:

- North Umpqua River is a Wild and Scenic River.
- Sterling Mine Ditch is eligible for listing under the National Historic Preservation Act.
- Jenny Creek and Pilot Rock are within the Cascade-Siskiyou National Monument.

The ACECs denoted by the lighter gray shading are those that meet all of the criteria for designation, but would not be designated under one or more action alternatives, because the relevant and important values cannot be managed without including the O&C harvest land base.

Table N-1. Management Direction For Areas Of Critical Environmental Concern

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated			
								Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/ Salable Mineral Entry	Timber Harvest
SALEM DISTRICT											
Beaver Creek	Potential	44	No	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Crabtree Complex RNA/ ONA	Existing	1,231	Yes	yes[a]	yes[a]	yes	Scenic, natural processes, fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	None
Elk Creek	Existing	784	No	yes	no	yes	Fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	Some thinning in stands <80 yrs old
Forest Peak RNA	Existing	155	Yes	yes	yes	yes	Natural processes, fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	None
Grass Mountain RNA	Existing	930	Yes	yes	yes	yes	Scenic, natural processes, fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	None
High Peak - Moon Creek RNA	Existing	1,490	Yes	yes	yes	yes	Natural processes, fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	None
Jackson Bend	Existing	15	yes[a]	yes[a]	yes[a]	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Little Grass Mountain	Existing	80					Scenic, natural processes, fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	None
Little North Fork Wilson River	Potential	1,822	yes	yes[a]	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Some management of previously entered stands.
Little Sink	Existing	81	yes	yes	yes	yes	Fish and wildlife, natural processes, natural hazards	Closed	Open - No Surface Occupancy	Proposed Closed	None
Lost Prairie	Existing	61	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Lower Scappoose Eagle	Potential	179	yes[a]	no	no	no	Fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	None
Marys Peak ONA	Existing	75	yes	yes	no	yes	Scenic, natural processes, fish and wildlife	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Marys Peak B	Potential	353	yes	yes	yes	yes	Scenic, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated			
								Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/ Salable Mineral Entry	Timber Harvest
McCully Mountain	Potential	101	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Middle Santiam Terrace	Existing	182	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Mill Creek Ridge	Potential	114	yes	yes	no	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Molalla Meadows	Potential	205	yes[a]	yes[a]	Yes[a]	Yes[a]	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Nestucca River	Existing	1,163	no	yes	no	yes	Scenic, fish and wildlife	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
North Santiam	Existing	15	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Rickreall Ridge	Existing	368	yes	yes	yes[a]	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Saddlebag Mountain RNA	Existing	300	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Sandy River[b]	Existing	9,780	yes[a]	yes[a]	yes[a]	yes[a]	Scenic, cultural, historic values, fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Permitted within some portions
Sheridan Peak	Existing	310					Natural processes	Closed	Open - No Surface Occupancy	Open with additional restrictions	Some thinning in stands <110 yrs old
Silt Creek	Potential	140	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes, natural hazards	Closed	Open - No Surface Occupancy	Proposed Closed	None
Snow Peak	Potential	1,667	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Soosap Meadows	Existing	343	yes	no	no	yes[a]	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
The Butte RNA	Existing	39	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Valley of the Giants ONA	Existing	1,311	yes	yes	no	yes	Scenic, natural processes, fish and wildlife	Closed	Minerals not federally administered	Minerals not federally administered	None

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated: Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/ Salable Mineral Entry	Timber Harvest
Walker Flat	Existing	11	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Waterloo	Potential	9	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Wells Island	Potential	73	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
White Rock Fen	Existing	55	yes	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Wilhoit Springs	Existing	133	no	no	no	no	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Williams Lake	Existing	90	no	no	no	no	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Yampo	Existing	13	yes	yes	yes	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Yaquina Head ONA	Existing	91	yes	yes	yes	yes	Scenic, cultural, historic values, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
EUGENE DISTRICT											
Camas Swale RNA	Existing	308	yes	yes	yes	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Coburg Hills RFI	Existing	855	no	no	no	no	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions
Cottage Grove Lake RFI	Existing	15	no	yes	no	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions
Cottage Grove Old Growth	Existing	80					Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Cougar Mountain Yew Grove	Existing	90	no	no	no	yes[a]	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions and Conifer removal to maintain grassland

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated			
								Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/ Salable Mineral Entry	Timber Harvest
Dorena Lake RFI	Existing	18	no	no	no	no	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions
Dorena Prairie	Potential	8	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential conifer removal to maintain prairie
Esmond Lake	Potential	86	no	yes[a]	yes[a]	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Fox Hollow RNA	Existing	159	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Grassy Mountain	Existing	74	yes[a]	yes[a]	yes[a]	yes[a]	Scenic, fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential conifer removal to maintain grassland
Heceta Sand Dunes ONA	Existing	210	yes	yes	Yes	yes	Scenic, natural processes	Closed	Open - No Surface Occupancy	Closed	None
Horse Rock Ridge RNA	Existing	378	yes	yes	yes	yes	Scenic, fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential conifer removal to maintain grassland
Hult Marsh	Existing	177	yes[a]	yes[a]	yes[a]	yes	Scenic, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Lake Creek Falls	Existing	54					Scenic, natural hazard	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Long Tom	Existing	8	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Lorane Ponderosa Pine	Potential	104	yes[a]	yes[a]	yes[a]	yes[a]	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions
Low Elevation Headwaters of the McKenzie River	Potential	9,765	no	no	no	no	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	Permitted if consistent with ACEC values
McGowan Meadow	Potential	75	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential conifer removal to maintain grassland

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated			
								Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/ Salable Mineral Entry	Timber Harvest
Mohawk RNA	Existing	290	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Oak Basin Prairies	Potential	223	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions and Conifer removal to maintain grassland
Taylor Creek	Potential	155	no	no	no	no	Fish and wildlife	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions
Upper Elk Meadows RNA	Existing	217	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Willamette Valley Prairie/ Oak and Pine Area	Potential	1,486	yes[a]	yes[a]	yes[a]	yes[a]	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Potential selective harvest/silvicultural prescriptions and Conifer removal to maintain grassland
ROSEBURG DISTRICT											
Bear Gulch RNA	Existing	351	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Beatty Creek RNA	Existing	864	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Bushnell-Irwin Rocks RNA	Existing	1,085	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Callahan Meadows	Potential	82	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
China Ditch	Potential	60	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Myrtle Island RNA	Existing	19	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated: Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/ Salable Mineral Entry	Timber Harvest
North Bank	Existing	6,162	yes	yes	yes	yes	Cultural, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
North Myrtle Creek RNA	Existing	453	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
North Umpqua River[c]	Existing	1,791					Scenic, fish and wildlife	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Red Pond RNA	Existing	141	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Stouts Creek	Potential	64	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Tater Hill RNA	Existing	303	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Umpqua River Wildlife Area	Existing	855	no	no	no	no	Fish and wildlife	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
COOS BAY DISTRICT											
Brownson Ridge	Potential	399	no	no	no	yes[a]	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Cherry Creek RNA	Existing	592	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
China Wall	Existing	302	yes	yes	yes[a]	yes	Cultural, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Euphoria Ridge	Potential	241	no	no	no	yes[a]	Cultural, fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Hunter Creek Bog	Existing	721	yes	yes	yes	yes	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Selective harvest (POC) to restore bog habitat.
New River	Existing	1,133	yes	yes	yes	yes	Cultural, fish and wildlife, natural processes	Closed (portion)/ Limited to designated roads (portion)	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Selective conifer removal to restore meadow habitat.

ACEC Name	Status	Total Area (Acres)	Alt 1	Alt 2	Alt 3	PRMP	Relevant and Important Value Category	Management Direction If Designated: Off-Highway Vehicle Designation	Management Direction If Designated: Leasable Mineral Entry	Management Direction If Designated: Locatable/ Salable Mineral Entry	Management Direction If Designated: Timber Harvest
North Fork Chetco	Existing	603	yes	yes	yes	yes	Cultural, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Possible density management thinning in young stands to restore late-successional conditions and produce large wood structure.
North Fork Coquille River	Existing	311	yes	yes[a]	no	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Possible density management thinning in young stands to restore late-successional values and produce large wood structure.
North Fork Hunter Creek	Existing	1,757	yes	yes	yes	yes	Cultural, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Clearcutting to restore the former extent of bald/meadow openings. Thinnings and group selections in adjacent stands.
North Spit	Existing	682	yes	yes	yes	yes	Cultural, scenic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Rocky Peak	Potential	1,827	yes	yes	yes	yes	Cultural, scenic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Roman Nose	Potential	205	yes	yes	yes[a]	yes	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Clearcutting to restore the former extent of bald/meadow openings. Thinnings and group selections in adjacent stands.
Steel Creek	Potential	1,381	yes[a]	yes[a]	No	yes[a]	Historic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Possible density management thinning in young stands to restore late-successional conditions and produce large wood structure.
Tioga Creek	Existing	42	yes	yes	No	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Upper Rock Creek	Existing	472	yes	no	no	yes[a]	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Possible density management thinning in young stands to develop late-successional red cedar stand.
Wassen Creek	Existing	3,394	yes	no	no	yes	Scenic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	No scheduled harvest. Possible density management thinning to restore late successional values.
MEDFORD DISTRICT											
Baker Cypress	Existing	11	no	no	no	no	Scenic, cultural, natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	Thinning of competing overstory around Bakers cypress
Bobby Creek RNA	Existing	1,915	yes	yes	yes	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None

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Brewer Spruce RNA	Existing	1,707	yes	yes	yes	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Cobleigh Road	Potential	261	yes[a]	yes[a]	yes[a]	yes[a]	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Manual fuels treatments likely benefit existing habitat for listed plants.
Crooks Creek	Existing	147	no	yes	no	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	Density management to maintain forest health, later successional state, and wildlfe values.
Dakubetede Wildland	Potential	1,796	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Fuels treatments will benefit existing habitat for listed plants and unique plant community.
East Fork Whiskey Creek	Potential	3,188	no	yes	no	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Density management to maintain forest health, later successional state, and wildlife values.
Eight Dollar Mountain	Existing	1,249	yes	yes	yes	yes	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	None
French Flat	Existing	651	yes[a]	yes[a]	yes[a]	yes[a]	Cultural, natural processes	Closed	Open - No Surface Occupancy	Open	Density management to maintain forest health, reduce fuels loads, remove trees encroaching into serpentine meadows occupied by listed plants.
Grayback Glades RNA	Existing	1,022	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Hole-In-The-Rock	Existing	63	no	no	no	no	Scenic, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Holton Creek RNA	Existing	421	yes	yes	yes	yes	Scenic, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Density management to maintain forest health, later successional state, scenic, and wildlfe values.
Hoxie Creek	Existing	255	no	no	no	no	Scenic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Iron Creek	Existing	286					Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Jenny Creek	Existing	966					Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
King Mountain Rock Garden	Existing	68	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	Commercial thinning of peripheral conifer stands.
Long Gulch	Potential	1,020	no	no	no	no	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Density management to maintain forest health, later successional state, and wildlife values.

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Lost Lake RNA	Existing	387	yes	yes	yes	yes	Scenic, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Density management to maintain forest health, owl cores, M20 and the heritage cell in a later successional state.
Moon Prairie	Existing	92	no	no	no	no	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	None
North Fork Silver Creek RNA	Existing	499	yes	yes	yes	yes	Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Density management in the future to maintain health and faciliate late successional characteristics.
Old Baldy RNA	Existing	115	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Oregon Gulch RNA	Existing	1,051	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Pickett Creek	Potential	32	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Fuels treatments will benefit existing habitat for listed plants and unique plant community
Pilot Rock	Existing	544					Fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Pipe Fork RNA	Existing	516	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Poverty Flat	Existing	29	yes	yes	yes	yes	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	None
Reeves Creek	Potential	117	no	no	no	no	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Rough and Ready	Existing	1,189	yes[a]	yes[a]	yes[a]	yes[a]	Natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	Limited commercial thinning of adjacent conifer stands (181 acres).
Round Top Butte RNA	Existing	605	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Scotch Creek RNA	Existing	1,799	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Sterling Mine Ditch[d]	Existing	143					Cultural, historic	Closed	Open - No Surface Occupancy	Open	Work with SHPO on mitigation measures; densitiy management to maintain the scenic character, directional falling
Table Rocks ONA	Existing	1,244	yes	yes	yes	yes	Scenic, natural processes	Closed	Open - No Surface Occupancy	Open	None

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Tin Cup	Existing	83	no	no	no	no	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Open	None
Waldo-Takilma	Potential	1,760	yes	yes	yes	yes	Historic, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	Density management and fuels thinning could benefit the values
Whiskey Creek[e]	Proposed	633	yes	yes	yes	yes	Natural processes				
Woodcock Bog RNA	Existing	265	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
KLAMATH FALLS RESOURCE AREA (of the Lakeview District)[f]											
Bumpheads	Potential	112	yes	yes	yes	yes	Scenic, cultural, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Miller Creek	Existing	939	yes	yes	yes	yes	Scenic, fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Old Baldy RNA	Existing	355	yes	yes	yes	yes	Natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Tunnel Creek	Potential	72	yes[a]	yes[a]	yes[a]	yes	Fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None
Upper Klamath River	Existing	5,092	yes	yes	yes	yes	Historic, cultural, scenic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	Forest health treaments
Upper Klamath River Addition	Potential	910	yes[a]	yes[a]	yes[a]	yes[a]	Historic, cultural, scenic, fish and wildlife, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	Forest health treaments
Wood River Wetland	Existing	3,225	yes	yes	yes	yes	Cultural, fish and wildlife, natural processes	Closed	Open - No Surface Occupancy	Proposed Closed	None
Yainax Butte	Existing	707	yes	yes	yes	yes	Cultural, natural processes	Limited to designated roads	Open - No Surface Occupancy	Proposed Closed	None

[a]Area would be designated without the O&C harvest base acres included.

[b]Under the No Action alternative, this ACEC is called the Sandy River Gorge ONA and consists of 392 acres. The action alternatives would expand the ACEC beyond the gorge itself.

[c]North Umpqua River is designated as a Wild and Scenic River.

[d]Sterling Mine Ditch is eligible for listing under the National Historic Preservation Act

[e]Whiskey Creek was not evaluated for ACEC status in the draft EIS. The area is a serpentine fen with special status plants. It will be managed under interim management until the Medford District determines if Whiskey Creek meets the ACEC criteria during a future plan amendment or revision.

[f]The jurisdiction for the lands identified as the Four Mile ACEC has been determined to belong to the Bureau of Reclamation and as such cannot be included in the western Oregon Plan Revision. The Four Mile ACEC has been removed from analysis in the EIS.

Table N-2. Specific Relevant And Important Values

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Salem District					
Beaver Creek	Potential			Natural system associated with mid-elevation oak meadow and native prairie flora seldom seen along western slopes of northern Cascades in Oregon. Contributes to regional oak meadow network as described in the Nature Conservancy's nomination letter (dated 1/6/2006) and the Willamette Valley-Puget Trough-Georgia Basin, Ecoregional Assessment.	
Crabtree Complex RNA/ ONA	Existing	Scenic values for this area are high in the immediate vicinity. Scenic qualities such as forest cover type, complex of habitats and geologic features are considered exceptional within the Salem District.	The relatively undisturbed forest is used by northern spotted owls (FT). Cliffs provide unique habitat with potential for raptor use. Evening field slug (*Derocerus hesperium*) (BS) is documented within the ACEC.	West Cascades, Oregon Ecoregion Cells: Western hemlock/devil's club and old-growth western red cedar types. Evidence of glaciation along with a relatively undisturbed old-growth forest at a relatively low elevation contributes to relevance for natural systems at this site. This area has a population of Alaska-cedar that is fairly uncommon in this region. Rare botanical species reported from this area include: *Phaeocollybia californica* (BS)	
Elk Creek	Existing		An ACEC since 1980, it was originally established for management of rare inland bald eagle (BS) nest site. In addition to continued use by eagles, also contains a known marbled murrelet (FT) site and an historic spotted owl site (FT). The ACEC is a rare northern coast range example of a relatively large contiguous block of old forest that contains excellent habitat for all three of these species, and is expected to continue to contribute to their recovery. Elk Creek is also considered to be the most important and biologically complex tributary to the Nestucca River system because Oregon Coastal coho (FT), chinook (BS), summer and winter steelhead (BS), sea-run and resident cutthroat trout and Pacific lamprey all spawn in this stream.	This contiguous block of old forest is a rare example of a fully functional natural system in the north Oregon Coast Range as evidenced by the extensive list of late-successional forest dependent species that occur there. While there are other patches of old forest in the northern coast range, few are of the size and contiguity of the Elk Creek area while also remaining relatively undisturbed.	
Forest Peak RNA	Existing		Undisturbed valley margin meadows are rare in this vicinity. This meadow may provide habitat for several rare invertebrate species including: Fender's blue butterfly (FE) and Taylor's checkerspot (BS). This meadow also offers habitat for declining Willamette valley songbirds, including common nighthawk, Oregon vesper sparrow (BS), western bluebird, and acorn woodpecker.	Willamette Valley Ecoregion cells: Douglas-fir/ poison oak forest, Douglas-fir/bigleaf maple forest with some grand fir, Lemmon's needlegrass-moss bald. . Valley margin cell\, undisturbed 3rd order stream in valley fringe. *Cimicifuga elata* (BS)	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Grass Mountain RNA	Existing	Scenic	High elevation grassy bald habitat is juxtaposed with mature noble fir and forest, offering undisturbed refugia for rare and endemic invertebrate species including an unnamed blind ground beetle. The older forest stands have a long history of use and offer nesting habitat for spotted owl (FT) and marbled murrelet (FT).	Coast Range Ecoregion Cells: Noble fir-western hemlock forest, Grass bald on Coast Range mountain. Meets the needs of a high elevation noble fir and grass meadow community and an undisturbed 3rd order stream system.	
High Peak - Moon Creek RNA	Existing		The Moon Creek ACEC contains active northern spotted owl (FT) and marbled murrelet (FT) sites. The area is comprised of contiguous late-successional forest habitat that is relatively inaccessible and undisturbed within a very steep canyon that is ideal for supporting owls and murrelets. Elevations within the ACEC range from over 2,800 feet on High Peak to about 600 feet on Moon Creek itself. Trees as much as 500 years old are found there. One of few remaining relatively large contiguous blocks of old forest found in north Oregon coast range. Moon Creek is also high quality habitat for anadromous fish of regional significance, including Oregon Coastal coho (FT) and steelhead (FT)	Rare example of northern Oregon coast range old-growth forest with intact functioning late-successional forest system. Coast Range Ecoregion Cells: Western hemlock/swordfern, Western hemlock/vine maple-salal. Douglas-fir/sword fern community natural processes also for riparian hardwoods/streamside forest on third to fifth order stream at low elevation.	
Jackson Bend	Existing		Roosting and nesting sites for bald eagle (BS), great blue heron, and osprey are documented within this ACEC.	This parcel is on the banks of, and within the floodplain of ,the Willamette River. The entire area is seasonally flooded during high water events. Very little land of this type is in federal ownership, and the habitat in this parcel is unique from all other BLM lands in northwest Oregon.	
Little Grass Mountain	Existing	scenic vistas	Example of grassy bald habitat adjacent to mature conifer forest. Rare or endemic invertebrate species are possible.	Grass balds are uncommon in the Oregon Coast Range Mountains. There are no specific values within this area that set it apart from other grassy balds that are not designated as ACECs.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Little North Fork Wilson River	Potential		High quality habitat and known sites for northern spotted owl (FT), marbled murrelet (FT) and bald eagle (BS) exists within the potential Little North Fork Wilson River ACEC. All three species have nested either now or in the recent past within the area. Due to its inaccessibility, ruggedness, lack of fragmentation, and proximity to highly managed state and private forest lands, this area is one of the few remaining areas in the northern Coast Range where late-successional dependent species exist largely undisturbed. The Little North Fork Wilson River is also a tier 1 key watershed and supports 5 salmonid species including coastal winter steelhead (BS), Oregon Coast coho (FT) and chum salmon, and is the only stream on BLM managed lands in the northern coast range that supports chum salmon.	Intact old-growth conifer riparian habitat is rare throughout the state of Oregon and is especially rare in coastal ecosystems. This potential ACEC contains old-growth components in a biologically diverse and natural condition not only within the riparian areas but throughout the adjacent slopes and tributary drainages as well. A relict old-growth plant community of Douglas-fir, Sitka spruce, Western hemlock, and Western red cedar that is approximately 450 years old within the canyon of the Little North Fork of the Wilson River. The riparian plant community is essentially natural, having large conifers shading and contributing downed material to the river system.	
Little Sink RNA	Existing		Parcel provides excellent example of low elevation coast range old-growth forest adjacent to Willamette Valley margin. Ponds support healthy populations of native amphibians (no bullfrogs). Potential release site for western pond turtle. Historic nest site for spotted owl (FT). Refugia for invertebrate species, with potential presence of Johnson's hairstreak (BS), spotted taildropper slug (BS), and other uncommon mollusks.	Willamette Valley Ecoregion Cells: Douglas-fir grand fir/vine maple-salal, Slump pond at margin of valley, with aquatic beds and marshy shore. "Instant Study (wilderness) Area in the foothills of the Willamette Valley. Rare botanical species reported from this location include: *Wolffia columbiana* (BS) and *Wolffia boraelis* (BS).	The past slumping soils or unstable ground at Little Sink has created at least 3 distinct ponds.
Lost Prairie	Existing		Large bog and wetland habitat supports a diverse assemblage of uncommon invertebrate species, which may include: evening field slug (BS), crowned tightcoil snail (BS), and spotted tail-dropper slug (BS). Site also offers nesting habitat for songbirds, such as the olive-sided flycatcher, western bluebird, and willow flycatcher.	Unique high elevation sphagnum bog and associated species located in the northern Oregon Coast Range. Rare botanical species reported from Lost Prairie ACEC include: *Fritillaria camschatcensis* (BS), *Erythronium elegans* (BS), *Anemone oregana* var. *felix* (BS), *Tetraplodon mnioides* (BS).	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Lower Scappoose Eagle	Potential		Lower Scappoose Eagle PACEC includes an active and productive bald eagle (BS) nest site and a communal winter roost, a circumstance that is highly unusual. Surrounded by private industrial forestland and expanding urban areas, this site provides refuge for eagles due to its relative inaccessibility and ruggedness and has contributed to the resurgence of eagle numbers in the lower Columbia River recovery zone.		
Marys Peak ONA	Existing	Marys Peak is the highest mountain in the Oregon Coast Range Mountains.	This unique high elevation grassy bald habitat is juxtaposed with mature and old-growth forests and is known to support populations of several rare or endemic invertebrates including: Haddocks caddisfly (BS), and Roth's blind ground beetle (BS). The older forest stands have a long history of use and offer nesting habitat for spotted owls (FT) and marbled murrelets (FT).	Marys Peak is the highest mountain in the Oregon Coast Range Mountains. Special habitats or natural values include: high elevation grass meadows, noble fir community, and shallow soils with ‘rock garden’ plants.	
Marys Peak B	Potential	High scenic values in the immediate vicinity.	Uncommon or endemic invertebrates are possible in high elevation tributaries of Parker Creek, including the Haddock's caddisfly (BS). The older forest stands have a long history of use and offer nesting habitat for spotted owls (FT) and marbled murrelets (FT).	Marys Peak Parcel B includes a high elevation Coast Range old-growth forest with a noble fir component, which is rare.	
McCully Mountain	Potential			Natural system associated with mid-elevation oak meadow and native prairie flora seldom seen along the western slopes of the northern Cascades in Oregon. Importance is met through regional interest in oak habitats within and adjacent to the Willamette valley. Contributes to the regional oak meadow network as described in the Nature Conservancy’s nomination letter (dated 01/06/2006) and the Willamette Valley-Puget Trough-Georgia Basin, Ecoregional Assessment. The McCully Mountain PACEC meets regional significance based on the limited number of mid-elevation oak meadows that remain intact. Potential for nesting raptors, use by Neotropical Migratory birds and occurrence of wildlife species associated with older forest.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Middle Santiam Terrace	Existing	A Native American cultural site at this location is one of few in the region on public lands.		Old-growth fir and hemlock forest at a relatively low elevation river terrace. Habitat of this type is relatively unique and has an increased value as a research site. All forest surrounding this ACEC is privately owned and has been previously logged, leaving this as the last remaining natural habitat in a matrix of young managed forests.	
Mill Creek Ridge	Potential			Oregon white oak community in northwest Oregon on east slopes of the Coast Range. Rare valley margin oak habitat juxtaposed with coast range conifer forests is likely to support great diversity of uncommon or endemic invertebrate species, and provide nesting habitat for declining Willamette valley songbirds, including common nighthawk, western bluebird, and white-breasted nuthatch.	
Molalla Meadows	Potential	The river corridor has a high level of public use and meets relevance criteria for both recreation and scenic values. The Molalla River has been found to be both eligible and suitable for inclusion into the National Wild and Scenic River (WSR) System for outstandingly remarkable values that include geology, scenic and recreation. The general area including the PACEC has been recognized for both its scenic and recreation values and has been designated a BLM Special Recreation Management Area. While there may be some overlap between the WSR and the PACEC boundaries, the protections and guidance provided under WSR guidance are interim unless the river is actually added to the WSR System by Congress. In addition, the interim guidance only addresses management within a 1/4-mile of either side of the Molalla River. As long as any management prescriptions for the PACEC met WSR interim guidance, these would be complimentary not competing designations.	The area meets relevance for Wildlife Resources due to presence of raptor nests, use by Neotropical Migratory birds and occurrence of wildlife species associated with older forest. Golden eagles, Oregon slender salamander (BS), harlequin duck (BS), and band-tailed pigeon occur here.	The meadows represent a unique ecotype with natural systems and geologic features seldom seen on BLM lands in the Salem District. The oak meadows represent a rare transition from valley oak savannas' to upland conifer forests. This site contributes to the regional oak meadow network as described in the Nature Conservancy's nomination letter (dated 01/06/2006) and the Willamette Valley-Puget Trough-Georgia Basin, Ecoregional Assessment. The oak meadow at this site is the largest of this habitat type under BLM ownership in the Cascades Range, within the Salem District.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Nestucca River	Existing	Designated State scenic waterway & BLM backcountry byway. The upper Nestucca River is eligible for inclusion in National Wild & Scenic River system (recreational designation). The river corridor is designated VRM 1.	The Nestucca River corridor includes high quality nesting, roosting and foraging habitat for bald eagles (FT) and marbled murrelets (FT). The river provides important connectivity to other high quality habitat areas, most notably the Elk Creek drainage and ACEC. Marbled murrelets are known to use the river corridor to access nesting habitat within the drainage. The Nestucca River is also a high quality anadromous fish stream and contributes significantly to wild fish production on the north Oregon Coast. Oregon Coastal coho (FT), chinook (BS), summer and winter steelhead (BS), sea-run and resident cutthroat trout and Pacific lamprey are all present.		
North Santiam	Existing			Represents a natural system not common in the region. The primary natural system operating in the area are the relatively undisturbed river meander channels which are rare and sensitive to additional disturbance. This area contributes to the habitat used by species in combination with Kingston prairie and Stout Mountain (adjacent areas with unique values). Existing alluvial forest provides potential nesting and roosting habitat for resident and migratory birds. With its unique habitat this area contributes to overall RNA values for this habitat type but it is not large enough to meet the needs of the RNA cell.	
Rickreall Ridge	Existing			Rocky “hogback” ridge, steep talus slopes, and unique vegetation in the Oregon Coast Range Mountains. Rickreall Ridge has a disjunct flora as the vegetation is similar to vegetation known from the Cascade Mountain Range. High elevation rocky outcrops and adjoining older forest support a diversity of rare or endemic invertebrate species, including Johnson's hairstreak (BS), and spotted tail-dropper (BS). Older forest provides potential nesting habitat for spotted owls (FT) and marbled murrelets (FT).	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Saddle Bag Mountain RNA	Existing		Exceptionally rare old-growth Pacific silver fir forest in Oregon Coast Range supports a diversity of rare invertebrate species that could include: Johnson's hairstreak (BS), and spotted tail-dropper (BS). Forest provides potential nesting habitat for spotted owls (FT) and marbled murrelets (FT).	Old-growth Pacific silver fir and western hemlock community. Saddlebag may be the last remaining mature naturally occurring Pacific silver fir stand in the Oregon Coast Range. Pacific silver fir was once thought to be more widespread but due to climatic changes may now be isolated to a few areas in the Oregon Coastal Mountains. Rare botanical species reported from Saddlebag Mountain RNA: *Erythronium elegans* (BS)	
Sandy River Gorge ONA	Existing	Cultural: Barlow Road and Rock Corral (currently listed) are National Register sites within the corridor. A prehistoric site eligible for the National Register also exists. Scenic: The inner gorge has steep canyon walls, deep, trench-like pools, waterfalls and cliff-dwelling plant communities. The Mt. Hood corridor (Highway 26) has a VRM 1 classification due to it scenic qualities and is congressionally designated as the Mt. Hood Scenic Corridor.	Stocks of Lower Columbia River chinook (BS), winter steelhead (BS), coho (FT)and cutthroat trout are present in this portion of the Sandy River. Spawning grounds for chinook salmon, rearing habitat for steelhead and chinook salmon are also present. Peregrine falcons, bald eagles (BS) and harlequin ducks (BS) have been known to use the Sandy River Gorge. Migratory birds such as the willow flycatcher have been documented within the ACEC.	Recognize that some of the lands are currently not in forest condition (agricultural). Value of the lands as a whole is greater than the value of individual parcels. Riparian old-growth forests in the Middle Sandy are rare in the watershed downstream from Marmot Dam. Bureau sensitive fungus species, *Bridgeoporus noblissimus* (BS) is reported from the PACEC.	Precipitous slopes and canyon walls that line the inner gorge are a threat to outdoor enthusiasts enjoying the captivating views.
Sheridan Peak	Existing			Former special status botanical species, *Poa marcida* is reported from this location. This species no longer has special status.	
Silt Creek	Potential			Active, natural landslide with an old-growth forest and unique habitat related to the slow but continual mass earth movement. The area is also host to an abnormally large population of *Pseudocyphellaria rainierensis*.	Large scale, active natural landslide
Snow Peak	Potential		Contains one occupied known northern spotted owl (FT) site and core area. Known to be used by various migratory bird species such as the olive-sided flycatcher. Oregon slender salamander (BS), Cascades torrent salamander and the Evening fieldslug (BS) (*Derocerus hesperium*), have been documented within the PACEC.	Snow Peak's elevation of 4280 feet makes it an uncharacteristically high point very close to the Willamette Valley. The PACEC hosts a variety of special habitats including wet meadows, dry meadows, rock outcrops/crevice habitat, talus slopes, mature to old-growth forests, headwater streams with adjacent riparian and brushy thickets in close proximity to one another. This habitat complex provides for an abundant array of wildlife species and rare botanicals including *Bridgeoporus noblissimus (*BS*),Corydalis aquae-gelidae (*BS*) , Pilophorus nigricaulis (*BS*), Lobaria linita (*BS*). A* wetland botanical species (*Fauria crista-galli*) found nowhere else in Oregon is also found here.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Soosap Meadows	Existing			These meadows are the only large, undisturbed expanse of natural Cascadian subalpine meadows in the Salem District. Streams which have cut through the glacial moraine have left behind a unique and diverse remnant of subalpine habitat.	
The Butte RNA	Existing			Willamette Valley & Coast Range Ecoregion Cells: Douglas-fir/poison oak forest, Oregon white oak/grass savanna. Uncommon transitional ecotone involving Willamette Valley margin plant communities and upland Coast Range forested communities. Rare botanical species reported from The Butte RNA include: *Cimicifuga elata* (BS)	
Valley of the Giants ONA	Existing	Outstanding example of coastal old-growth forest	Valley of the Giants ONA lies within the largest contiguous patch of old-growth forest habitat in the northern Oregon Coast Range (over 800 acres, 400+ years old). This older forest provides nesting habitat for one of the largest concentrations of breeding marbled murrelets (FT) in Oregon. The proposed area also provides habitat for northern spotted owls (FT), bald eagles (FT), and Oregon Coastal steelhead (summer-run and winter-run; both FC). These old-growth stands provide an exceptionally large refugium for invertebrate species that are closely associated with older forest conditions.	Although not designated as an RNA, Valley of the Giants is well studied as a remnant 'old-growth' western hemlock plant association. Rare botanical species reported from this location include: *Schistostega pennata* (BS), *Filipendula occidentalis* (BS), and *Tetraphis geniculata* (BS)	
Walker Flat	Existing			The only natural occurrence of Sidalcea *nelsonia* (FT) in the Salem District is within the Walker Flat ACEC.	
Waterloo	Potential			The BLM's Waterloo parcel is within The Nature Conservancy's Waterloo Rocks portfolio site. This is the only known Salem District parcel with naturally-occurring Ponderosa Pine. The map of historic (mid-1800s) vegetation shows this as part of a large oak-fir-pine savanna, with prairie located just to the east. Considered in the context of The Nature Conservancy's Ecoregional Assessment and the Waterloo Rocks portfolio site, in particular, the Waterloo parcel becomes an important part of a larger system of target conservation areas for the oak-pine-fir habitats.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Wells Island	Potential		Diverse floodplain forest, seasonally exposed gravel bars, and side-channel habitats. Supports nesting herons, ospreys and numerous songbird species. Invertebrates may include: Willamette floater mussel, and Oregon Floater.	Wells Island is an island in the Willamette River. Very little land from within the Willamette Valley is in Federal ownership. This island includes habitat that is unique from all BLM ownership in northwest Oregon.	
White Rock Fen	Existing			The ACEC is centered around four fens differing in size. These four fens provide special habitat to an array of botanical species seldom seen in the Cascade Resource Area. Each fen is unique and may represent various stages in succession. Formation of the fens appears to be the result of an ancient large-scale mass wasting of the local ridge system which created a system of landslide scraps and sag ponds. Hydrologic features associated with bogs are the natural systems of interest. Bogs within this ACEC are unique to the region and are considered fragile.	
Wilhoit Springs	Existing			Contributes to low elevation old-growth cell as described by the Nature Conservancy. A rare community with regionally significance as an intact low elevation old-growth conifer forest.	
Williams Lake	Existing			Cascade Lake and bog habitats with lakeside plant community that is unique and fragile. William's Lake and its bog ecosystem is the best example within the Salem District of a Cascadian massive seep formed lake undergoing peat bog/quaking bog succession.	
Yampo	Existing			Yampo ACEC supports a late-seral Willamette Valley bottom plant community that includes occurrences of rare botanical species *Cimicifuga elata* (BS) and *Lathyrus holochlorus* (BS). *Lathyrus holochlorus* has not been seen in this parcel since the 1980s.	
Yaquina Head ONA	Existing	Headland on the Pacific Ocean. The area is known as a cultural site for past native Americans use and as a historical site with an operating lighthouse.	A diverse assemblage of coastal habitats such as tide pools, rocky islands, and upland meadow provide for a great diversity of marine invertebrates, nesting seabirds, and marine mammals.	This headland on the eastern Pacific Ocean provides for several unique habitats including: Sitka spruce forest, lodgepole forest, headland grass/shrub communities, wildlife roosts and nesting habitat, tide pools and associated ocean organisms. Rare bryophyte species *Eucladium verticillatum* is reported from the Yaquina Head ONA.	
Eugene District					
Camas Swale RNA	Existing		Provides habitat for wildlife species, but does not explicitly list distinct species.	The site fills the natural heritage cell or element as: Douglas-fir/swordfern and Douglas-fir/Oregon-grape forest	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Coburg Hills RFI	Existing		Raptors (bald eagles (BS), northern spotted owl (FT), western screech owl, northern saw-whet owl, osprey red-tailed hawk; great gray owl, northern pygmy-owl, American kestrel)	Relict Forest Islands provide representative examples of mature and old-growth plant communities in areas where few to no other such communities exist.	
Cottage Grove Lake RFI	Existing		Raptors: (bald eagles (BS), northern spotted owl (FT), western screech owl, northern saw-whet owl, osprey red-tailed hawk; great gray owl, northern pygmy-owl, American kestrel, osprey)	Relict Forest Islands provide representative examples of mature and old-growth plant communities in areas where few to no other such communities exist.	
Cottage Grove Old Growth	Existing			Douglas-fir old-growth stand. Multiple canopy layers represent the late-successional stage of mesic Douglas-fir plant community with some existing older trees representing ages of 500 years old or more. Cimicifuga elata (BS).	
Cougar Mountain Yew Grove	Existing		Good cavity nester habitat	Site represents one of the lowest elevation stands of Pacific Yew remaining in the Willamette Valley	
Dorena Lake RFI	Existing		Raptors (bald eagles (BS), northern spotted owl (FT), western screech owl, northern saw-whet owl, osprey, red-tailed hawk; great gray owl, northern pygmy-owl, American kestrel, osprey).	Relict forest islands provide representative examples of mature and old-growth plant communities in areas where few to no other such communities exist.	
Dorena Prairie	Potential			Considered one of the few remaining representative examples of native upland prairie within the Willamette Valley Province.	
Esmond Lake	Potential		Coho salmon and steelhead migrate through Esmond Lake and spawn in tributaries above the lake. This lake appears to contain one of the best Coho rearing habitats in the Siuslaw Basin on BLM-administered lands.	Esmond Lake has an uncommon geologic feature formed by a large deep-seated landslide. It is the one of only tow significantly sized lakes found in the Siuslaw Resource Area and has experienced very little human disturbance.	
Fox Hollow RNA	Existing			The site fills the natural area cell or element described in the Oregon natural heritage plan as: Douglas-fir/swordfern and Douglas-fir/Oregon-grape forest. A mixed stand of Douglas-fir and ponderosa pine is found on the south slopes and ridge tops, with minor amounts of Oregon white oak and Incense-cedar.	
Grassy Mountain	Existing	Highly visible grassy bald.	Screening results recognize contribution to wildlife habitat, but no species explicitly mentioned.	The site fills the natural heritage cell or element as: Blue wildrye or red fescue grass bald communities; vernal seepage slopes on low to mid elevation rocky bald communities, with monkey flower, saxifrages and moss. One of the finest, undisturbed representative examples of a grassy bald on the western margin of the Cascades.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Heceta Sand Dunes ONA	Existing	Scenic dune system		Seashore bluegrass association; Red Fescue association; Shore pine/slough sedge association; Shore pine/bearberry association; shore pine/hairy manzanita association.	
Horse Rock Ridge RNA	Existing	Highly visible grassy bald.	Provides habitat for wildlife species, but does not explicitly list distinct species.	The site fills the natural area cell or element in the Oregon Natural Heritage Plan as: West Cascades Ecoregion/shrub and Grassland type blue wildrye or Roemer's fescue grass bald communities.	
Hult Marsh	Existing	scenic values		*Utricularia gibba* (BS) and *Lycopodiella inundata* (BS)	
Lake Creek Falls	Existing				The algae that creates a slippery rock slide also creates a very unstable walking surface in the stream. Sharp, poorly visible, underwater boulders in pools present hazards to divers. Unstable logs tend to jam up in the pools following winter floods and present hazards to swimmers.
Long Tom	Existing			Willamette Valley prairie adjacent to the West Eugene Wetlands	
Lorane Ponderosa Pine	Potential			Willamette Valley Ponderosa Pine; The Willamette Valley population of ponderosa pine is considered a separate and distinct population from other ponderosa pine populations within Oregon.	
Low Elevation Headwaters of the McKenzie River	Potential	McKenzie River (11 miles) suitable for inclusion in National Wild and Scenic System as a Recreational Segment	Bull trout; Upper Willamette spring chinook; cutthroat trout; northern spotted owl, tailed frog; Harlequin duck	Unique nature of a large continuous block of native forest. Minimally disturbed blocks of land under 2,000 feet on the east side of Willamette Valley.	
McGowan Meadow	Potential	Proposed Celebrating Wildflower Site		Site exemplifies a wet meadow with flora of both the Cascades and Willamette Valley ecoregions.	
Mohawk RNA	Existing		Provides habitat for wildlife species, but does not explicitly list distinct species (possible habitat for Spotted Owls).	The site fills the natural heritage cell or element as: Douglas-fir/western hemlock/Oregon-grape and salal forest. Old-growth Douglas-fir and western hemlock within low elevation Willamette Valley foothills. Site contains small marsh. Tributaries of McGowan Creek flow through or originate in the area.	
Oak Basin Prairies	Potential		Fender's blue butterfly (FE), Taylor's checkerspot butterfly (BS).	These tracts are portions of a large upland prairie complex on the west side of the Coburg hills. Kincaid's lupine (*Lupinus sulphureous* ssp. *kincaidii*) (FT), Hitchcock's blue-eyed grass (BS).	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Taylor Creek	Potential		Bald eagle (BS), northern spotted owl (FT), osprey. Western parcel is a significant spawning channel of the McKenzie River.		
Upper Elk Meadows RNA	Existing			Four distinct plant communities are in the area: open, wet sedge meadow; wet red alder/willow/hawthorn thickets; open forest dominated by old-growth silver and grand fir; and closed forest dominated by old-growth Douglas-fir.	
Willamette Valley Prairie/Oak and Pine Area	Potential			These sites represent some of the few remaining upland red fescue prairies and oak habitats in the Willamette Valley Province.	
Roseburg District					
Bear Gulch RNA	Existing			Douglas-fir/canyon live oak woodland w/ poison oak and dwarf Oregon-grape; and Douglas-fir/canyon live oak forest	
Beatty Creek RNA	Existing			Jeffrey pine community on serpentine. Wayside aster (*Eucephalus vialis*) (BS), California sword fern (*Polystichum californicum*) (BS), *Pseudoleskeella serpentinensis*	
Bushnell-Irwin Rocks RNA	Existing			Oregon white oak savanna; Oregon white oak/Douglas-fir/poison oak woodland; Thompson's mistmaiden (*Romanzoffia thompsonii*) (BS), California sword fern	
Callahan Meadows	Potential			Kincaid's lupine (*Lupinus sulphureous* ssp. *kincaidii*) (FT), serpentine meadow, Umpqua mariposa lily (*Calochortus umpquaensis*) (BS)	
China Ditch	Potential			Kincaid's lupine (FT)	
Myrtle Island RNA	Existing			Old-growth stand of California bay laurel and Douglas-fir (riparian hardwood forest along a major river)	
North Bank	Existing	Important cultural site	Columbian white-tailed deer	Koehler's rock cress (*Arabis koehleri* var. *koehleri*) (BS), Red-rooted yampah (*Perideridia erythrorhiza*) (BS), rough popcorn flower (*Plagiobothrys hirtus*) (FE), *Sulcaria badia*	
North Myrtle Creek RNA	Existing			Douglas-fir/ponderosa pine forest; white fir/dwarf Oregon-grape; Douglas-fir/bigleaf maple forest	
North Umpqua River	Existing	Scenic	Fish		
Red Pond RNA	Existing		Northern spotted owl, western pond turtle	Low elevation permanent pond; dotted water-meal (*Wolffia borealis*) (BS), *Phaeocollybia californica* (BS)	
Stouts Creek	Potential			Kincaid's lupine (FT)	
Tater Hill RNA	Existing			Western hemlock/oceanspray community	Active landslide

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Umpqua River Wildlife Area	Existing		Bald eagle (BS). Most of the six parcels within the existing ACEC fall within Bald eagle management areas.		
Coos Bay District					
Brownson Ridge	Potential		Marbled murrelet occupied site (FT), northern spotted owl (FT) known site.	Well developed Port-Orford-cedar stand with all age classes	
Cherry Creek RNA	Existing		Northern spotted owl (FT), marbled murrelet (FT).	Fills two (Western hemlock/oxalis; Western hemlock/ rhododendron-Oregon-grape) ONHP Coast Range Ecological Cells	
China Wall	Existing	Remnant of historic Brewster Trail; prehistoric site.		Unique plants associated with bald meadows;	
Euphoria Ridge	Potential			Old-growth western red cedar stand series rare in Coast Range at this elevation (potential ONHP Coast Range cell)	
Hunter Creek Bog	Existing			Fills ONHP Coast Range Ecoregion Cell (Port Orford Cedar on ultramafic soils). Botany -- large, diverse serpentine bog.	
New River	Existing	Prehistoric sites	Western snowy plover (FT), Northwestern pond turtle (BS). Coho, Chinook, cutthroat trout, steelhead.	Fills two ONHP Coastal lowlands ecological cells (lacustrine and palustrine); special status plants -- pink sand verbena (*Abronia umbellata ssp. breviflora)* (BS), *Calypogeia sphangnicola* (liverwort) (BS), timwort *(Cicendia quadrangularis)* (BS), russet cotton-grass (*Eriophorum chamissonis*) (BS), western lily (*Lilium occidentale*)(FE), silvery phacelia (*Phacelia argentea*)(BS)	
North Fork Chetco	Existing	Undisturbed cultural site	Anadromous fish habitat -- sea run cutthroat trout.	Oregon myrtle/evergreen shrub riparian forest ONHP Coast Range cell.	
North Fork Coquille River	Existing		High quality, extremely high density Coho salmon spawning	Old-growth riparian Douglas-fir/hardwood community on intact 4th order stream	
North Fork Hunter Creek	Existing	Historic cabin sites/trail; prehistoric sites.	Important spawning and rearing habitat for chinook salmon, steelhead, sea-run cutthroat, and resident cutthroat trout.	Undisturbed old-growth Port Orford cedar, and oak/ grass savannah; Hairy manzanita (*Arctostaphylos hispidula*)(BS)	
North Spit	Existing	Scenic coastal landscapes comprised of dunes, deflation plain wetlands and Sitka Spruce forest islands. Historic US Lifeguard Service sites and artifacts, and potential prehistoric site.	Western snowy plover (FT), marbled murrelet (FT), northwestern pond turtle (BS), purple martin (BS).	Numerous outstanding plant associations and wetlands. Special status plants: *Bryoria pseudocapillaris*(lichen) (BS), *Byoria spiralifera* (lichen) (BS), Point Reyes bird's-beak (*Cordylanthes maritimus ssp. palustris)* (BS), *Heterodermia leucomela (* lichen) (BS), *Niebla cephalota* (lichen) (BS).	
Rocky Peak	Potential	Historic trail and lookout sites. Panoramic views of coastline plains, foothills and ocean.	Habitat for marbled murrelet (FT), northern spotted owl (FT), fringed myotis (BS), foothill yellow-legged frog (BS), spotted tail-dropper (BS).	ONHP Special species Siskiyou monardella (*Monardella purpurea)* (BLM Strategic); rare meadow, knob-cone pine plant communities.	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Roman Nose	Potential	Outstanding, sweeping views of forest landscape from highest point in local region		Outstanding example of Oregon Coast Range grassy bald system.	
Steel Creek	Potential	Portion of historic Brewster Trail	One of the most productive spawning reaches in Coquille Basin; supports sea run and resident cutthroat trout, chinook, coho, steelhead and Pacific lamprey.	Large, structurally complex unmanaged and undisturbed late-successional forest community uncommon in Coast Range.	
Tioga Creek	Existing		High quality stream/riparian conditions and spawning habitat for coho, steelhead, and cutthroat trout.	Old-growth riparian Douglas-fir/hardwood community on 4th order stream with high value as reference site.	
Upper Rock Creek	Existing			Large red cedar dominated forest with sedge dominated wetlands; Fills Western red cedar-western hemlock/skunk cabbage ONHP Coast Range Ecological cell.	
Wassen Creek	Existing	Scenic: Large block of undisturbed mid-age forest dissected by creek with several waterfalls, plunge pools, and small palustrine lake.	Pure strain of native cutthroat trout; northern spotted owl (FT)	Fills ONHP Coast Range Ecoregion Palustrine Wetlands pond at mid to high elevation); fits two ONHP Western Hemlock association cells.	
Medford District					
Baker Cypress	Existing			Most northern Baker cypress stand in north America	
Bobby Creek RNA	Existing		Northern spotted owl (LT), northern goshawk, pileated woodpecker, tailed frog, western bluebird	Intact, uninfected Port-Orford-cedar stands, Natural heritage cell, Tanoak - Douglas-fir communities, late-successional reference stands, hydrological reference watershed.	
Brewer Spruce RNA	Existing		Northern spotted owl (FT), northern goshawk	Unique conifer assemblage, Brewer spruce,Port-Orford-cedar, and Alaska cedar community (rare inland), Natural heritage cell, serpentine pockets, the most resistant, uninfected stands of Port-Orford-cedar, critical seed/tree improvement collection area, late successional reference area, small natural lake	
Cobleigh Road	Potential			Bellinger's meadow foam (*Limnanthes floccosa ssp. bellingeriana)* (BS), Gentner's fritillary (*Fritillaria gentneri*)(FE) bulb collection site	
Crooks Creek	Existing		Townsends big eared bat (BS), Siskiyou salamander (BS)	Limestone caves, ponds, later successional Tanoak - Douglas-fir communities	
Dakubetede Wildland	Potential	Sterling Mine Ditch	Northern spotted owl (FT), Siskiyou salamander (BS)	Slender-flowered evening primrose (*Camissonia graciliflora)* (BS), tall bugbane (*Cimicifuga elata)* (BS), , clustered lady's slipper (*Cypripedium fasciculatum*)(BS), Gentner's fritillary (*Fritillaria gentneri*)(FE), western most stands of western juniper, rare water birch (*Betula occidentalis)*, intact native grasslands	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
East Fork Whiskey Creek	Potential		Northern spotted owl (FT), northern goshawk (BS), peregrine falcon (BS), clouded salamander, Pacific fisher (BS), fringed myotis (bat), and tailed frog. Intact functioning riparian habitat with cutthroat trout and sculpins.	Rogue River stonecrop (*Sedum moranii)* (BS), late-successional reference stands of Tanoak - Douglas-fir communities, inclusions of knobcone pine, Natural Heritage cell	
Eight Dollar Mountain	Existing	Historic mining and mining claims		Howell's mariposa lily (*Calochortus howelli*)BS), Oregon willow-herb (*Epilobium oreganum*)(BS), Waldo gentian (*Gentiana setigera)* (BS), Howell's microseris (*Micoseris howellii*)(BS), Siskiyou monardella (*Monardella purpurea*)(BLM Strategic), red-rooted yampah (*Perideridia erythrorhiza*)(BS), *Pseudoleskeella serpentinensis* , western bog violet (*Viola primulifolia* ssp. *occidentalis*) (BS). Serpentine communities and *Darlingtonia* fens	
French Flat	Existing	Historic mining		Howell's adder's tongue (*Erythronium howellii)* (BS), slender meadow foam (*Limnanthes gracilis* ssp. *gracilis*) (BS),Cook's lomatium *(Lomatium cookii)* (FE), Howell's microseris (*Microseris howellii*)(BS), *Senecio hesperius*, serpentine plant communities, vernal meadows with native grasses.	
Grayback Glades RNA	Existing			Natural heritage cells, aquatic (1st to 3rd order cell), Port-Orford-cedar and white fir systems, uninfected with Port-Orford-cedar disease, Sitka alder and vine maple glades, Shasta red fir	
Hole-In-The-Rock	Existing			Unique geological feature, a natural basalt arch, creating a 'hole' in the rock.	
Holton Creek RNA	Existing			Natural Heritage cell, reference site for low elevation late-successional Douglas-fir/white fir community	
Hoxie Creek	Existing	High scenic value, high recreation use	Bald eagle (BS), osprey	Relict remnant late-successional Douglas-fir community, with few ponderosa pine.	
Iron Creek	Existing			Douglas-fir, Pacific madrone and California black oak communities	
Jenny Creek	Existing		Jenny Creek sucker (BLM Strategic), Inland red band trout (BS)	Greene's mariposa lily (*Calochortus greenii*) (BS), slender nemacladus (*Nemacladus capillaris)* (BS)	
King Mountain Rock Garden	Existing	Scenic location, view point, high recreation use.		*Fritillaria glauca*, high elevation serpentine outcrop community	
Long Gulch	Potential		Northern spotted owl (FT)	unique trellised watershed, late-successional Douglas-fir/sticky whiteleaf manzanita chaparral	
Lost Lake RNA	Existing		Northern spotted owl (FT)	Tall bugbane (*Cimicifuga elata)* (BS), Natural heritage cell: Aquatic (natural lake), mixed conifer low elevation communities	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Moon Prairie	Existing	Scenic and special education value for relict old-growth	Northern spotted owl (FT)	Last remaining old-growth stand on Moon prairie, old-growth, multi-layered stand of Douglas-fir and white fir with Pacific yew, ponderosa pine and sugar pine.	
North Fork Silver Creek RNA	Existing			Natural heritage cells, white fir, Douglas-fir/Port-Orford-cedar, and sugar pine/deer oak (*Quercus saddleriana)* communities, serpentine outcrops and *Darlingtonia* fens, burned area reference site (1987 & 2002)	
Oregon Gulch RNA	Existing		Northern goshawk	Greene's mariposa lily (*Calochortus greenei*) (BS), Gentner's fritillary (*Fritillaria gentneri*) (FE), Natural heritage cell: Mixed conifer forest and mixed chaparral (*Arctostaphylos viscida-Ceanothus*-Rosaceous species), grasslands.	
Pickett Creek	Potential			Gentner's fritillary (*Fritillaria gentneri*)(FE)	
Pilot Rock	Existing	Geologic feature, scenic, high recreation use	Peregrine falcon (BS)	Greene's mariposa lily (*Calochortus greenei)* (BS), Gentner's fritillary (*Fritillaria gentneri*) (FE)	
Pipe Fork RNA	Existing		Northern spotted owl (FT), Siskiyou salamander (BS)	Clustered lady's slipper (*Cypripedium fasciculatum*) (BS)	
Poverty Flat	Existing			Bellinger's meadow foam (*Limnanthes floccosa* ssp. *bellingeriana*) (BS), vernal pool systems	
Reeves Creek	Potential			Slender meadow foam (*Limnanthes gracilis* ssp. *gracilis*) (BS), Cook's Lomatium (*Lomatium cookii)* (FE)	
Rough and Ready	Existing	Scenic, Adjacent State Botanical Wayside, and Recreation Use		Large-flowered rush lily (*Hastingsia bracteosa* var. *bracteosa*) (BS), red larkspur (*Delphinium nudicale*) (BS), *Calochortus howellii*(BS), *Erthronium howellii* (BS), *Limnanthes gracilis* ssp. *gracilis* (BS), *Lomatium cookii* (FE), *Microseris howellii* (BS), Unique flood plain and Hyporheic zone	
Round Top Butte RNA	Existing			Natural heritage cell, oak woodland savannah, native grasslands, vernal pool, unique *Calochortus uniflorus* population (un-common but not listed).	
Scotch Creek RNA	Existing			California milk-vetch (*Astragalus californicus*) (BS), saw-tooth sedge (*Carex serratodens*) (BS), *Fritillaria gentneri* (FE), Parish's horse-nettle (*Solanum parishii*)(BS), Natural heritage cell: rosaceous chaparral	
Sterling Mine Ditch	Existing	Historic mining ditch, and National Register of Historic Places		Gentner's fritillary (*Fritillaria gentneri)* (FE)	
Table Rocks ONA	Existing		Vernal pool fairy shrimp (FT)	Dwarf meadow foam (*Limnanthes floccosa ssp. pumila*) (BS), *Plagiobothrys austiniae* (BS), *Plagiobothrys greenei* (BS), southern Oregon buttercup (*Ranunculus austrooreganus)* (BS), vernal pools	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Tin Cup	Existing			Relict late-successional white fir community	
Waldo-Takilma	Potential	Historic Mining, National Register of Historic places		*Calochortus howellii* (BS), *Cypripedium fasciculatum* (BS), *Erythronium howellii* (BS), *Limnanthes gracilis ssp. gracilis* (BS), *Lomatium cookii* (FE), *Microseris howellii* (BS), *Eucephalus vialis* (BS), *Streptanthus howellii* (BS).	
Woodcock Bog RNA	Existing			*Lomatium cookii* (FE), pale sedge (*Carex livida)* (BS),Oregon willow-herb (*Epilobium oreganum)* (BS) , *Gentiana setigera* (BS), *Hastingsia bracateosa var. bracteosa* (BS), *Microseris howellii* (BS), *Monardella purpurea* (BLM Strategic), *Viola primulifolia ssp. occidentalis* (BS), Jeffrey pine/serpentine communities, *Darlingtonia* fens	
Klamath Falls Resource Area (in the Lakeview District)					
Bumpheads	Potential	Numerous, undisturbed prehistoric sites		Western juniper/Idaho fescue (*Juniperus occidentalis*/*Festuca idahoensis*) plant community that has been naturally somewhat isolated from grazing	
Miller Creek	Existing	Deep canyon within high desert plateau	Riparian habitat for migratory songbirds and raptors	Old-growth ponderosa pine community, perennial stream within high desert environment	
Old Baldy RNA	Existing			Natural Heritage cells: high elevation white fir communities with Shasta red fir, mountain hemlock, Pacific silver fir, and Western white pine; Southern Oregon Cascades chaparral.	
Tunnel Creek	Potential		Oregon spotted frog (BS)	Lodgepole pine swamp with bog blueberry (*Vaccinium uliginosum*) and sedges. Riparian and wetland processes. English sundew (*Drosera anglica*), an insectivorous plant, is listed as endangered by the state of Maine and as threatened by the state of Wisconsin.	
Upper Klamath River	Existing	Historic road, prehistoric cultural artifacts/sites. The Klamath River Canyon holds great spiritual and religious significance for the Klamath Tribe and the Shasta Nation. The unique landform, diverse vegetation, water, and a low level of adverse cultural modifications has been given a Scenic Quality A classification.	Lost River and shortnose suckers (FE), Klamath largescale sucker, native inland redband trout, bald eagle (BS) nests, Townsend's big-eared bat (BS).	Unique plant communities bisecting the Cascade Mountains which range from montane conifer forest communities to high desert communities, and from riparian communities to oak savannah communities. Red-root yampah (*Perideridia erythrorhiza* a BS plant species).	

ACEC Name	Status	Relevant and Important Value Category			
		Historic, Cultural, Scenic	Fish and Wildlife	Natural Process or System	Natural Hazard
Upper Klamath River Addition	Potential	Historic road, prehistoric cultural artifacts/site. The Klamath River Canyon holds great spiritual and religious significance for the Klamath Tribe and the Shasta Nation. The unique landform, diverse vegetation, water, and a low level of adverse cultural modifications has been given a Scenic Quality “A” classification.	Lost River and shortnose suckers (FE), Klamath largescale sucker, native inland redband trout, and bald eagle (BS) nests.	Unique plant communities bisecting the Cascade Mountains, and that range from montane conifer forest communities to high desert communities, and from riparian communities to oak savannah communities. Red-root yampah (*Perideridia erythrorhiza*), a BS plant species).	
Wood River Wetland	Existing	Native American village and wocus gathering sites.	Lost River suckers (FE), bald eagle (BS) foraging and nesting, Oregon spotted frogs (BS), yellow rails, wild trout, migratory waterfowl	Complex of wetland plant communities	
Yainax Butte	Existing	Yainax Butte is considered to be a very important place in the traditional beliefs of the Klamath Tribes, and is likely eligible for inclusion to the National Register of Historic Properties as a Traditional Cultural Property.		Unusual variation of bitterbrush/bluebunch wheatgrass plant community; blue-leaved penstemon (*Penstemon glaucinus*), a BS plant species	

FT – Federal threatened species
FE – Federal endangered species
FC – Federal candidate species
BS – Bureau sensitive species
ONHP – Oregon Natural Heritage Program
WSR – Wild and Scenic River
PACEC – potential ACEC

Appendix O Federally Recognized Indian Tribes with Interests in the Planning Area

This appendix provides the background on federally recognized American Indian Tribes in the planning area.

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Federally recognized American Indian Tribes in, or with interests in, the planning area 514

Federally Recognized American Indian Tribes in, or with Interests in, the Planning Area

There are nine federally recognized American Indian Tribes in, or with interests in, the planning area:

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

American Indian tribes represent unique legal entities in the United States and are distinct political communities with extensive powers of self-government. Tribal sovereignty predates the U.S. Government. Treaties, Federal statutes, and executive agreements over the past 200 years have established a special trust relationship between tribes and the Federal Government. The Federal Bureau of Indian Affairs has been designated by the Secretary of the Interior as the primary agency to protect tribal interests and administer trust responsibilities.

During the 1950s, in a move to assimilate American Indians into mainstream America, the U.S. Government ended Federal trusteeship of roughly three percent of the country's American Indian population through a process called termination. Of the 109 tribes and bands terminated, 62 were native to Oregon. Even though the tone of the termination legislation was emancipation, the net effect of the policy on terminated tribes was cultural, political, and economic devastation.

In recent years, however, terminated tribes have made vigorous efforts to re-establish or restore the trust relationship. In 1977, the Confederated Tribes of the Siletz Reservation, Oregon won restoration; followed by the Cow Creek Band of Umpqua Indians of Oregon in 1982; the Confederated Tribes of the Grand Ronde Community of Oregon in 1983; the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians of Oregon in 1984; the Klamath Tribes, Oregon in 1986; and the Coquille Tribe of Oregon in 1989.

Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians of Oregon

These tribes are descendants of the aboriginal inhabitants of the central and south-central coast of Oregon. Their homeland includes the estuaries of Coos Bay, and the Umpqua and Siuslaw Rivers. The Tribes have been operating under a confederated government since signing of the Treaty of August 1855. They currently possess a 6.1-acre reservation and a tribal hall erected in 1940, but past claims have not yet been settled. The Tribes hope to work out a reservation agreement with the Federal Government. The Tribes had a relationship with the U.S. Government from 1853 until their termination by Congress in the year of 1956. The majority of their members were removed in 1856 from their aboriginal homelands and held on a wind-swept spit at the mouth of the Umpqua River at a place called Fort Umpqua. Their territory encompassed part of Coos, Curry, Douglas, Lane and Lincoln counties. Federal recognition was restored to the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians in October of 1984.

Confederated Tribes of the Grand Ronde Community of Oregon

These tribes include more than 20 Tribes and bands from western Oregon and northern California that were relocated to the Grand Ronde Reservations in the 1850s. These included the Rogue River, Umpqua, Chasta, Kalapuya, Molalla, Salmon River, Tillamook, and Nestucca Indians. The Grand Ronde Reservation was established by treaty arrangements in 1854 and 1855, and an Executive Order of June 30, 1857. The Reservation contained over 60,000 acres and was located on the eastern side of the coastal range on the headwaters of the South Yamhill River. In 1887, under the General Allotment Act, 270 allotments totaling slightly more than 33,000 acres of the Grand Ronde Reservation were made available to individual Indians. The result of this action was the loss of major portions of the reservation to non-Indian ownership.

Then, in 1901, U.S. Inspector James McLaughlin declared a 25,791-acre tract of the reservation "surplus" and the land was sold. In 1954, Congress passed the Termination Act, which severed the trust relationship between the Federal Government and the Tribe. On November 22, 1983, with signing of Public Law 98-165 (the Grand Ronde Restoration Act), the Tribe was restored to Federal recognition. In addition, on September 9, 1988, the Tribe regained 9,811 acres of the original reservation when President Ronald Reagan signed the Grand Ronde Reservation Act into law. The reservation lies just north of the community of Grand Ronde.

The mission of the Grand Ronde Natural Resources Division is to manage, develop, and protect the natural resources of the Grand Ronde Tribes, such as timber, non-merchantable young stands of trees, fish, wildlife, recreation, minerals, air, streams, roads, and minor forest products. Their Natural Resources Division strives to manage the Tribes' resources in a unique, creative, and efficient manner, taking care to meet mandates while balancing the importance of non-revenue-producing elements of the reservation.

Confederated Tribes of the Siletz Reservation, Oregon

These tribes are a federally recognized confederation of 27 bands originating from northern California, western Oregon and southern Washington. Termination was imposed on the Siletz by the U. S. Government in 1955. In November of 1977, the Tribe was restored to Federal recognition. The Tribe occupies and manages a 3,666-acre reservation in Lincoln County, Oregon. The Tribe manages resources on their reservation, including wildlife, timber, water, fish, and air quality.

Confederated Tribes of the Warm Springs Reservation of Oregon

These tribes include bands of the Wasco, Warm Springs and Paiute. The Wasco bands on the Columbia River were the eastern-most group of Chinookan-speaking Indians living along the Columbia River. The Warm Springs bands lived along the Columbia's tributaries, and the Paiutes lived in southeastern Oregon. In 1855, Joel Palmer, superintendent for the Oregon Territory, negotiated a series of Indian treaties including the one establishing the Warm Springs Reservation. Under the Treaty of 1855, the Warm Springs and Wasco Tribes relinquished approximately 10 million acres of land, but reserved the Warm Springs Reservation for their exclusive use. The Tribes also kept their rights to harvest fish, game and other foods off the reservation in their usual and accustomed places. The Tribes' Natural Resource Management Services exist to plan and execute a balanced direction for the protection, use, and enhancement of all tribal natural resources. Resources shall be managed as sustainable assets available for cultural, subsistence, economic and social purposes or opportunities in perpetuity consistent with the Confederated Tribes sovereign and treaty status.

Coquille Tribe of Oregon

This tribe's members are descended from people who inhabited the watersheds of the Coquille River system, a small portion of Coos Bay at the South Slough, and areas north and south of the Coquille River mouth where it enters the ocean at present day Bandon. The Coquille ancestral territory encompassed more than 700,000 acres, ceded to the U.S. Government. Coquille headmen signed treaties in 1851 and 1855. Because neither treaty was ever ratified by Congress, those Coquille people and their descendants were denied a permanent homeland. The Coquille Indian Tribe was terminated by the U.S. Government in 1954. On June 28, 1989, the Coquilles regained their status as a federally recognized Indian tribe. The modern Coquille Tribe negotiated several land purchases, which constitute a 6,400-acre tribal land base. By an Act of Congress in 1996, the Coquille Tribe now has reservation acreage totaling 6,512 acres.

Cow Creek Band of Umpqua Indians of Oregon

Their traditional use area lies primarily in Douglas County, from the Umpqua River headwaters to the Pacific Ocean. The Tribe's ceded lands lie in the Cow Creek drainage of the South Umpqua River. In 1853, seeking a peaceful solution to tensions that had intensified after gold was discovered in their territory, the Cow Creek Umpqua Indians entered into a treaty with the Federal Government that resulted in their ceding their homeland in exchange for $12,000. The treaty left the Cow Creek Umpquas without land, a place to live, or protection. The Cow Creeks had been drawn into the Rogue Indian wars in the early 1850s. As a result of the fighting and their new treaty in 1856, survivors were rounded up and forcefully marched 150 miles north to the Grand Ronde Reservation.

In 1954, the Government declared that there were no Indians left in western Oregon, the existing Cow Creeks notwithstanding, and the Tribe was terminated. In 1982, the Tribe was restored and entered into formal relations with the U. S. Government through the Bureau of Indian Affairs. Public Law 100-139 (1987), the Cow Creek Umpqua "Distribution Judgment Funds Act," adopted the tribal endowment plan. The Bureau of Indian Affairs allowed the Tribe to use the settlement funds as collateral for the purchase of what was known as the "Evergreen" land. In addition, the Tribe was allowed to draw the interest on their endowment for the purpose of economic development, education, housing, and elderly assistance.

Klamath Tribes, Oregon

This tribe includes the Klamaths, the Modocs, and the Yahooskin band of Snake Indians. The Tribes' traditional territory is in the Klamath Basin of Oregon. The Klamath Tribes ceded more than 23 million acres of land in 1864 and entered the Klamath Reservation. In 1954, the Klamath Tribes were terminated from Federal recognition as a tribe by Act of Congress. In 1974, the Federal Court ruled that the Klamath Tribes had retained their Treaty Rights to hunt, fish and gather, and to be consulted in land management decisions when those decisions affected their Treaty Rights. These Treaty Rights apply to the Klamath Tribes' former reservation boundaries. The BLM Klamath Falls Resource Area carries out trust responsibilities on 185 acres of wetland located east of Wood River that was formerly reservation land, managing the natural resources located within this area to enhance Tribal Trust assets and water rights.

In 1986, the Klamath Tribes were successful in regaining restoration of Federal recognition.

Modoc Tribe of Oklahoma

This tribe originally lived on Little Klamath Lake, Modoc Lake, Tule Lake, Clear Lake, Goose Lake, and in the Lost River Valley. In 1864, the Modoc ceded lands and moved to the Klamath Reservation. Due to starvation conditions and tensions with the Klamath Indians, some Modocs returned to their original territory in northern California in 1870. In 1872, attempts to force their return to Oregon began the Modoc War, and the Modocs retreated to lava beds for months. Finally overrun, 153 survivors were sent to Quapaw Agency in Oklahoma. Other survivors were sent to the Klamath Reservation. In 1909, some Modocs were permitted to return to Klamath Agency. In 1954, the Oklahoma and Oregon Modoc Tribes were terminated. In 1978, the Oklahoma Modoc Tribes were reinstated.

Quartz Valley Indian Community of the Quartz Valley Reservation of California

Located in Siskiyou County, California, they include the members of the Shasta Tribe that traditionally lived in southern Oregon and northern California. A treaty signed by Shasta Tribal chiefs on November 4, 1851 was never ratified by Congress, and the Tribe did not get their own reservation. Some members of the Shasta Tribe joined the Confederated Tribes of the Grand Ronde Community of Oregon.

Appendix P
Lands

This appendix provides detailed data about lands, realty, and access information found in *Chapters 2* and *3* of the EIS.

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

Land Withdrawals and Land Tenure Zone 3 Lands

Table P-1 through *Table P-12* contain detailed information about existing and proposed land withdrawals. Zone 3 lands are available for disposal.

Table P-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 HACTCHERY & 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	REC SITE/ ALDER GLENN	BLM	B	C
ORE 016183	PLO 3869	T. 14 S., R. 7 W., SEC 25,26	40	REC SITE/ ALSEA FALLS	BLM	B	C
ORE 016183	PLO 3869	T. 9 S., R. 3 E., SEC 7	80	REC SITE/ CANYON CREEK	BLM	B	C
ORE 016183	PLO 3869	T. 12 S., R. 3 E., SEC 3	80	REC SITE/ DOGWOOD	BLM	B	C
ORE 016183	PLO 3869	T. 9 S., R. 3 E., SEC 9	120	REC SITE/ ELKHORN VALLEY	BLM	B	C
ORE 016183	PLO 3869	T. 9 S., R. 2 E., SEC 25	160	REC SITE/ FISHERMEN'S BEND	BLM	B	C
ORE 016183	PLO 3869	T. 3 N., R. 3 W., SEC 21	20	REC SITE/ LITTLE BEND	BLM	B	R
ORE 016183	PLO 3869	T. 7 S., R. 6 W., SEC 4 & 9		REC SITE/ MILL CREEK	BLM	B	C
ORE 016183	PLO 3869	T. 14 S., R. 9 W., SEC 13	40	REC SITE/ MISSOURI BEND	BLM	B	C
ORE 016183	PLO 3869	T. 3 S., R. 4 E., SEC 11	160	REC SITE/ NORTH FORK EAGLE CREEK	BLM	B	C
ORE 016183	PLO 3869	T. 4 N., R. 3 W., SEC 7	30	REC SITE/ SCAPONIA	BLM	B	C
ORE 016183	PLO 3869	T. 11 S., R. 4 E., SEC 19	80	REC SITE/ YELLOWBOTTOM	BLM	B	C
OR 6363	PLO 5136	T. 12 S., R. 7 W., SEC 28	40	ADMIN 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
OR 50856	PLO 7215	T 9 S., R., 11 W., SEC 4		PROTECT LANDS/ PACIFIC COAST HWY	BLM	B	C
OR 50856	PLO 7215	T .13 S., R., 11 W., SEC 28		PROTECT LANDS/ PACIFIC COAST HWY	BLM	B	C
OR 50856	PLO 7215	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

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
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
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

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
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 P-2. Existing Land Withdrawals And Recommendations For Continuance In The Eugene District

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
ORE 05555	BO of 7/12/1957	T.15S. R.7W. Section 7	40	Air Navigation	FAA	A	C
ORE 013117	PLO 3610	T.18S. R.1E. Section 31 T.19S. R.1E Section 6	81.2	Fall Creek Reservoir	COE	B	C
OR 19234	PLO 497	T.17S., R.5W. Sections 27, 28	5.27	Fern Ridge Reservoir	COE	A	C
OR 19240	PLO 727	T.19S. R.1E. Section 34	1.37	Lookout Point Reservoir	COE	A	C
OR 711	PLO 4395	T.16S, R.12W. Section 33	1	Oregon Islands National Wildlife Refuge	USFWS	B	C
OR 25306	PLO 6287	T.16S., R.12W Section 33	1	Oregon Islands National Wildlife Refuge	USFWS	B	C
ORE 0 16183A	PLO 3869	T.16S., R.7W. Section 19 T.18S., R.8W. Section 21 T.19S., R.7W. Sections 19, 35 T.22S., R.1W. Section 15	440.12	Lake Creek, Whittaker Creek, Clay Creek, Haight Creek, Sharps Creek Recreation Sites	BLM	B	C
ORE 012093	PLO 5490	*Various Townships	9,000.52	Reserved for multiple use management	BLM	Surface closed to Ag laws	C
OR 8754	PLO 5229	T.15S., R.1W. Sections 29, 30, 31,32	260	Shotgun Creek Recreation Site	BLM	B	C
OR 37548	PLO 6662	T.20S., R.5W. Sections 9,15 21	832.5	Tyrrell Seed Orchard	BLM	B	C
OR 46473	PLO 6963	T.18S., R.12W. Sections 3, 15	257.6	Florence Sand Dunes	BLM	B	C
OR 48744	PLO 7081	T.17S., R.3E. Sections 3, 9, 10,11	292.25	Eagle Rock Section of McKenzie River	BLM	B	C
OR 19133**	SO of 6/7/1922	T.19S., R.7W. Sections 21, 25, 35	550.49	Protect water power and reservoir development potential / PSC 41	BLM	D	
OR 19133**	SO of 6/7/1922	T.20S., R.6W. Section 5		PSC 41	BLM	D	
OR 19148**	SO of 5/23/1957	T.20S., R.2W. Section 31 T.21S., R.1W. Sections 31***, 33, 35	300.6	Protect water power and reservoir development potential / PSC 180	BLM	D	
OR 19148**	SO of 5/23/1957	T.21S., R.2W. Section 15		PSC 180	BLM	D	
OR 19186**	DO of 7/25/1952	T.16S., R.2E. Sections 23,24, 27	276.64	Protect water power and reservoir development potential / PSC 426	BLM	D	

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

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19115**	EO of 12/12/1917	T.22 S., R.2W.		Protect water-power development Potential/ PSR 661	BLM	D	
		Sections 5, 15, 23					
OR 19115**	EO of 12/12/1917	T.23S., R.2W. Section 1		Protect water-power development Potential/ PSR 661	BLM	D	
OR 19116**	EO of 12/12/1917	T.18S., R.8W. Section 28	40	Protect water-power development Potential/ PSR 662	BLM	D	
OR 19127**	EO of 2/19/1920	T.22S., R.1W. Sections 1***, 5, 9, 15****, 23, 27,35	1,249.16	Protect water-power and reservoir development potential / PSR 730	BLM	D	
OR 19127**	EO of 2/19/1920	T.23S., R.1W. Sections 1, 7		PSR 730	BLM	D	
OR 19014**	SO of 12/12/1917	T.15S., R.6W. Section 7	8,234.24	Protect water-power development potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.16S., R.2E. Sections 29, 33***, 35***		Protect water-power development potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.16S., R.7W. Section 19		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.17S., R.2E. Section 1***		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.17S., R.3E. Section 3*** Section 5***, Section 9***		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.17S., R.8W Sections 1***,3***		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.18S., R.7W. Sections 31,33		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.18S., R.8W Sections 17***, 21, 27, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.19S., R.6W Sections 7, 9, 29, 31		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.19S., R.7W Sections 1****, 3****, 5, 9,11***, 19, 21, 27, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.19S., R.8W. Sections 3, 11, 13		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.20S., R.2W. Section 31		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.20S., R.6W. Sections 1, 3, 5, 9, 11		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.20S., R.7W. Section 3		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.21S., R.1W. Sections 31****, 33, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.21S., R.2W. Sections 3***, 7, 31		Protect water-power development Potential / WPD 14	BLM	D	

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19014**	SO of 12/12/1917	T.22S., R.1W Sections 1***, 5, 9, 15****, 23,27, 35		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.22S., R.2W Sections 5, 15, 23		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.23S., R.1W. Sections 1, 7		Protect water-power development Potential / WPD 14	BLM	D	
OR 19014**	SO of 12/12/1917	T.23S., R.2W. Section 1		Protect water-power development Potential / WPD 14	BLM	D	
OR 19016**	SO of 12/24/1919	T.23S., R.1W. Section 1	80	Protect water power and reservoir development Potential/WPD 16	BLM	D	
OR 52939	PLO 7445	T.20S.,R2W. Sections 30, 31, 32, 33, 34	178.95	Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.20S.,R3W. Section 25, 36		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.21S.,R.1W. Sections 19, 30, 31, 32		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.21S.,R.2W Sections 2, 3, 11, 13, 14, 24		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.21S.,R.3W. Section 1		Row River Trail and associated recreation facilities	BLM	B	
OR 52939	PLO 7445	T.22S.,R.1W Section 5		Row River Trail and associated recreation facilities	BLM	B	
OR 50856	PLO 7215	T.18S.,R12W. Section 2	36.52	Pacific Coastline Highway 101	BLM	B	

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DO: Director Order
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PLO: Public Land Order
PSR: Power Site Reserve
PSC: Power Site Classification
R&PP: Recreation and Public Purposes
WPD: Water Power Designation
FPCO: 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:
C – Continue R - Revoke

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

Table P-3. Existing Land Withdrawals And Recommendations For Continuance In The Roseburg District

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19101	EO of 8/7/1917	20S,7W, Sec. 25,27****, 33***,35	600	Water Power Potential / PSR 629	BLM	D	C
OR 19101	EO of 8/7/1917	21S,7W, Sec. 5,9	392.59	Water Power Potential / PSR 629	BLM	D	C
OR 19011	SO of 7/13/1959	20S,7W, Sec. 25,27****, 33***,35	600	Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	21S,7W, Sec. 5,9	392.59	Water Power Potential / WPD 11	BLM		C
OR 19011	SO of 7/13/1959	22S,7W, Sec. 19,31	47.45	Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	23S,7W, Sec. 5,9***,15,23, 27		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	24S,7W, Sec. 3,11,13***, 15***,17,21***,23,29***,33		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	25S,7W, Sec. 5***,7****,9, 15, 17,21****,23,27		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	26S,2W, Sec. 7,13,15,17,23		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	26S,3W, Sec. 1,9***,11,17***		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	26S,4W, Sec. 7		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	26S,6W, Sec. 5***,7		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	30S,3W, Sec. 25****,29***, 31, 33****,35		Water Power Potential / WPD 11	BLM	D	C
OR 19011	SO of 7/13/1959	30S,4W, Sec. 15,21,23, 25****,27		Water Power Potential / WPD 11	BLM	D	C
OR 19105	EO of 7/24/1917	22S,7W, Sec. 19,31	47.45	Water Power Potential / PSR 633	BLM	D	C
OR 19105	EO of 7/24/1917	23S,7W, Sec. 5,9***,15,23, 27		Water Power Potential / PSR 633	BLM	D	C
OR 19105	EO of 7/24/1917	24S,7W, Sec. 3,11,13***, 15***,17,21***,23,29***,33		Water Power Potential / PSR 633	BLM	D	C
OR 19105	EO of 7/24/1917	25S,7W, Sec. 5***,7****,9, 15, 17,21****,23,27		Water Power Potential / PSR 633	BLM	D	C
OR 19105	EO of 7/24/1917	26S,6W, Sec. 5***,7		Water Power Potential / PSR 633	BLM	D	C
OR 19057	EO of 6/4/1912	23S,7W, Sec. 21,32		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	24S,7W, Sec. 20***,28		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	25S,7W, Sec 6****,7***		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	26S,2W, Sec. 21		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	26S,3W, Sec. 9***		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	26S,4W, Sec. 18***		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	26S,6W, Sec. 8		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	30S,2W, Sec. 28		Water Power Potential / PSR 280	BLM	D	C
OR 19057	EO of 6/4/1912	30S,4W, Sec. 25***		Water Power Potential / PSR 280	BLM	D	C
OR 19341	PLO 754	24S,7W, Sec. 20,21	28.28	Timber Preservation	BLM	A	C

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
ORE 0 16183B	PLO 3869	21S,6W, Sec. 1	80	Gunter Recreation Site	BLM	B	C
ORE 0 16183B	PLO 3869	24S,7W, Sec. 13	23.7	Tyee Recreation Site	BLM	B	C
ORE 0 16183B	PLO 3869	25S,1W, Sec. 23	20	Scaredman	BLM	B	C
ORE 0 16183B	PLO 3869	25S,1W, Sec. 24	40	Recreation Site	BLM	B	C
ORE 0 16183B	PLO 3869	25S,1W, Sec. 25	20	Scaredman	BLM	B	C
ORE 0 16183B	PLO 3869	25S,1W, Sec. 30	40	Recreation Site	BLM	B	C
ORE 0 16183B	PLO 3869	25S,2W, Sec. 15	160	Rock Creek Recreation Site	BLM	B	C
ORE 0 16183B	PLO 3869	25S,2W, Sec. 21	320	Mill Pond Recreation Site	BLM	B	C
ORE 0 16183B	PLO 3869	26S,2W, Sec. 14	160	Susan Creek Falls	BLM	B	C
ORE 0 16183B	PLO 3869	26S,3W, Sec. 9	6.44	Lone Rock	BLM	B	C
ORE 0 16183B	PLO 3869	27S,2W, Sec. 16	178.53	Wolf Creek Trail	BLM	B	C
ORE 0 16183B	PLO 3869	27S,3W, Sec. 23	80	Cavitt Creek Forest	BLM	B	C
ORE 0 16183B	PLO 3869	31S,8W, Sec. 35	20	Darby Creek Recreation Site	BLM	B	C
OR-1102	EO of 6/29/1917	25S,7W, Sec. 6		Water Power Potential / PSR 630	BLM	D	C
OR 3660-A	PLO 4537	25S,7W, Sec. 9,10,15	91.88	Umpqua Recreation Site	BLM	B	C
OR 19144	SO of 1/20/1970	25S,8W, Sec.12	20.8	Water Power Potential / PSC 162	BLM	D	C
OR 19144	SO of 1/20/1970	26S,6W, Sec 30***		Water Power Potential / PSC 162	BLM	D	C
OR 19144	SO of 1/20/1970	26S,5W, Sec 26		Water Power Potential / PSC 162	BLM	D	C
OR-19153	SO of 6/29/1928	26S,3W, Sec 17***		Water Power Potential / PSC 202	BLM	D	C
OR 44740	PL 100-557	26S,2W, Sec. 7,8,13,-18,. 20-24	1,620	North Umpqua Wild and Scenic River	BLM	VARIOUS	C
OR 18874	*FPC Orders of 12/28/1948 & 5/18/1953	26S,3W, Sec 35		100-foot wide Electric transmission line/ PP 1927	BLM	B	C
OR 18874	*FPC Orders of 12/28/1948 & 5/18/1953	26S,2W, Sec. 7,13-15,17,21, 29-31	110.11	100-foot wide Electric transmission line/ PP 1927	FERC	B	C
OR 19103	EO of 7/10/1917	26S,2W, Sec. 7,13,15,17,23	397.3	Water Power Potential / PSR 631	BLM	D	C
OR 19103	EO of 7/10/1917	26S,3W, Sec. 1,9***,11,17***		Water Power Potential / PSR 631	BLM	D	C
OR 19103	EO of 7/10/1917	26S,4W, Sec. 7		Water Power Potential / PSR 631	BLM	D	C
OR 19184	SO of 5/29/1951	26S,2W, Sec. 14,22,24	300	Water Power Potential / PSC 416,	BLM	D	C
OR 19016	SO of 10/24/1919	26S,2W, Sec. 21	33.78	Water Power Potential / WPD 16,	BLM	D	C
OR 18874	FPC ORDER of 3/30/1945	26S,3W, Sec. 1,35	12.17	100-foot wide Electric transmission line/ PP 1927	FERC	B	
OR 5263	PLO 4848	26S,3W, Sec. 1	80	Swiftwater Recreation Site	BLM	B	C
OR 5263	PLO 4848	27S,2W, Sec. 1	80	Emile Creek Recreation Site	BLM	B	

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 5263	PLO 4848	27S,2W, Sec. 8	80	Little River Wayside	BLM	B	
ORE 013683	PLO 4448	29S,7W, Sec. 17,21	60.22	Umpqua River Reclamation Project	BR	B	C
ORE 013683	PLO 4448	30S,7W, Sec. 5,6	50.15	Umpqua River Reclamation Project	BR	B	C
OR 19113	EO of 12/12/1917	20S,7W, Sec 3	40	Water Power Potential / PSR 659	BLM	D	C
OR 19113	EO of 12/12/1917	29S,9W, Sec. 35	40	Water Power Potential / PSR 659	BLM	D	C
OR 19113	EO of 12/12/1917	30S,3W, Sec. 25****,29***, 31, 33****,35		Water Power Potential / PSR 659	BLM	D	C
OR 19113	EO of 12/12/1917	30S,4W, Sec. 15,21,23, 25****,27		Water Power Potential / PSR 659	BLM	D	C
OR 19113	EO of 12/12/1917	30S,9W, Sec. 3		Water Power Potential / PSR 659	BLM	D	C
OR 19014	SO of 12/12/1917	20S,7W, Sec 3		Water Power Potential / WPD 14	BLM	D	C
OR 19014	SO of 12/12/1917	29S,9W, Sec. 35	40	Water Power Potential / WPD 14	BLM	D	C
OR 19014	SO of 12/12/1917	30S,9W, Sec. 3		Water Power Potential / WPD 14	BLM	D	C
OR 19152	SO of2/151928	30S,2W, Sec. 23,29,31		Water Power Potential / PSC 198	BLM	D	C
OR 19152	SO of2/151928	30S,4W, Sec. 15***		Water Power Potential / PSC 198	BLM	D	C
OR 19171	SO of 1/6/1940	30S,2W Sec. ,12		Water Power Potential / PSC 315	BLM	D	C
OR 19171	SO of 1/6/1940	30S,3W, Sec. 19,29		Water Power Potential / PSC 315	BLM	D	C
OR 19171	SO of 1/6/1940	30S,4W, Sec. 29		Water Power Potential / PSC 315	BLM	D	C
OR 19171	SO of 1/6/1940	31S,3W, Sec. 3	83.61	Water Power Potential / PSC 315	BLM	D	C
ORE 012693	PLO 5490	All Public Domain (PD) lands	18,426	Multiple Use	BLM	Surface closed to Ag laws	C
OR 53486	PLO 7413	T 31 S, R 7 W, Sec. 4	36.6	Gold Panning Area	BLM	B	C
OR 53486	PLO 7413	T 30 S, R 7 W, Sec. 36	58.72	Island Creek Rec. site	BLM	B	C
OR 53486	PLO 7413	T 31 S, R 7 W, Sec. 1		Island Creek Rec. site	BLM	B	C
OR 53486	PLO 7413	T 30 S, R 7 W, Sec. 23	40	Picket Bridge Rec. Site	BLM	B	C
OR 53486	PLO 7413	T 30 S, R 7 W, Sec. 5	25	Olalla-Thompson Cr. Day Use Site	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.

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.
Note: Table does not include lands that have been completely transferred out of Federal ownership subsequent to withdrawal or lands within National Forest boundaries.

Table P-4. Existing Land Withdrawals And Recommendations For Continuance In The Coos Bay District

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 50856	PLO 7215	19S 12W Sec. 1	40.43	Pacific Coastline, Highway 101	BLM	B	C - serving original
OR 50856	PLO 7215	26S 14W Sec. 28	40	Pacific Coastline, Highway 101	BLM	B	purpose, revoke patented parcel.
OR 50856	PLO 7215	27S 14W Sec. 29	2.26	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	30S 15W Sec. 12	40	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	32S 15W Sec. 4	71.75	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	33S 14W Sec. 31	155.16	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	34S 14W Sec. 6	40.7	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	34S 14W Sec.33	162.05	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	34S 14W Sec. 34	40	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	34S 15W Sec. 1	7.92	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	38S 14W Sec. 4	40	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	38S 14W Sec. 5	40	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	38S 14W Sec. 34	34	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	39S 14W Sec. 23	40	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	41S 13W Sec. 6	2.56	Pacific Coastline, Highway 101	BLM	B	C
OR 50856	PLO 7215	41S 13W Sec. 7	0.32	Pacific Coastline, Highway 101	BLM	B	C
ORE 016183C	PLO 3869	20S 9W Sec. 31	81.29	Smith River Falls Recreation Site	BLM	B	C - Developed Sites
ORE 016183C	PLO 3869	20S 9W Sec. 33	3.5	Vincent Creek Recreation Site	BLM	B	C
ORE 016183C	PLO 3869	23S 10W Sec. 2	78.86	Loon Lake Recreation site	BLM	B	C
ORE 016183C	PLO 3869	27S 10W Sec. 4	60	Park Creek Recreation Site	BLM	B	C
ORE 016183C	PLO 3869	27S 10W Sec. 18	20	Big Tree Recreation Site	BLM	B	C
ORE 016183C	PLO 3869	30S 9W Sec. 9	80	Bear Creek Recreation Site	BLM	B	C
ORE 016183C	PLO 3869	32S 14 W Sec. 12	120	Sixes River Recreation Site	BLM	B	C
ORE 016183C	*PLO 3869*	*Total acres*	443.65				
OR 23558	SO 12-31-1930	23S 10W Sec. 1	51.51	Rec Wdl. No. 43 East Shore Recreation Site	BLM	B	C - Developed Site
OR 19291A	PLO 3530	27S 10W Secs. 17-20	590	Cherry Creek Natural Area	BLM	B	C - Protecting site, for research opportunities
OR 6398	PL 181	27S 11W Sec. 35	120	Lavern County Park	BLM/ Coos Cnty	B	C - Developed County Park
OR 6398	PL 181	27S 12W Sec. 35	160	Rock Prairie County Park	BLM/ Coos Cnty	B	C - Developed County Park
OR 6398	PL 181	28S 9W Sec. 7	87.72	Judge Hamilton County Park	BLM/ Coos Cnty	B	C - Developed County Park
OR 6398	PL 181	28S 11W Sec. 5	80	Middle Creek County Park	BLM/ Coos Cnty	B	C - Potential for County Park Development
OR 6398	PL 181	28S 11W Sec. 11	80	Frona County Park	BLM/ Coos Cnty	B	C - Developed County Park
OR 6398	*PL 181*	*Total acres*	527.72				
OR 21318	SO 6-12-1907	40S 13W Secs. 11, 14	320.75	Potential National Park	BLM	B	R – Not developed. No planned development. No public support for establishment of park or monument.
OR 19231	EO 11-24-1903	22S 13W Sec. 14	71.1	Umpqua Jetty Maintenance	COE	B	R – COE indicated a desire to relinquish.
OR 21901	EO 8-23-1895	22S 13W Sec. 13	130	Umpqua River Light Station	USCG	B	R – USCG indicated a desire to relinquish.

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 4011	EO 7-14-1884	26S 14W Secs. 2,3	5.1	Bar Watch Administrative Site	USCG	B	C – serving original purpose
OR 19227	EO 7-14-1884	26S 14W Sec. 2	2.43	Military Facility	US Navy	B	C – serving original purpose
OR-22094	EO 6/14/1876	26S 14W Sec. 4	21.58	Sub Surface only / Cape Arago Lighthouse	USCG		R
ORE 012693	PLO 5490	All Public Domain lands	50,329	Multiple use management	BLM	Surface closed to Ag laws	C - serving original purpose
OR 54142	PLO 7436	25S 13W Secs. 4-8,18,19	See total acres below.	North Spit Rec Area and ACEC	BLM	Closed to the mining laws	C - serving original purpose
OR 54142	PLO 7436	25S 14W Secs. 12,13,23-26		North Spit Rec Area and ACEC	BLM	Closed to the mining laws	C
OR 54142	*PLO 7436*	*Total acres*	1,779.27				
OR 24294	PL 95-450	26S 14W Secs. 5,8,17-19	15	Oregon Islands NWR	USFW	A	C - serving purpose
OR 24294	PL 95-450	27S 14W Sec. 19	8	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	28S 15W Secs. 25,26,35	3.56	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	29S 15W Sec. 2	4	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	31S 16W Secs. 24,25,34,35	30	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	32S 16W Secs. 2,3,10,17,21, 28-31	54	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	33S 15W Secs. 6,8,21,22,33	38	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	34S 14W Sec. 30		Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	34S 15W Sec. 31	31.83	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	36S 15W Secs. 2,11,15-17	32	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	38S 14W Secs. 30,31	12	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	38S 15W Sec. 1	16	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	39S 14W Secs. 6,8,16,17	30	Oregon Islands NWR	USFW	A	
OR 24294	PL 95-450	40S 14W Secs. 4,16,22,26	38	Oregon Islands NWR	USFW	A	
OR 711	PLO 4395	28S 15W Sec. 25	See total acres below.	Oregon National Wildlife Refuge	USFW	B	C - serving original purpose
OR 711	PLO 4395	31S 16W Secs. 24,25,34		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	31S 15W Sec. 35		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	32S 16W Secs. 17,21,28-31		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	33S 15W Secs. 21,22,33		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	34S 15W Sec. 4		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	36S 15W Secs. 2,11		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	38S 15W Sec. 1		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	38S 14W Secs. 30,31		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	39S 14W Secs. 6,8,16,17		Oregon National Wildlife Refuge	USFW	B	C
OR 711	PLO 4395	40S 14W Secs. 4,22		Oregon National Wildlife Refuge	USFW	B	C
OR 711	*PLO 4395*	*Total acres*	222.56				

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 50874	PLO 7170	29S 15W Secs. 35, 36	70.9	Lost Lake	BLM	B	C - serving original purpose
OR 45401	PLO 6967	30S 15W Secs. 2,3,10,11,15, 21,28,32,33	963.38	New River ACEC	BLM	B	C - serving original purpose
OR 51194	PLO 7170	31S 15W Secs. 7,8	111.48	Floras Lake	BLM	B	C - serving original purpose
OR 51891	PLO 7246	32S 14W Sec. 6	44.48	Edson Creek Rec Site	BLM	B	C - serving original purpose
OR 24293	PL 91-504	40S 14W Sec. 22	21	Oregon Islands NWR	USFW	A	C - serving original purpose
OR 22376	EO 7035	40S 14W Sec. 35	21	Oregon Islands NWR	USFW	B	C - serving original purpose
OR 25306	PLO 6287	Unsurveyed Islands rocks reefs		Oregon National Wildlife Refuge	USFW	B	C - serving original purpose
OR 11517	EO 5-6-1935	Unsurveyed Islands rocks reefs	100	Oregon Islands NWR Addition	USFW	B	C - serving original purpose
OR 19130	SO of 4/30/1921	27S 11W Sec. 35	40	Water Power Potential/ PSC 1	BLM	D	R - unless viable for hydropower
OR 19130	SO of 4/30/1921	28S 10W Secs. 6,8,12,14	165.26	Water Power Potential/ PSC 1	BLM	D	R - unless viable for hydropower
OR 19140	SO of 6/1/1926	27S 10W Sec. 31	115.35	Water Power Potential/ PSC 147	BLM	D	R - unless viable for hydropower
OR 19140	SO of 6/1/1926	27S 11W Sec. 35	236.72	Water Power Potential/ PSC 147	BLM	D	R - unless viable for hydropower
OR 19140	SO of 6/1/1926	28S 10W Secs. 5,6	169.26	Water Power Potential/ PSC 147	BLM	D	R - unless viable for hydropower
OR 19140	SO of 6/1/1926	28S 11W Sec. 1	320	Water Power Potential/ PSC 147	BLM	D	R - unless viable for hydropower
OR 19140	*SO of 6/1/1926*	*Total acres*	841.33				
OR 19144	SO of 7/19/1926	22S 8W Secs. 4***, 7,9,17,21	276.1	Water Power Potential/ PSC 162	BLM	D	R - unless viable for hydropower
OR 19144	SO of 7/19/1926	22S 9W Secs. 7-9	109.44	Water Power Potential/ PSC 162	BLM	D	R - unless viable for hydropower
OR 19144	SO of 7/19/1926	23S 8W Sec. 13	80	Water Power Potential/ PSC 162	BLM	D	R - unless viable for hydropower
OR 19144	*SO of 7/19/1926*	*Total acres*	465.54				
OR 19152	SO of 2/15/1928	22S 9W Sec. 7	183.93	Water Power Potential/ PSC 198	BLM	D	R - unless viable for hydropower
OR 20365	EO of 5/28/1912	20S 9W Secs. 26,28,32,34	245.22	Water Power Potential/ PSR 273	BLM	D	R - unless viable for hydropower
OR 20365	EO of 5/28/1912	21S 8W Secs. 2***,4***	320	Water Power Potential/ PSR 273	BLM	D	R - unless viable for hydropower
OR 19101	EO of 8/7/1917	20S 8W Secs. 17,19,21,27, 33	186.57	Water Power Potential/ PSR 629,	BLM	D	R - unless viable for hydropower
OR 19101	EO of 8/7/1917	20S 9W Secs. 21,25,27,31, 33,35	1,508.32	Water Power Potential/ PSR 629	BLM	D	R - unless viable for hydropower
OR 19101	EO of 8/7/1917	21S 8W Secs. 1,9,11	616.26	Water Power Potential/ PSR 629	BLM	D	R - unless viable for hydropower
OR 19101	*EO of 8/7/1917*	*Total acres*	2,311.15				
OR 19011	SO of 7/13/1917	20S 9W Secs. 21,25,27,31, 33,35	1,362.74	Water Power Potential/ WPD 11	BLM		R - unless viable for hydropower
OR 19011	SO of 7/13/1917	20S 8W Secs. 17,19,21,27, 31,33	1,586.55	Water Power Potential/ WPD 11	BLM		R - unless viable for hydropower

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19011	SO of 7/13/1917	21S 8W Secs. 1,9,11	1,062.95	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19011	SO of 7/13/1917	22S 9W Secs.7,13,15***,17	282.52	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19011	SO of 7/13/1917	22S 8W Secs. 5,21	20.03	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19011	SO of 7/13/1917	22S 7W Sec.19	47.45	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19011	SO of 7/13/1917	23S 10W Secs.1,11***,13,35	37.38	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19011	SO of 7/13/1917	23S 9W Secs. 7***,17***, 19***	200.21	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19011	SO of 7/13/1917	23S 7W Secs. 5,7,9,15,19***, 21,23,27,31,33	887.79	Water Power Potential/ WPD 11	BLM	D	R - unless viable for hydropower
OR 19102	EO of 6/29/1917	22S 8W Sec. 24	3	Protect water power and reservoir potential/ PSR 630	BLM	D	R - unless viable for hydropower.
OR 19105	EO of 7/24/1917	22S 7W Sec. 19	29.93	Water Power Potential/ PSR 633	BLM	D	R - unless viable for hydropower
OR 19105	EO of 7/24/1917	22S 8W Secs. 5, 21	20.03	Water Power Potential/ PSR 633	BLM	D	R - unless viable for hydropower
OR 19105	EO of 7/24/1917	22S 9W Secs. 7,13, 15***,17	282.52	Water Power Potential/ PSR 633	BLM	D	R - unless viable for hydropower
OR 19105	EO of 7/24/1917	23S 7W Secs. 5,7,9,15,19***, 21,23,27,31,33	887.79	Water Power Potential/ PSR 633	BLM	D	R - unless viable for hydropower
OR 19105	EO of 7/24/1917	23S 8W Sec. 11	29.38	Water Power Potential/ PSR 633	BLM	D	R - unless viable for hydropower
OR 19106	EO of 7/17/1917	22S 10W Sec. 35	239.95	Water Power Potential/ PSR 634	BLM	D	R - unless viable for hydropower
OR 19106	EO of 7/17/1917	23S 9W Secs. 7***,17***, 19***	200.21	Water Power Potential/ PSR 634	BLM	D	R - unless viable for hydropower
OR 19106	EO of 7/17/1917	23S 10W Secs. 1, 13	211.51	Water Power Potential/ PSR 634	BLM	D	R - unless viable for hydropower
OR 19106	*EO of 7/17/1917*	*Total acres*	651.67				
OR 19109	EO of 7/17/1917	23S 10W Sec. 35	40	Water Power Potential / PSR 645,	BLM	D	R - unless viable for hydropower
OR 19012	SO of 7/13/1917	23S 10W Sec. 35	40	Water Power Potential/ WPD 12	BLM	D	R - unless viable for hydropower
OR 19113	EO of 12/12/1917	26S 9W Secs. 17***,19***,29***, 31***		Water Power Potential / PSR 659	BLM	D	R - unless viable for hydropower
OR 19113	EO of 12/12/1917	27S 11W Sec. 15	182.8	Water Power Potential / PSR 659	BLM	D	R - unless viable for hydropower
OR 19113	EO of 12/12/1917	30S 9W Secs. 9,17	120	Water Power Potential / PSR 659	BLM	D	R - unless viable for hydropower
OR 19113	EO of 12/12/1917	30S 10W Secs. 3,13	280	Water Power Potential / PSR 659	BLM	D	R - unless viable for hydropower
OR 19014	SO of 12/12/1917	26S 9W Secs. 17***,19***,29***, 31***		Water Power Potential / WPD 14	BLM	D	R - unless viable for hydropower
OR 19014	SO of 12/12/1917	27S 11W Sec. 15	187	Water Power Potential / WPD 14	BLM	D	R - unless viable for hydropower
OR 19014	SO of 12/12/1917	30S 9W Secs. 9,17	200	Water Power Potential / WPD 14	BLM	D	R - unless viable for hydropower
OR 19014	SO of 12/12/1917	30S 10W Sec. 3,13	280	Water Power Potential / WPD 14	BLM	D	R - unless viable for hydropower

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19017	SO of 1/12/1921	27S 11W Secs. 5***,7****,17, 19,21****,29,31,33****	2,418.76	Water Power Potential / WPD 17	BLM	D	R - unless viable for hydropower
OR 19017	SO of 1/12/1921	27S 12W Secs. 11***,13***, 23***, 25***, 27***, 35***	1,663.57	Water Power Potential / WPD 17	BLM	D	R - unless viable for hydropower
OR 19017	SO of 1/12/1921	28S 9W Sec. 7	335.2	Water Power Potential / WPD 17	BLM	D	R - unless viable for hydropower
OR 19017	SO of 1/12/1921	28S 10W Seca. 3, 5, 9, 11, 15***	1,296.28	Water Power Potential / WPD 17	BLM	D	R - unless viable for hydropower
OR 19017	SO of 1/12/1921	28S 11W Secs. 1,3,5***,7	883.12	Water Power Potential / WPD 17	BLM	D	R - unless viable for hydropower
OR 19017	SO of 1/12/1921	28S 12W Secs. 1****,3***, 11***,13,15***21***,	1,516	Water Power Potential / WPD 17	BLM	D	R - unless viable for hydropower
OR 19017	*SO of 1/12/1921*	*Total acres*	8,112.93				
OR 19142	SO of 12/4/1926	22S 10W Secs. 15***,21***, 22***, 26***,27***,34***		Water Power Potential / PSC 157	BLM	D	R - unless viable for hydropower
OR 19142	SO of 12/4/1926	23S 10W Sec. 2***	76.86	Water Power Potential / PSC 157	BLM	D	R - unless viable for hydropower
OR 19142	SO of 12/4/1926	24S 8W Sec. 31***		Water Power Potential / PSC 157	BLM	D	R - unless viable for hydropower
OR 19116	EO of 12/12/1917	26S 9W Secs.10***,14***	640	Water Power Potential / PSR 662	BLM	D	R - unless viable for hydropower
OR 19116	EO of 12/12/1917	32S 13W Secs. 17, PB 37	387	Water Power Potential / PSR 662	BLM	D	R - unless viable for hydropower
OR 19116	EO of 12/12/1917	32S 14W Secs 11,12	160	Water Power Potential / PSR 662	BLM	D	R - unless viable for hydropower
	EO of 12/12/1910	25S 12W Secs. 29-33	400	Resource Protection/ Coal Lands	BLM		
OR-19180	USGS Order of 7/15/1947	26S 8W Sec. 8	80	Water Power Potential / PSC 382	BLM	D	R - unless viable for hydropower
ORE 0 13683	PLO 4448	29.5 S 7W Secs. 32	4.3	Reclamation Project/ Umpqua river	COE	B	C
OR 19142				Water Power Potential / PSC 157	BLM	D	

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
FPCO: 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:
C – Continue R - Revoke

*** 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 Coos Bay BLM District Office.
Table does not include lands that have been completely transferred out of Federal ownership subsequent to withdrawal or lands within National Forest boundaries.

Table P-5. Existing Land Withdrawals And Recommendations For Continuance In The Medford District

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
ORE 016674	PLO 5105	T 33 S, R 1 E, Secs. 11,13, 14,23,24,27,35		Lost Creek Reservoir	COE	B	
ORE 016674	PLO 5105	T 33 S, R 2 E, Secs. 11,15,19	Total acres 2,483.48	Lost Creek Reservoir	COE.	B	R (716.88 acres)
ORE 016753	PLO 6373	T 32 S, R 1 E Sec. 33		Elk Creek Reservoir			C
ORE 016753	PLO 6373	T 33 S, R 1 E, Secs. 5,9,21, 29	840.59	Elk Creek Reservoir	COE	B	C
OR 49	PLO 4132	T 35 S, R 6 W, Sec. 9	200	Sprague Orchard	BLM	B	C
OR 10729	PLO 5481	T 36 S, R 6 W, Sec. 3	160	Sprague Orchard	BLM	B	C
OR 04135	PLO 1726	T 35 S, R 6 W, Sec.		Recreation area	BLM	B	R (519.8 acres)
OR 04135	PLO 1726	T 33 S, R 10 W, Secs.9,10,16		Recreation area	BLM	B	
OR 04135	PLO 1726	T 33 S, R 9 W, Secs. 8,16-18, 22,23,26,35,36		Recreation area	BLM	B	
OR 04135	PLO 1726	T 33 S, R 8 W, Secs. 32-35		Recreation area	BLM	B	
OR 04135	PLO 1726	T 33 S, R 7 W, Sec. 31		Recreation area	BLM	B	
OR 04135	PLO 1726	T 33 S, R 1 E, Secs. 23,24,32		Recreation area	BLM	B	
OR 04135	PLO 1726	T 33 S, R 2 E, Secs 11,19		Recreation area	BLM	B	
OR 04135	PLO 1726	T 34 S, R 9 W, Sec. 1,2		Recreation area	BLM	B	
OR 04135	PLO 1726	T 34 S, R 8 W, Secs. 1,5,6, 12,13,24,25		Recreation area	BLM	B	
OR 04135	PLO 1726	T 34 S, R 7 W, Secs. 6,19, 30,31		Recreation area	BLM	B	
OR 04135	PLO 1726	T 34 S, R 1 W, Secs. 2,3,10		Recreation area	BLM	B	
OR 04135	PLO 1726	T 35 S, R 8 W, Sec. 1		Recreation area	BLM	B	
OR 04135	PLO 1726	T 35 S, R 7 W, Secs. 3-6,9, 10,24		Recreation area	BLM	B	
OR 04135	PLO 1726	T 36 S, R 7 W, Secs. 2,3,11, 12		Recreation area	BLM	B	
OR 04135	PLO 1726	T 36 S, R 3 W, Secs. 11-13		Recreation area	BLM	B	
OR 04135	PLO 1726	T 36 S, R 2 W, Sec. 13		Recreation area	BLM	B	
OR 04135	PLO 1726	T 39 S, R 2 W, Secs.19,23	15,481.14	Recreation area	BLM	B	
OR 12261	PLO 3165	T 33 S, R 8 W, Sec. 33		Recreation area	BLM	B	
OR 12261	PLO 3165	T 34 S, R 8 W, Secs. 2,3,13, 25		Recreation area	BLM	B	Needs review
OR 12261	PLO 3165	T 35 S, R 8 W, Sec 1	174.21	Recreation area	BLM	B	
ORE 016183D	PLO 3869	T 32 S, R 9 W, Sec. 16		Recreation area	BLM	B	R
ORE 016183D	PLO 3869	T 35 S, R 9 W, Sec. 11		Recreation area	BLM	B	R
ORE 016183D	PLO 3869	T 38 S, R 7 W, Sec. 1		Recreation area	BLM	B	R
ORE 016183D	PLO 3869	T 39 S, R 2 W, Sec. 25		Recreation area	BLM	B	R
ORE 016183D	PLO 3869	T 39 S, R 3 E, Secs. 21,22	444.35	Recreation area	BLM	B	R
OR 19008	SO of 1/19/1917	T 38 S, R 3 E, Sec. 25***		Water power Potential/ WPD 3	BLM	D	R
OR 19008	SO of 1/19/1917	T 38 S, R 4 E, Secs. 31***,33		Water power Potential/ WPD 3	BLM	D	R

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19008	SO of 1/19/1917	T 39 S, R 3 E, Secs. 3***,11***, 15***,		Water power Potential/ WPD 3	BLM	D	R
OR 19008	SO of 1/19/1917	T 39 S, R 4 E, Secs. 5***,9,15, 21****,27****	5,631.54	Water power Potential/ WPD 3	BLM	D	R
OR 19010	SO of 4/27/1917	T 33 S, R 1 E, Secs. 23,27, 32, 33****		Water power Potential/ WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 33 S, R 2 E, Sec. 1***, 11***,15,17***,19****		Water power Potential/ WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 33 S, R 3 E, Sec. 7***		Water power Potential/ WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 34 S, R 1 W, Sec. 3****,15, 21***,29***		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 34 S, R 1 E, Secs. 3****, 11***,13,23***,25****,35		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 34 S, R 2 E, Sec.7,33****		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 35 S, R 7 W, Secs. 3-5 9-11, 13,25***,35***		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 35 S, R 6 W, Sec 19		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 35 S, R 6 W, Secs. 5***,9***, 13****		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 35 S, R 1 E, Secs. 1, 3, 5,17		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 35 S, R 2 E, Sec. 13		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 35 S, R 3 E, Sec. 7		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 36 S, R 7 W, Sec. 11		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 36 S, R 6 W, Sec. 21		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 36 S, R 5 W, Secs. 21***, 23***		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 36 S, R 7 W, Secs. 19, 21****,25****,29***		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 36 S, R 3 W, Secs. 11,13, 17***, 21***		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 36 S, R 2 W, Secs. 1***, 13***, 15***		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 38 S, R 8 W, Sec 27,35		Water power Potential WPD 10	BLM	D	Needs review
OR 19010	SO of 4/27/1917	T 39 S, R 8 W, Secs. 3, 5****, 9****, 17, 20***, 27***, 29	12228.88	Water power Potential WPD 10	BLM	D	Needs review
OR 19013	SO of 4/27/1917	T 32 S, R 6 W, Sec 23		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 4/27/1917	T 33 S, R 6 W, Sec 15		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 4/27/1917	T 33 S, R 1 E, Secs. 13,32,33		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 4/27/1917	T 33 S, R 2 E, Secs. 17-19		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 4/27/1917	T 34 S, R 5 W, Secs. 17,29		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 34 S, R 1 W, Sec 21		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 34 S, R 1 W, Secs. 9,21, 29,31		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 35 S, R 5 W, Sec 19		Transmission Line/ WPD 13	BLM	D	R

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19013	SO of 7/20/1917	T 36 S, R 5 W, Secs. 5,23		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 36 S, R 4 W, Sec. 21		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 36 S, R 2 W, Sec. 1		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 39 S, R 2 E, Sec. 17,35		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 40 S, R 3 E, Secs. 7,17,21, 27,35		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 41 S, R 3 E, Sec. 1		Transmission Line/ WPD 13	BLM	D	R
OR 19013	SO of 7/20/1917	T 41 S, R 4 E, Secs. 7,17	127.27	Transmission Line/ WPD 13	BLM	D	R
OR 19018	SO of 4/13/1942	T 33 S, R 4 W, Sec 31		Water power Potential/ WPD 18	BLM		Needs review
OR 19018	SO of 4/13/1942	T 34 S, R 5 W, Sec .31		Water power Potential/ WPD 18	BLM	D	Needs review
OR 19018	SO of 4/13/1942	T 34 S, R 4 W, Sec. 5		Water power Potential/ WPD 18	BLM	D	Needs review
OR 19018	SO of 4/13/1942	T 34 S, R 3 W, Secs. 23,25,35	872.35	Water power Potential/ WPD 18	BLM	D	Needs review
OR 19047	EO of 12/1/1910	T 33 S, R 1 E, Secs. 24,32, 31****		Power site Potential/PSR 161	BLM	D	Needs review
OR 19047	EO of 12/1/1910	T 34 S, R 1 W, Secs. 2,3,10	157.49	Power site Potential/PSR 161	BLM	D	Needs review
OR 19048	EO of 12/19/1910	T 35 S, R 7 W, Secs. 4,6,10,26		Power site Potential/PSR 167	BLM	D	Needs review
OR 19048	EO of 12/19/1910	T 36 S, R 7 W, Secs. 2***,12		Power site Potential/ PSR 167	BLM	D	Needs review
OR 19048	EO of 12/19/1910	T 36 S, R 3 W, Secs. 11,12***	495.38	Power site Potential/ PSR 167	BLM	D	Needs review
OR 19078	EO of 3/28/1916	T 36 S, R 4 W, Secs. 22,24***	2.17	Power site Potential/ PSR 528	BLM	D	Needs review
OR 19088	EO of 1/19/1917	T 38 S, R 3 E, Sec. 25****		Power site Potential/ PSR 583	BLM	D	R
OR 19088	EO of 1/19/1917	T 38 S, R 4 E, Sec 31,33		Power site Potential/ PSR 583	BLM	D	R
OR 19088	EO of 1/19/1917	T 39 S, R 4 E, Secs. 5****, 9, 15,21,27	1799.03	Power site Potential/ PSR 583	BLM	D	R
OR 19089	EO of 1/19/1917	T 39 S, R 3 E, Secs. 3,11,15	160	Power site Potential/ PSR 584	BLM	D	R
OR 19094	EO of 4/30/1917	T 34 S, R 1 E, Secs. 3****, 11, 13,23,25,35		Power site Potential/ PSR 619	BLM	D	Needs review
OR 19094	EO of 4/30/1917	T 34 S, R 2 E, Sec. 7		Power site Potential/ PSR 619	BLM	D	Needs review
OR 19094	EO of 4/30/1917	T 35 S, R 1 W, Sec. 13		Power site Potential/ PSR 619	BLM	D	Needs review
OR 19094	EO of 4/30/1917	T 35 S, R 1 E, Secs. 1,3,5,17		Power site Potential/ PSR 619	BLM	D	Needs review
OR 19094	EO of 4/30/1917	T 35 S, R 2 E, Secs. 3,13		Power site Potential/ PSR 619	BLM	D	Needs review
OR 19094	EO of 4/30/1917	T 35 S, R 3 E, Sec. 7	3360.34	Power site Potential/ PSR 619	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 33 S, R 1 E, Secs. 23****, 27****,33****		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 33 S, R 2 E, Secs. 1,11***, 15***,17***,19****		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 33 S, R 3 E, Sec 7***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 34 S, R 1 W, Secs. 3****, 15***,21***,29***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 35 S, R 7 W, Secs. 3,5****, 9,11,13****,25***,35***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 35 S, R 6 W, Secs. 19		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 35 S, R 1 W, Secs. 5***,9***		Power site Potential/ PSR 621	BLM	D	Needs review

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19096	EO of 4/28/1917	T 36 S, R 7 W, Sec. 11***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 36 S, R 6 W, Sec. 21		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 36 S, R 5 W, Secs. 21***, 23***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 36 S, R 4 W, Secs. 19***, 21*** 25,29***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 36 S, R 3 W, Secs. 11****, 13,17***,21***		Power site Potential/ PSR 621	BLM	D	Needs review
OR 19096	EO of 4/28/1917	T 36 S, R 2 W, Secs. 1***, 13***,15***	5,379.4	Power site Potential/ PSR 621	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 33 S, R 10 W, Secs. 3,9,10, 12-14		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 33 S, R 9 W, Secs. 8,16-18, 23,26,36		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 33 S, R 8 W, Secs. 32,34,35		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 33 S, R 7 W, Secs. 31****, 32****		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 33 S, R 1 E, Secs. 13,14***, 23		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 33 S, R 2 E, Sec. 3***		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 34 S, R 9 W, Sec. 2		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 34 S, R 8 W, Secs. 2,6,12, 13,24,25,35		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 34 S, R 7 W, Secs. 5,6,18, 19****,30,31		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 34 S, R 1 E, Secs. 15,23		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 34 S, R 2 E, Sec. 33		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 35 S, R 8 W, Sec. 1,2		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 35 S, R 7 W, Secs. 5-7		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 36 S, R 7 W, Sec. 2***		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 36 S, R 2 W, Sec. 18		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 37 S, R 6 W, Secs.13, 15****,23,24		Power site Potential/ PSC 143	BLM	D	Needs review
OR 19139	SO of 5/8/1926	T 37 S, R 5 W, Secs.17, 19***	22948.95	Power site Potential/ PSC 143	BLM	D	Needs review
OR 19143	SO of 12/10/1926	T 35 S, R 7 W, Sec. 5		Power site Potential/ PSC 158			
OR 19143	SO of 12/10/1926	T 36 S, R 7 W, Sec. 15****	71.8	Power site Potential/ PSC 158	BLM	D	Needs review
OR 19154	SO of 2/27/1929	T 38 S, R 4 E, Sec. 32		Power site Potential/ PSC 218	BLM	D	R
OR 19154	SO of 2/27/1929	T 39 S, R 2 E, Secs. 26,35		Power site Potential/ PSC 218	BLM	D	R
OR 19154	SO of 2/27/1929	T 39 S, R 3 E, Secs. 11,19,20		Power site Potential/ PSC 218	BLM	D	R
OR 19154	SO of 2/27/1929	T 39 S, R 4 E, Secs. 5***,15	1482.21	Power site Potential/ PSC 218	BLM	D	R
OR 19173	SO of 4/11/1942	T 33 S, R 4 W, Sec. 31		Power site Potential/ PSC 330	BLM	D	Needs review
OR 19173	SO of 4/11/1942	T 34S, R 5 W, Sec. 31		Power site Potential/ PSC 330	BLM	D	Needs review
OR 19173	SO of 4/11/1942	T 34S, R 4 W, Sec. 5		Power site Potential/ PSC 330	BLM	D	Needs review
OR 19173	SO of 4/11/1942	T 34 S, R 3 W, Secs. 23,25, 26,35	1151.73	Power site Potential/ PSC 330	BLM	D	Needs review
OR 19174	SO of 4/27/1943	T 33 S, R 1 W, Secs. 29,33,35		Power site Potential/ PSC 340	BLM	D	Needs review

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 19174	SO of 4/27/1943	T 33 S, R 1 E, Secs. 13,17,18, 23,27,31		Power site Potential/ PSC 340	BLM	D	Needs review
OR 19174	SO of 4/27/1943	T 33 S, R 2 E, Secs. 16,17,19		Power site Potential/ PSC 340	BLM	D	Needs review
OR 19174	SO of 4/27/1943	T 34 S, R 1 W, Secs. 9,15,23, 27,29,31		Power site Potential/ PSC 340	BLM	D	Needs review
OR 19174	SO of 4/27/1943	T 33 S, R 2 E, Secs. 3,11,15, 23		Power site Potential/ PSC 340	BLM	D	Needs review
OR 19174	SO of 4/27/1943	T 35 S, R 1 W, Sec. 7	5207.45	Power site Potential/ PSC 340	BLM	D	Needs review
OR 19291	PLO 3530	T 39 S, R 6 W, Secs. 5,6	210.36	Brewer Spr. RNA	BLM	B	C
ORE 03644	B.O. of 1-24-1956	T 34 S, R 1 W, Sec. 10		Rogue R. Basin Project	BOR	B	Needs review
ORE 03644	B.O. of 1-24-1956	T 34 S, R 2 W, Sec 20		Rogue R. Basin Project	BOR	B	Needs review
ORE 03644	B.O. of 1-24-1956	T 34 S, R 3 E, Sec. 24		Rogue R. Basin Project	BOR	B	Needs review
ORE 03644	B.O. of 1-24-1956	T 34 S, R 4 E, Sec 32		Rogue R. Basin Project	BOR	B	Needs review
ORE 03644	B.O. of 1-24-1956	T 39 S, R 4 E, Sec. 6	875.93	Rogue R. Basin Project	BOR	B	Needs review
ORE 011495	PLO 4289	T 40 S, R 7 W, Sec. 1****	1132.39	Rogue R. Basin Project	BOR	C	C
ORE 017844	PLO 4037	T 39 S, R 4 E, Sec. 6	162.5	Rogue R. Basin Project	BOR	B	C
OR 20519	S.O. of 2-20-1943	T 33 S, R 1 E, Sec. 32		Medford\SV Project	BOR	B	R
OR 20519	S.O. of 2-20-1943	T 34 S, R 1 W, Sec. 2	84.64	Medford\SV Project	BOR	B	R
OR 20572	B.O. of 8-18-1950	T 35 S, R 2 W, Secs. 34,35	80	Air Nav. Site	FAA	A	C
ORE 03801	PLO 1189	T 34 S, R 8 W, Sec. 2	395.5	Recreation area	USFS	B	R
OR-19110	EO of 7/23/1917	T 32 S, R 6 W, Sec. 23		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 33 S, R 6 W, Sec. 15		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 33 S, R 1 E, Sec. 13		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 33 S, R 2 E, Secs. 9,17-19		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 34 S, R 5 W, Secs. 17,29		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 34 S, R 1 W, Sec. 21		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 35 S, R 5 W, Secs. 9,21,27, 29,31		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 36 S, R 5 W, Secs. 5,23		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 36 S, R 4 W, Sec. 21		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 36 S, R 2 W, Sec. 1		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 39 S, R 2 E, Secs. 17,35		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 40 S, R 3 E, Secs. 7,17,21, 27,35		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 41 S, R 3 E, Sec. 1		Transmission Line/ PSR 649	BLM	D	Needs review
OR-19110	EO of 7/23/1917	T 41 S, R 4 E, Secs. 7, 17		Transmission Line/ PSR 649	BLM	D	Needs review
OR-37299	FO of 1/19/1983	T 31 S, R 4 W, Secs. 27,28, 34,35		Water Power Project/ PP-7161	FERC	D	Needs review
OR-37299	FO of 1/19/1983	T 32 S, R 4 W, Sec. 3		Water Power Project/ PP-7161	FERC	D	Needs review
OR-19014	SO of 12/12/1917	T 33 S, R 10 W, Secs. 9****, 10,11,13		Water power Potential/ WPD 14	FERC	D	Needs review
OR-19014	SO of 12/12/1917	T 33 S, R 9 W, Secs.17,21, 23,35		Water power Potential/ WPD 14	FERC	D	Needs review
OR-19014	SO of 12/12/1917	T 33 S, R 8 W, Secs. 33****,35		Water power Potential/ WPD 14	FERC	D	Needs review

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR-19014	SO of 12/12/1917	T 34 S, R 9 W, Sec. 1		Water power Potential/ WPD 14	FERC	D	Needs review
OR-19014	SO of 12/12/1917	T 34 S, R 8 W, Secs. 1,3,5		Water power Potential/ WPD 14	FERC	D	Needs review
OR-19125	EO of 12/27/1919	T 33 S, R 10 W, Secs. 9****, 10, 11, 13		Power site Potential/ PSR 728	FERC	D	Needs review
OR-19125	EO of 12/27/1919	T 33 S, R 9 W, Secs. 17,21, 23,35		Power site Potential/ PSR 728	FERC	D	Needs review
OR-19125	EO of 12/27/1919	T 33 S, R 8 W, Secs. 33****,35		Power site Potential/ PSR 728	FERC	D	Needs review
OR-19125	EO of 12/27/1919	T 34 S, R 9 W, Sec. 1		Power site Potential/ PSR 728	FERC	D	Needs review
OR-19125	EO of 12/27/1919	T 34 S, R 8 W, Secs. 1,3,5		Power site Potential/ PSR 728	FERC	D	Needs review
OR-4337	PL 90-542	T 33 S, R 10 W, Secs. 9-14		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 33 S, R 9 W, Secs. 8,15-18, 21-23,26,27,35,36		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 33 S, R 8 W, Secs. 31-36		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 33 S, R 7 W, Sec. 31		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 34 S, R 9 W, Sec 1,2		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 34 S, R 8 W, Secs. 1-3, 5, 6, 12, 13, 24, 25, 36		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 34 S, R 7 W, Secs. 6,18,19, 30,31		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 35 S, R 8 W, Sec. 1		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 35 S, R 7 W, Secs. 3-11,14, 15, 23-26, 35,36		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 36 S, R 7 W, Sec 1,2, 11-14,24		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-4337	PL 90-542	T 36 S, R 6 W, Secs. 18,19		Protection of Wild and Scenic River values/ Rogue W&SR	BLM		C
OR-57512	FO of 6/6/2002	T 36 S, R 6 W, Secs. 19,20, 29-31		Water Power Project/ PP-12205	FERC	B	R
OR-19098	EO of 5/7/1917	T 33 S, R 2 E, Sec. 1***		Power site Potential/ PSR 623	BLM	D	Needs review
OR-19098	EO of 5/7/1917	T 35 S, R 7 W, Secs. 6****,10		Power site Potential/ PSR 623	BLM	D	Needs review
OR-19098	EO of 5/7/1917	T 36 S, R 7 W, Sec. 12		Power site Potential/ PSR 623	BLM	D	Needs review
OR-49212	PLO 7136	T 34 S, R 8 W, Sec. 35		Protect Recreation Values/ Galice Creek Recreation Area	BLM	B	Needs review
OR-49212	PLO 7136	T 35 S, R 8 W, Secs. 2,3	290	Protect Recreation Values/ Galice Creek Recreation Area	BLM	B	Needs review
ORE-0-12261	PLO 3259	T 36 S, R 3 W, Sec. 11	79.73	Protection of R&PP/ Recreation Area	BLM	B	Needs review
OR-49218	PLO 7103	T 37 S, R 7 W, Sec. 36		Protection of Scenic, Fisheries, Wildlife, and Recreation Values/	BLM	B	Needs review
OR-49218	PLO 7103	T 37 S, R 6 W, Sec. 31		Limestone Caves and Crook Creek	BLM	B	Needs review

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR-49218	PLO 7103	T 39 S, R 8 W, Sec. 11	758.46	Fisheries Area	BLM	B	Needs review
OR-19138	SO of 1/7/1926	T 38 S, R 8 W, Secs. 9,26***, 27,28,34,35		Power site Potential/ PSC 123	BLM	D	Needs review
OR-19138	SO of 1/7/1926	T 39 S, R 8 W, Secs. 5****, 15, 27****,29,33,34****,35		Power site Potential/ PSC 123	BLM	D	Needs review
OR-19138	EO of 1/7/1926	T 40 S, R 8 W, Secs. 5****,9		Power site Potential/ PSC 123	BLM	D	Needs review
OR-19093	EO of 4/28/1917	T 38 S, R 8 W, Secs. 27,35		Power site Potential/ PSR 618	BLM	D	Needs review
OR-19093	EO of 4/28/1917	T 39 S, R 8 W, Secs. 3, 4***,5, 9****, 17****, 21****,27***, 29***		Power site Potential/ PSR 618	BLM	D	Needs review
OR-19092	EO of 4/28/1917	T 38 S, R 8 W, Sec. 28	27.9	Power site Potential/ PSR 617	BLM	D	Needs review
OR-56726	FO of 5/21/2001	T 39 S, R 2 E, Secs. 34,35		Water Power Project/ PP-12022	FERC	D	FERC Vacation
OR-56726	FO of 5/21/2001	T 40 S, R 2 E, Sec. 2		Water Power Project/ PP-12022	FERC	D	FERC Vacation
OR-18974	FPC Orders OF 4/22/1959, 2/25/1975	T 39 S, R 2 E, Secs. 28,35 T 40 S, R 2 E, Sec. 1 T 40 S, R 3 E, Secs. 6,17		Transmission Line/ PP-2082	FERC	D	
OR-18974	FPC Orders OF 4/22/1959, 2/25/1975	T 41 S, R 3 E, Sec. 1 T 41 S, R 4 E, Secs. 6-9,12,17		Transmission Line/ PP-2082	FERC	D	
Not Serialized	Act Of 12/30/1982	T 40 S, R 2 E, Secs. 31,32 T 41 S, R 3 E, Secs. 5,6		Protection of Wilderness Potential/ BLM Wilderness Study Area	BLM		Needs Review

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
FPCO: 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:
C - Continue R - Revoke

*** 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.

Note: 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 P-6. Existing Land Withdrawals And Recommendations For Continuance In The Klamath Falls Resource Area

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
ORE 05433	BO of 6/14/57	40S 10E Sec. 9	80	Air navigation/ ANS 57	FAA	A	Modify withdrawal, 80 acres continued,
ORE 05433	BO of 6/14/57	40S 10E Sec. 10	80	Air navigation/ ANS 57	FAA	A	80 acres revoked
ORE 05433	*BO of 6/14/57*	*Total acres*	160				
OR 36244	BO of 2/11/47	39S 9E Sec. 21	51.12	Kingsley Field	USAF	B	Modify withdrawal. Partial revocation/ continuation
OR19001	EO 5907	38S 13E Sec. 35	40	Public Water Reserve 146	BLM	E	Not evaluated
OR 20219	EO of 1/24/1914	41S 13E Sec. 6	52.14	Public Water Reserve 15	BLM	E	Not evaluated
OR 20219	EO of 1/24/1914	40S 13E Secs. 19,31	189.55	Public Water Reserve 15	BLM	E	Not evaluated
OR 20219	EO of 1/24/1914	41S 12E Sec. 1	40	Public Water Reserve 15	BLM	E	Not evaluated
OR 20219	EO of 1/24/1914	40S 12E Sec. 24	160	Public Water Reserve 15	BLM	E	Not evaluated
OR 20219	*EO of 1/24/1914*	*Total acres*	441.69				
OR 9041	EO 4/17/1926	41S 14.5E Sec. 1	40	Public Water Reserve 107	BLM	E	Not evaluated
ORE 0 16183E	PLO 3869	39S 13E Secs. 2,11	160	Gerber Reservoir recreation site.	BLM	B	C – Needed to protect the investment of federal
ORE 0 16183D	PLO 3869	38S 5E Sec. 21	40	Surveyor Mountain recreation site	BLM	B	C – Needed to protect the investment of federal
ORE 0 16183D	PLO 3869	40S 7E Sec. 6	14.35	Topsy recreation site	BLM	B	C – Needed to protect the investment of federal
ORE 012799	PLO 3274	39S 9E Sec. 21	10.04	Administrative site	FWS	B	R / Suitable for return to Public Domain
OR 20243	SO of 7/9/1904	39S 14E Secs. 5-8,16-22		Klamath Basin Reclamation Project	BR	B	R / Suitable for return to Public Domain
OR 20243	SO of 7/9/1904	38S 14E Secs. 31,32		Klamath Basin Reclamation Project	BR	B	R / Suitable for return to Public Domain
OR 20243	*SO of 7/9/1904*	*Total acres*	3,585.82				
	SO of 7/27/1904	38S 13E Sec. 35	120	Klamath Basin Reclamation Project	BR	B	R –Wdl relinquished. Suitable for return to BLM.
	SO of 7/27/1904	39S 13E Secs. 1,2,11-14,23, 26,27,33,34	2,758.87	Klamath Basin Reclamation Project	BR	B	R –Wdl relinquished. Suitable for return to BLM.
	SO of 7/27/1904	*Total acres*	2,878.87				
OR 2870	PL 88-567	34S 6E Secs. 1, 12, 13, 25, 26, 35, 36		Upper Klamath National Wildlife Refuge	FWS		C
OR 2870	PL 88-567	35S 6E Secs. 1, 2, 12, 13, 24, 25,35,36,PB 37,38		Upper Klamath National Wildlife Refuge	FWS		C

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 2870	PL 88-567	37S 8E Sec. 36		Upper Klamath National Wildlife Refuge	FWS	Closed to Homestead Entrys	C
OR 4669	PLO 1512	37S 7.5E Secs. 9,10	6	Upper Klamath National Wildlife Refuge, Addition	FWS		
OR-20587	EO 4851	35S 6E Secs. 1, 2, 12, 13,24, 25,35,36,PB 37,38		Upper Klamath National Wildlife Refuge	FWS	B	C
OR-20587	EO 4851	36S 6E Secs. 2,3,11-14, PB 37-42		Upper Klamath National Wildlife Refuge	FWS	B	C
OR 22625	EO 924	37S 8E Secs. 23-28,31-36		Lower Klamath National Wildlife Refuge	FWS	B	C
OR 22625	EO 924	40S 8E Secs..1-16, 21-27, 34-36		Lower Klamath National Wildlife Refuge	FWS	B	C
OR 22625	EO 924	40S 9E Secs. 6-8,17-21, 27-35		Lower Klamath National Wildlife Refuge	FWS	B	C
OR 22625	EO 924	41S 10E Secs. 7,17,18		Lower Klamath National Wildlife Refuge	FWS	B	C
OR 22625	EO 924	41S 9E Secs. 1-6,8-13		Lower Klamath National Wildlife Refuge	FWS	B	C
OR 22625	EO 924	41S 8E Secs. 1-5,9-16		Lower Klamath National Wildlife Refuge	FWS	B	C
OR 20246	SO of 1/28/1905	37S 8E Sec. 17	68.7	Klamath Basin Reclamation Project	BR		R
OR 20249	SO of 1/20/1910	34S 6E Secs. 1, 12, 13, 25,26, 35,36		Klamath Basin Reclamation Project,	BR	B	R
OR 20249	SO of 1/20/1910	35S 6E Secs. 1, 2, 12, 13, 24, 25,35,36,PB 37,38		Klamath Basin Reclamation Project	BR	B	C
OR 20249	SO of 1/20/1910	36S 6E Secs. 2,3,11-14, PB 37-42		Klamath Basin Reclamation Project	BR	B	C
OR 20253	SO of 6/25/1919	41S 10E Secs. 15,16,		Klamath Basin Reclamation Project	BR	B	C
OR 20253	SO of 6/25/1919	41S 9E Secs. 3-6, 8-10, 12, 14-18		Klamath Basin Reclamation Project	BR	B	C
OR 20253	SO of 6/25/1919	41S 8E Secs. 1,4,9,11-16		Klamath Basin Reclamation Project	BR	B	C
OR 20253	SO of 6/25/1919	40S 8E Sec.25		Klamath Basin Reclamation Project	BR	B	C
OR 20244	SO of 7/19/1904	40S 9E Sec. 24		Klamath Basin Reclamation Project	BR	B	C
OR 20244	SO of 7/19/1904	41S 9E Secs. 3-6, 8-10, 12, 14-17		Klamath Basin Reclamation Project	BR	B	C
OR 20246	SO of 1/28/1905	41S 9E Secs. 3-6, 8-10, 12, 14-17		Klamath Basin Reclamation Project	BR	B	C
OR 20254	SO of 7/31/1919	39S 11E Sec. 19	80	Klamath Basin Reclamation Project	BR	B	R - Withdrawal relinquished ,suitable for return to Public Domain
OR 20240	SO of 6/20/1922	41S 14E Secs. 19,20	29.55	Klamath Basin Reclamation Project	BR	B	C
OR 20259	SO of 2/25/1939	39S 12E Secs. 22,26	120	Klamath Basin Reclamation Project	BR	B	R - Withdrawal relinquished ,suitable for return to Public Domain

Serial Number	Order Number	Legal Description	Acres	Purpose/Name	Managing Agency	Segregation Effect	Recommendation (C/R)
OR 20261	SO of 4/21/1940	40S 14E Sec. 5	41.04	Klamath Basin Reclamation Project	BR	B	R - Withdrawal relinquished ,suitable for return to Public Domain
OR 20239	SO of 2/21/1946	41S 14E Secs. 15,20-23	1063.8	Klamath Basin Reclamation Project	BR	B	
OR 20264	BO of 2/11/1947	39S 9E Secs. 20-22,25,27, 28,31-34	60.14	Klamath Basin Reclamation Project	BR	B	
OR 20264	BO of 2/11/1947	40S 9E Sec 3		Klamath Basin Reclamation Project	BR	B	
OR 20263	SO of 1/6/1944	40S 9E Sec. 15		Klamath Basin Reclamation Project	BR	B	
OR 20262	SO of 6/18/1940	39S 12E Sec 28	40	Klamath Basin Reclamation Project	BLM	D	Not evaluated
	SO of 3/31/1939	40S 14E Secs. 5***,7***,17***		Klamath Basin Reclamation Project			
OR 19085	EO 2/1/1917	41S 6E Secs. 2,7,10,18	313.95	Water Power Potential / PSR 579	BLM	D	Not evaluated
OR 44762		40S 6E Secs.1,12-14,23,26, 34,35		Klamath Wild and Scenic River		various	
OR 44762		40S 7E Sec.6		Klamath Wild and Scenic River			
OR 19054	EO 4/13/1912	41S 6E Secs. 4,8,10		Water Power Potential / PSR 258	BLM	D	Not evaluated
OR 19054	EO 4/13/1912	40S 6E Sec. 12,14,26,34		Water Power Potential / PSR 258	BLM	D	Not evaluated
OR 19054	EO 4/13/1912	41S 5E Sec. 13		Water Power Potential / PSR 258	BLM	D	Not evaluated
OR 19054	*EO 4/13/1912*	*Total acres*	1611.34				
OR 18974	FPC Order of 1/28/1954	39S 7E Secs. 26-29,35,36		Protection of J.C. Boyle Power Project/ Power project 2082	FERC		
OR 18974	FPC Order of 1/28/1954	40S 7E Sec. 6	14.47	Protection of J.C. Boyle Power Project/ Power project 2082	FERC	B	Not evaluated
OR 18974	FPC Order of 1/28/1954	40S 6E Secs. 1,12-14,23,26,27,34,35	23.41	Protection of J.C. Boyle Power Project/ Power project 2082	FERC	B	Not evaluated
OR 18974	FPC Order of 1/28/1954	41S 6E Secs. 3,5,6,10,		Protection of J.C. Boyle Power Project/ Power project 2082	FERC	B	Not evaluated
OR 19131	SO 5/19/1921	41S 5E Sec. 12	6.42	Protect water, power, and reservoir development Potential/ PSC 2	BLM	B	Not evaluated

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
FPCO: 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:
C – Continue R - Revoke

*** 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 P-7. Land Tenure Zone 3 Lands In The Salem District

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
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	N1/2,SW1/4	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
2 S	9 W	7	UN Lot	0.19	PD	16
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, SESE	80.00	OC	25
4 S	2 E	23	SWNW	40.00	OC	26
4 S	2 E	33	Lots 1, 2	1.80	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	1 E	23	SESE	40.00	OC	48
7 S	3 W	29	Lot 3	5.42	OC	49
7 S	6 W	34	SWSE	40.00	OC	50
8 S	1 E	3	SWNW, SW	200.00	OC	51

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
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	5 W	32	Lots 1, 2	2.90	PD	64
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	3 W	1	Lot 11	0.15	Ot	80
11 S	7 W	14	Lot 5	0.14	PD	81
11 S	7 W	23	Lots 1, 2	1.39	Ot	82
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	15	Lot 13	3.85	PD	87
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	36	SESE	40.00	PD	91
12 S	3 E	23	SESW, SWSE	80.00	PD	92
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	4 W	1	Lot 3	0.23	OC	97
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

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
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
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	3 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
13S	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
			Total Acres	**5,698.86**		

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
** Map 2-5 is in Chapter 2 of the EIS

Table P-8. Land Tenure Zone 3 Lands In The Eugene District

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
14 S	2 W	13	Lots 4-5 (part)[2]	2.00	O&C[1]	128
15 S	2 W	25	SE1/4SE1/4(part)	5.00	O&C*[1]	129
17 S	3 W	15	Lots 6, 9	1.30	O&C[3]	130
16 S	3 W	30	Lot 3	15.28	PD*	131
16 S	6 W	7	Lot 6	3.76	O&C*	132
16 S	7 W	11	NW¼SE¼ (part)	2.50	O&C*[1]	133
18 S	1 W	5	Lot 8 (part)	0.50	O&C	134
18 S	1 W	26	Lot 7	1.68	PD	135
18 S	7 W	11	NE¼NE¼ (part)	3.00	O&C[1]	136
18 S	9 W	7	SE1/4SW	40.00	PD*	137
18 S	10 W	11	Lot 9	6.24	PD	138
18 S	11 W	18	SE1/4SE	40.00	PD*	139
18 S	12 W	15	SE1/4NE/1/4	40.00	PD*	140
19 S	3 W	35	Lot3[2]	2.79	O&C	141
19 S	4 W	29	NE¼SW¼ (part)	0.36	O&C[1]	142
21 S	1 W	31	Lot 13	1.42	O&C	143
22 S	1 W	5	Lot 18	0.25	O&C*[1]	144
			Total Acres	**166.08**		

[1]Acreage is approximate until cadastral survey is completed.
[2]Tract may be sold only to current R&PP lessee so long as case is in effect.
[3]Actual acreage may vary due to erosion and accretion.
* These listings were not included in the 1995 RMP

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
** Map 2-5 is in Chapter 2 of the EIS

Table P-9. Land Tenure Zone 3 Lands In The Roseburg District

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
26S	2 W	17	NENESESE (part North of Highway 138)	0.30	O&C	145
30 S	2 W	34	SESW	40.00	PD	146
26 S	4 W	10	Lot 1	7.00	PD	147
26 S	4 W	17	Lots 9 and 10	12.00	O&C	148
27 S	4 W	7	Lot 2	4.00	O&C	149
28 S	4 W	29	SENE	40.00	O&C	150
30 S	4 W	1	Lot 9	4.00	O&C	151
24 S	5 W	29	Lot 5	28.00	O&C	152
28 S	5 W	28	NWNW	40.00	PD	153
28 S	5 W	29	E2NE	80.00	O&C	154
24 S	6 W	27	W1/2, SWSE	360.00	O&C	155
25 S	6 W	3	NWNE, NESW, NESE	122.00	O&C	156
25 S	6 W	33	SESE	40.00	O&C	157
26 S	6 W	3	SENE, NESE	80.00	O&C	158
26 S	6 W	17	Lot 2, SENW, SESW, SWSE	126.00	O&C	159
30 S	6 W	18	Lots 1 and 2	39.00	PD	160
			Total Acres	**1,022.30**		

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
** Map 2-5 is in Chapter 2 of the EIS

Table P-10. Land Tenure Zone 3 Lands In The Coos Bay District

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
19S	12W	1	Lots 1, 2	40.48	PD	161
20S	9W	33	Lot 7	3.98	O&C	162
20S	10W	31	Por. Lot 10	5.98	Acq.	163
20S	11W	36	Por. Lot 9			164
21S	11W	31	Lot 18	37.22	PD	165
21S	11W	32	Lots 16, 23	59.01	PD	166
22S	8W	15	Lot 9, 10	25.30	O&C	167
22S	13W	14	Lots 1, 2	71.10	PD	168
25S	11W	30	Lot 5	39.92	PD	169
25S	13W	4	N1/2NW1/4	80.00	PD	170
25S	13W	7	Lots 6, 8, 13, 14, 15	92.78	PD	171
25S	13W	18	Lot 7, E1/2NW1/4	96.15	PD	172
26S	08W	10	SE1/4NE1/4	40.00	PD	173
26S	11W	8	NW1/4NE1/4	40.00	PD	174
26S	12W	9	Por. SE1/4SW1/4	4.00	Acq.	175
26S	14W	3	Pors. Lots 1, 2 , SE1/4NW1/4	62.18	PD	176
26S	14W	28	NW1/4NE1/4	40.00	PD	177
28S	12W	19	SE1/4SE1/4	40.00	CBWR	178
30S	12W	5	Lot 6	1.80	O&C	179
30S	12W	6	Lots 3,4	1.14	PD	180
30S	13W	21	N1/2NE1/4NW1/4	20.00	PD	181
32S	14W	7	N1/2SW1/4NE1/4NW1/4	5.00	PD	182
32S	15W	4	NE1/4SE1/4NE1/4, S1/2NE1/4NE1/4, W1/2SE1/4NE1/4, Lots 1, 2, 3, 4	71.75	PD	183
39S	12W	8	W1/2NW1/4	80.00	PD	184
			Total Acres	957.79		

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
** Map 2-5 is in Chapter 2 of the EIS

Table P-11. Land Tenure Zone 3 Lands In The Medford District

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
34 S	6 W	22	NW¼SE¼;	40.00	PD	185
		33	SW¼SW¼; E½SW¼;	120.00	OC	186
		35	NW¼NE¼;	40.00	OC	187
35 S	1 W	15	NW¼SE¼;	40.00	OC	188
35 S	5 W	31	SE¼NW¼, SW¼, W½SE¼;	280.00	OC	189
		32	SW¼NE¼; W½SE¼, NE¼SE¼;	160.00	PD	190
35 S	6 W	5	S½NE¼, SE¼SW¼, SE¼;	280.00	OC	191
		7	NE¼NE¼, N½NW¼, SW¼NW¼, SE¼NE¼;	200.00	OC	192
		11	E½NE¼, SW¼NE¼, NE¼SE¼;	160.00	OC	193
		14	NW¼SE¼;	40.00	PD	194
		17	NE¼NE¼, NW¼NW¼;	80.00	OC	195
		19	NE¼, N½NW¼;	240.00	OC	196
		21	NE¼NE¼;	40.00	OC	197
		29	NW¼NW¼;	40.00	OC	198
		30	S½S¼;	80.00	PD	199
		31	SW¼NE¼, W½, NW¼SE¼;	400.00	OC	200
		33	E½NE¼, E½NW¼, NW¼NW¼, SE¼SE¼;	240.00	OC	201
36 S	3 W	21	NE¼SW¼;	40.00	OC	202
		33	SW¼SW¼,	40.00	OC	203
			NW¼SE¼SW¼;	10.00	PD	
		35	NE¼NE¼;	40.00	OC	204
36 S	4 W	25	SE¼SW¼, S½SW¼SE¼;	60.00	OC	205
		35	Lot 5, W½SW¼;	112.40	OC	206
36 S	5 W	4	E½NW¼, N½SW¼;	160.00	PD	207
		5	SE¼NE¼, E¼SE¼;	80.00	OC	208
		9	W½E½, E½W½, E½NW¼SW¼;	340.00	OC	209
		29	S½SW¼;	80.00	OC	210
36 S	6 W	1	Lots 2,3,4, S½NE¼, N½SW¼, SE¼NW¼, W½SE¼, SE¼SE¼;	440.00	OC	211
		3	SW¼, S½SE¼	240.00	OC	212
		4	W½W½	160.00	PD	213
		5	E½SE¼, SW¼NW¼, W½SW¼;	200.00	OC	214
		8	W½SE¼, SE¼SE¼;	120.00	PD	215
		9	N½NW¼, SW¼NW¼, E½SE¼;	200.00	OC	216
		11	NW¼NE¼;	40.00	OC	217
		17	N½N½;	160.00	OC	218
		30	NW¼SW¼;	40.00	PD	219
		31	NW¼NW¼;	40.00	OC	220
		33	SE¼NE¼;	40.00	OC	221
37 S	3 W	1	Lot 8	13.82	*PD	222
		4	Lot 2	4.28	PD	223
		5	Lot 7	39.69	PD/OC	224
			Lot 8	30.72	PD/OC	
			Lot 9	4.87	PD	
37 S	5 W	5	NE¼NW¼, SW¼NW¼, NW¼SW¼;	120.00	OC	225
		7	W½SW¼;	80.00	OC	226
		18	W½SW¼;	80.00	PD	227

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
37 S	6 W	3	SE¼NE¼, NE¼SE¼;	80.00	OC	228
		8	NE¼NE¼;	40.00	PD	229
		9	NE¼, N½SW¼, SE¼SW¼, W½SE¼, NE¼SE¼;	400.00	OC	230
		11	N½NW¼;	80.00	OC	231
		13	SW¼SE¼, E½SE¼;	120.00	OC	232
		15	NE¼NE¼, SW¼NE¼, SE¼NW¼;	120.00	OC	233
		24	NW¼NE¼;	40.00	PD	234
38 S	1 W	21	Lot 1, NE¼SW¼, S1/2SW¼	147.04	OC	235
38 S	2 W	10	NE¼NW¼;	40.00	PD	236
		28	Lot 1	5.00	*PD	237
38 S	4 W	17	NE¼NE¼;	40.00	OC	238
		25	Lot 7	9.26	*PD	239
39 S	1 W	1	NE¼NE¼;	40.00	OC	240
39 S	2 W	18	NW¼NE¼SW¼;	10.00	*PD	241
40 S	8 W	1	Lots 7, 8;	11.53	OC	242
		5	Lots 6, 7;	21.21	OC	243
		7	Lots 1,2, E½SW¼, W½SE¼;	202.34	OC	244
32 S	2 E	17	NW¼SW¼SW¼SW¼;	2.50	*PD	245
33 S	2 E	1	SE¼SW¼;	40.00	PD	246
36 S	1 E	6	SE¼SE¼;	40.00	*PD	247
36 S	2 E	34	SE¼SW¼, SW¼SE¼;	80.00	PD	248
37 S	1 E	15	SE¼NW¼;	40.00	OC	249
38 S	1 E	3	SW¼NW¼;	40.00	OC	250
		5	SE¼NE¼;	40.00	OC	251
38 S	2 E	34	SW¼NW¼, NW¼SW¼;	80.00	PD	252
			Total Acres	**7,264.66**		

E = East N = North S = South W = West UN = Unnumbered PD = Public Domain Land
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** Map 2-5 is in Chapter 2 of the EIS

* Land added by amendment and not subject to FLTFA funds

Table P-12. Land Tenure Zone 3 Lands In The Klamath Falls Resource Area

Township	Range	Section	Subdivision	Acres	Status	**Location on Map 2-5
37 S	14 E	10	W1/2NE	80.00	PD	253
38 S	8 E	31	LOT 4	10.30	PD	254
38 S	11 E	17	NWNE,	40.00	PD	255
			E1/2SE	80.00	PD	
38 S	11 E	32	NESW, NWSE	80.00	PD	256
39 S	8 E	6	LOT8	27.20	PD	257
39 S	8 E	7	LOT5	16.90	PD	258
39 S	11 E	2	LOT 1	40.24	PD	259
39 S	12 E	28	NESW	40.00	PD	260
40 S	8 E	17	SWSE	40.00	PD	261
40 S	9 E	23	SWNW	40.00	PD	262
40 S	11 E	9	N1/2NW, SENW,	120.00	PD	263
			SENE	40.00	PD	
40S	11E	10	SENE, S1/2NW, E1/2SW, W1/2SE	280.00	PD	264
40 S	11 E	14	NWNE, NENW, S1/2NW, N1/2SW	240.00	PD	265
40 S	12 E	10	SENW,	40.00	PD	266
			W1/2SE	80.00	PD	
40 S	12 E	14	SENW, N1/2SW, SWSW, NWSE	200.00	PD	267
40 S	12 E	15	N1/2NE,	80.00	PD	268
			SESW, N1/2SW	120.00	PD	
40 S	12 E	21	NESE	40.00	PD	269
40 S	12 E	22	SWNE, SENW,	80.00	PD	270
			SWSW	40.00	PD	
40 S	12 E	27	W1/2NE, SENE, N1/2NW, SENW	240.00	PD	271
40 S	13 E	35	SWNE	40.00	PD	272
41 S	7 E	13	NENE	40.00	PD	273
			LOT 4	24.69	PD	
41 S	11 E	8	LOT 6	7.12	PD	274
			Total Acres	**2,206.45**		

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
** Map 2-5 is in Chapter 2 of the EIS

FERC Relicensing for the Klamath Hydroelectric Project

The BLM's section 4(e) conditions and other BLM decisions made in the Federal Energy Regulatory Commission (FERC) relicensing proceeding for the Klamath Hydroelectric Project (FERC No. 2082) are not affected by the decision regarding the revision of BLM resource management plans in western Oregon. The relicensing proceeding was initiated in 2000, well before the process for revising the existing resource management plans was initiated. The BLM's section 4(e) conditions and record of decision were developed under the guidance of the then existing management plan. The section 4(e) conditions have been subjected to extensive public review and comment, and a trial type hearing by an Administrative Law Judge under the Energy Policy Act of 2005 ("EP Act"). Additionally, the BLM received and analyzed alternatives submitted under the EP Act. These conditions ultimately became conditions of the Department of the Interior through a submission by the Department to FERC dated January 24, 2006, and no changes are being contemplated in the revision process that would be inconsistent with that submission.

Inventory of Communication Sites

Table P-13 through *Table P-18* contain information on existing communication sites. *Chapter 2* of the FEIS contains management actions related to management of communication sites.

Table P-13. Inventory Of Communication Sites For The Salem District

Location # on Map 2-6[a]	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
1	Bald Mountain	OR049380	3S	6W	29	NW¼SW¼	45° 17' 00"	123° 25' 50"
2	Brightwood	OR 044996, OR 54285, OR 054287, OR 060816	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	5S	4E	14	SW¼SW¼	45° 07' 52"	122° 17' 16"
5	High Heaven	OR018080, ORE000172	3S	5W	33	NW¼SE¼	45° 15' 53"	123° 18' 33"
6	Mt. Horeb	OR002086	9S	4E	17	NE¼NE¼	44° 47' 35"	122° 20' 21"
7	Prairie Mtn.	ORE005555	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"
12	Tater Hill	OR016808	4N	3W	27	SW¼SW¼	45° 47' 45"	123° 03' 00"
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"

[a]Map 2-6 is in Chapter 2 of the EIS.

Table P-14. Inventory of Communication Sites For The Eugene District

Location # on Map 2-6[a]	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
15	Badger Mountain	OR 55473, OR 48253, ORE 02880, OR 59637, OR 34510	17 S	7 W	35	Lot 7	44.05073	123,5015
16	Brickerville	Vacant	18 S	10 W	3	Lot 5	44.03375	123.886
17	Vaughn Hill	Vacant	18 S	6 W	5	SE, SW4NE4	44.03641	123.4373
18	Amy Road	OR 15674	16 S	7 W	1	NW, SW	44.20898	123.4823
19	Hawley Butte	OR 56656, OR 43048	21 S	1 W	29	Lot 7	43.71797	122.8375
20	Huckleberry Mountain	OR 51261,	24 S	1 W	6	Lot 21	43.51053	122.8571
21	Horse Rock	OR 53355, OR 02743	15 S	2 W	1	Lot 4	44.30092	122.8831
22	Buck Mountain	ORE 017963, OR28799	16 S	2 W	7	Lot 1	44.19825	122.9851
23	Mt. Tom	Vacant	15 S	2 W	31	SW	44.21592	122.9784
24	South McGowan	Vacant	16 S	2 W	31	NW	44.13768	122.9786
25	Windy Peak	Vacant	16 S	8 W	27	SW	44.14644	123.6521
26	Elk Mountain	Vacant	16 S	8 W	26	NE	44.15383	123.622
27	Black Canyon	Vacant	17 S	2 W	7	SW	44.10226	122.9794
28	Camp Creek Ridge	Vacant	17 S	2 W	15	NE	44.09592	122.9066
29	High Point	Vacant	19. S	6 W	23	NW	43.9065	123.3783
30	Eagle's Rest	Vacant	20 S	1 W	12	NE	43.8471	122.7465
31	Cougar Mountain	Vacant	20 S	3 W	1	NE	43.86457	122.9869
32	Laurel Butte	Vacant	22 S	3 W	23	SE	43.64147	123.0066
33	Hobart Butte	Vacant	22 S	3 W	1	NW	43.61182	123.0993

[a]Map 2-6 is in Chapter 2 of the EIS.

Table P-15. Inventory of Communication Sites For The Roseburg District

Location # on Map 2-6[a]	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
34	Kenyon Mountain		30S	9W	3	NW	42.5944	123.4531
35	Canyon Mountain		31S	5W	3	SW	42.5436	123.1706
36	Yellow Butte		23S	6W	27	NW	43.3207	123.2413
37	Lane Mountain		27S	4W	25	NE	43.1144	1230710

[a]Map 2-6 is in Chapter 2 of the EIS.

Table P-16. Inventory Of Communication Sites For The Coos Bay District

Location # on Map 2-6[a]	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
38	Roman Nose	OR 8652	19 S	9 W	23	NWNE,NENW	43-54-50	122-44-00
39	Johns's Peak	OR 53660	23 S.	9 W	27	SESW	43-31-56	123-45-41
40	Blue Ridge	OR 36189	26 S	12 W	35	SESW	43-16-34.7	124-5-24.5
41	Signal Tree	OR 8651	29 S	9 W	33	NWSW	43-00-07	123-46-28
42	Sugar Loaf	None	29 S	12 W	23	NE	43-02-48	124-05-14
43	Bennett Butte	OR	30 S	13 W	20	NENW	43-57-38	124-16-27
44	Edson Butte	OR 46648	31 S	14 W	23	SWNW	43-52-20	124-20-03
45	Grizzly Mountain		37 S	14 W	4	Lot 15	42-23-50	124-21-55
46	Bosley Butte	OR 16304	39 S	13 W	10	SWSE	42-12-33	124-13-25
47	Palmer Butte		40 S	13 W	10	Lot 10	42-7-36	124-12-34
48	Black Mound	OR 60391	40 S	13 W	20	NWNWSW	42-5-17	124-18-52.83

[a]Map 2-6 is in Chapter 2 of the EIS.

Table P-17. Inventory Of Communication Sites For The Medford District

Location # on Map 2-6	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
49	Mt. Bluie						42.2256	123.1629
50	Beacon Hill						42.2706	123.1750
51	Mt. Sexton						42.3700	123.2200
52	Mt. Baldy						42.1944	123.1117
53	Gilbert Peak						42.2932	123.1842
54	Chestnut Mountain						42.1397	122.4408
55	Mt. Isabelle						42.3034	123.1036
56	Soda Mountain						42.0648	122.4780
57	Squires Peak						42.2190	123.0330
58	Tallowbox						42.1966	123.1504
59	King Mountain						42.6920	123.2294
60	Flounce Rock						42.4360	122.3650
61	Wolf Ridge						42.4582	122.5113
62	Fielder Mountain						42.2688	123.1273
63	Tin Pan Peak						42.2558	123.0899
64	Elk Mountain						42.3240	123.1498
65	Nuggett Butte						42.2700	123.0333

[a]Map 2-6 is in Chapter 2 of the EIS.

Table P-18. Inventory of Communication Sites For The Klamath Falls

Location # on Map 2-6[a]	Site Name	Serial Number	T	R	S	Quarter Section	Latitude North	Longitude West
66	Stukel	OR 48956					42.1010	121.6342
		OR 35373						
		OR 46312						
		OR 52152						
67	Hamaker	OR 15231					42.0679	121.9699
		OR 36377						
		OR 36541						
		OR 36562						
		OR 37192						
		OR 45051						
		OR 46180						
		OR 56655						
		OR 56235						
		ORE 09843						
		ORE 10866						
		ORE 05614						
		ORE 10317						
		ORE 15790						
68	Yaniax	OR 39227					42.3264	121.2684
69	Buck Butte	OR 55670					42.0921	121.4432
		OR 2231						
70	Brady Butte	OR 2087					42.0166	121.0340

[a]Map 2-6 is in Chapter 2 of the EIS.

Analytical Methods to Determine Legal Public Accessibility of BLM Lands in the Planning Area

Purpose

Since a majority of the BLM-administered lands in western Oregon are intermingled with private lands, public access opportunities can vary greatly. Reciprocal right-of-way agreements, easements, and unsecured access rights across adjacent private lands all have a determining effect on the availability of legal public access to the BLM-administered lands.

This analysis is not designed to distinguish between motorized and non-motorized use areas, seasonal use restrictions, or consider other resource management constraints associated with public use. Nor does this analysis consider natural barriers that may affect public access (e.g., steep topography, dense vegetation, impassible rivers, etc.). Only the legal accessibility of BLM-administered lands for the public will be determined primarily using existing agency transportation database information. A small percentage of BLM-administered lands are legally accessible to the public other than via the road network (i.e., navigable waterways, coastal beaches, trail systems, etc.). These other access options will be considered as part of the analysis, either in the actual calculations or in the narrative for each BLM district.

The following public access categories will be assigned to all distinct management units of BLM-administered land throughout western Oregon:

(1) <u>Secured Public Access</u>	**(2) <u>Unsecured Public Access</u>**
Legal public access to BLM land is secured across private lands.	Legal public access to BLM land is not secured across private lands.

A distinct management unit is defined by a contiguous block of BLM-administered land, not including BLM lands that are joined by corners. Each access category is further defined below.

It is important to note that this analysis will only determine if the public can legally access a distinct management unit, not if a particular management unit provides roaded access throughout it. In some cases, a road may only access a small portion of a management unit; the remainder of the unit would require cross-country travel to reach. In this instance, the entire management unit is considered legally accessible to the public.

(1) <u>Secured public access</u>: Public access rights to a distinct management unit of BLM-administered land have been secured by the United States. Physical access must be present and available via the general transportation road network, a navigable waterway, coastal beach, or trail systems. Public access rights are generally included in the acquisition of exclusive or access road easements where the U.S. has acquired control of the right-of-way. However, individual access documents should be reviewed and used as the determining factor where necessary.

(2) <u>Unsecured public access</u>: Public access rights to a distinct management unit of BLM-administered land have not been secured by the United States. Administrative access is legally and/or physically available to the BLM via the general transportation road network; however, associated reciprocal right-of-way agreements or non-exclusive easements do not include legal access rights for the public. Individual access documents should be reviewed and used as the determining factor where necessary.

Legal public access may not be secured to certain distinct management units; however, the public may currently be allowed to access these BLM-administered lands at the consent of the adjacent private landowner. In fact, a number of BLM recreation sites do not have secured legal public access to them. Due to the difficulty and sensitivity of mapping private lands that provide unsecured public access to BLM-administered lands, this analysis is not designed to map these occurrences. BLM districts may decide to conduct a follow-up analyzes to determine the extent of this type of unsecured public access in order to improve management of these areas.

Methods

Part I. Geographic Information System Mapping

Step 1

Develop a digital layer of distinct management units of BLM-administered land for each district – using the 'dissolve' tool.

Step 2

Identify which access routes (line segments) on the BLM's transportation system have secured legal public access rights using the selected 'access rights' attribute from the BLM's ground transportation road network database described below. Legal public access is available to a distinct management unit where a management unit boundary intersects with an access route from a public road in which all of the line segments contain one of the following designation in the "*acc_rgt*" attribute field.

- BP = BLM Public Access
- FP = USFS Public Access
- OF = Other Federal Agency
- CO = County
- ST = State

Step 3

Determine which distinct management units do not have secured legal public access using the remaining 'access rights' attributes of the ground transportation road network: *Located in field acc_rgt.* (The remainder of the BLM-administered lands should be captured with this step.)

- BA = BLM Administrative Access
- BR = BLM Reciprocal Right-of-Way Agreement
- FA = USFS Administrative Access
- NO = No Legal Access
- PV = Private only
- UK = Unknown (also shown as "NKN")
- Blank (This will capture all roadless blocks of BLM-administered land surrounded by private lands.)

Step 4

Map the location and calculate total acreage for all distinct management units having either secured or unsecured legal public access for each district by land status (O&C lands, Coos Bay Wagon Road lands, Public Domain lands, and Acquired lands).

The scale of these maps must be large enough for the Realty, Roads, and Recreation Specialists to analyze the data. It may take 10 or more maps to cover the entire land base for most districts. Develop a template for each map that displays the following information:

(1) District boundary lines

(2) Distinct management units of BLM-administered land (using a distinct boundary type). Distinct management units will be identified using a reproducible color code or symbol based on one of the following attributes:

- Secured legal public access (see Step 2 above)
- Unsecured legal public access (see Step 3 above)

(3) Road line segments (using distinct colors and thicknesses), based on the following attributes:

- Secured public access (based on the attributes in Step 2 above)
- Unsecured legal public access (based on the attributes in Step 3 above)
- A thicker line for BLM roads with maintenance levels 3 or higher. (This will help the Road Specialists orient the transportation system for their analysis.)
- BLM Road numbers (e.g.,18-5-12)
- U.S., State, and County highways/roads
- County and State roads and highways labeled accordingly

(4) Township, range, and section numbers

Step 5

The District Geographic Information System Specialists will then print out the maps provided to them by the Geographic Information System Project Coordinators. After the maps have been printed, they will be passed to the Realty and/or Road Specialists.

Part II. Analysis of Maps

Step 1

The District Realty and/or Road Specialists verify the Geographic Information System outputs and quality control the maps. The maps must be reviewed for accuracy of attribute data that may affect public access to each distinct management unit of BLM-administered land. This quality control process should answer that all the distinct management units correctly color-coded as “Secured Public Access” or “Unsecured Public Access?” All errors should be corrected by marking up the maps using the following two rules:

- If a block is incorrectly color-coded as “Secured Public Access,” circle the letters “UPA” in the center of the block, meaning the block should be changed to “Unsecured Public Access.”
- If a block is incorrectly color-coded as “Unsecured Public Access,” circle the letters “SPA” in the center of the block, meaning the block should be changed to “Secured Public Access.”

This quality control check may be used in the future to correct errors in FAMS database and the Ground Transportation Road Network “access rights.” However, for purposes of this analysis, it is only necessary to mark up the paper copies of the maps.

Step 2

After the district maps have been analyzed by the realty and/or road specialists, the specialists will then coordinate with the district recreation planners for a final evaluation. This is necessary so that the recreation planners can consider other public access options other than via the road network (i.e., navigable waterways, coastal beaches, trail systems, etc.). After all changes have been incorporated, the maps will be mailed to the Geographic Information System staff in the State Office who will arrange for a contractor to incorporate all the necessary changes to produce final maps.

Part III. Development of Final Results

Update digital coverages for each district in western Oregon based on the marked-up maps provided by each BLM district in western Oregon. The final product will include:

(1) The BLM district maps of public accessibility routes and distinct management units of BLM-administered land identified by one of the following attributes:

- Secured legal public access
- Unsecured legal public access

(2) Spreadsheets that calculate the total number of acres per attribute and a percentage of the total land base for each district by land status (O&C, CBWR, PD and Acquired).

Appendix Q
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 564

Reasonably Foreseeable Mineral and Energy Developments in the Eugene, Roseburg, and Medford Districts and the Klamath Falls Resource Area of the Lakeview District 568

Proposed Restrictions and Requirements on Mineral and Energy Exploration and Development Activity 597

Reasonably Foreseeable Mineral and Energy Developments Summary

Table Q-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 Q-2. Salable Mineral Development Scenario Summary For 2008-2018

	Roseburg	Salem	Eugene	Coos Bay	Medford	Klamath Falls
New quarries	1	5	2	5	3	1 to 2
Acres disturbed	2 acres per quarry, plus ½ acre for access.					2 to 3 acres per quarry, plus ½ acre for access.
Existing quarries	60	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 than1 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 Q-3. Locatable Mineral Development Scenario

	Roseburg	Salem	Eugene[a]	Coos Bay	Medford	Klamath Falls
Bench Placer notices	2	10	6	6	80	0
Roads	0.3 acres per	0.3 acres per	0.3 acres per	0.3 acres per	Of 80 estimated, 10 would have roads at ½ acre per notice.	0
Test pits, support facility	1 acre per notice	1 acre per notice	1 acre per notice	1 acre per notice	1 acre per notice on average.	
Notice to plan	1	1	0	1	0	0
Vein notices	2	4	4	one	100 notices; surface disturbance 1 to 5 acres per notice.	4
Roads	3 per notice 40x200 = ½ acre per notice	3 per notice 40X200=1/2 acre per notice	3 per notice 40x200= ½ acre per notice	3 per notice 40x200= ½ acre per notice	Mostly existing roads; minimal temporary roads; estimate 0.50-acre for half of the notices; and zero acres for the other half of the notices.	Mostly existing roads; minimal temporary roads.
Support facilities	1 acre per notice	1 acre per notice	1 acre per notice	1 acre per notice	1 acre for half of the notices (many current notices take ore off-site for processing).	
Sample sites	½ acre per notice	0.50-acre per notice	0.50-acre per notice	0.50-acre per notice	Ten holes per notice; 0.1 acre per hole; estimate 1/5 of the notices will drill a hole.	Ten holes per notice; 0.1 acre per hole.
Plans of Operation	1	1	1	1	15 (lode & placer)	0
Exploratory holes	5; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre	Ten; 0.1 acre per hole; roads 40x300= 0.75 acre. Estimate ½ of the plans will be lodes and have exploratory holes.	
Support facility	1 acre	1 acre	1 acre	1 acre	1 acre per plan	
Second Phase Exploration						
Roads	5 (standard as above)= 2.5 acres	10 (standard as above)= 2.5 acres	10 (standard as above)= 2.5 acres	10 (standard as above)= 2.5 acres	Mostly existing roads; minimal temporary roads; estimate ½ acre for ½ of the plans;zero acres for the other half of the plans.	
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.	
Mine Development						
Bench placer	One; 1 acre	One, 7.5 acres	one; 7.5 acres		Eight of the plans are estimated to be bench placers at five acres per plan.	

	Roseburg	Salem	Eugene[a]	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.	
Mineral Processing	Done offsite	Done offsite			One acre for half of the plans.	
Silica sand deposit		One	[a] See Footnote	one		0
Mine site		21 acres		20 acres		
Stockpile heavy minerals		One acre		2 acres		
vegetation stockpile		One acre		½ acre		
Office & magnetic separation		One acre		One acre		
Laterite placer plan of operation				One plan		0
Exploratory Holes drilled				10 @ 0.1 acre per hole		
New temporary Roads				0.75 acres total		
Support facility				One acre		
Second Phase Expansion						
Temporary roads				2.5 acres total		
Ten additional drill holes				One acre total		
Recreational mining	5 notices; 2 Acres total	30 notices; 7.5 acres total	30 notices; 7.5 acres total	30 notices; 7.5 acres total	800 Estimate 300 acres, this is disturbance only under the water level.	See suction dredging above.

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

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

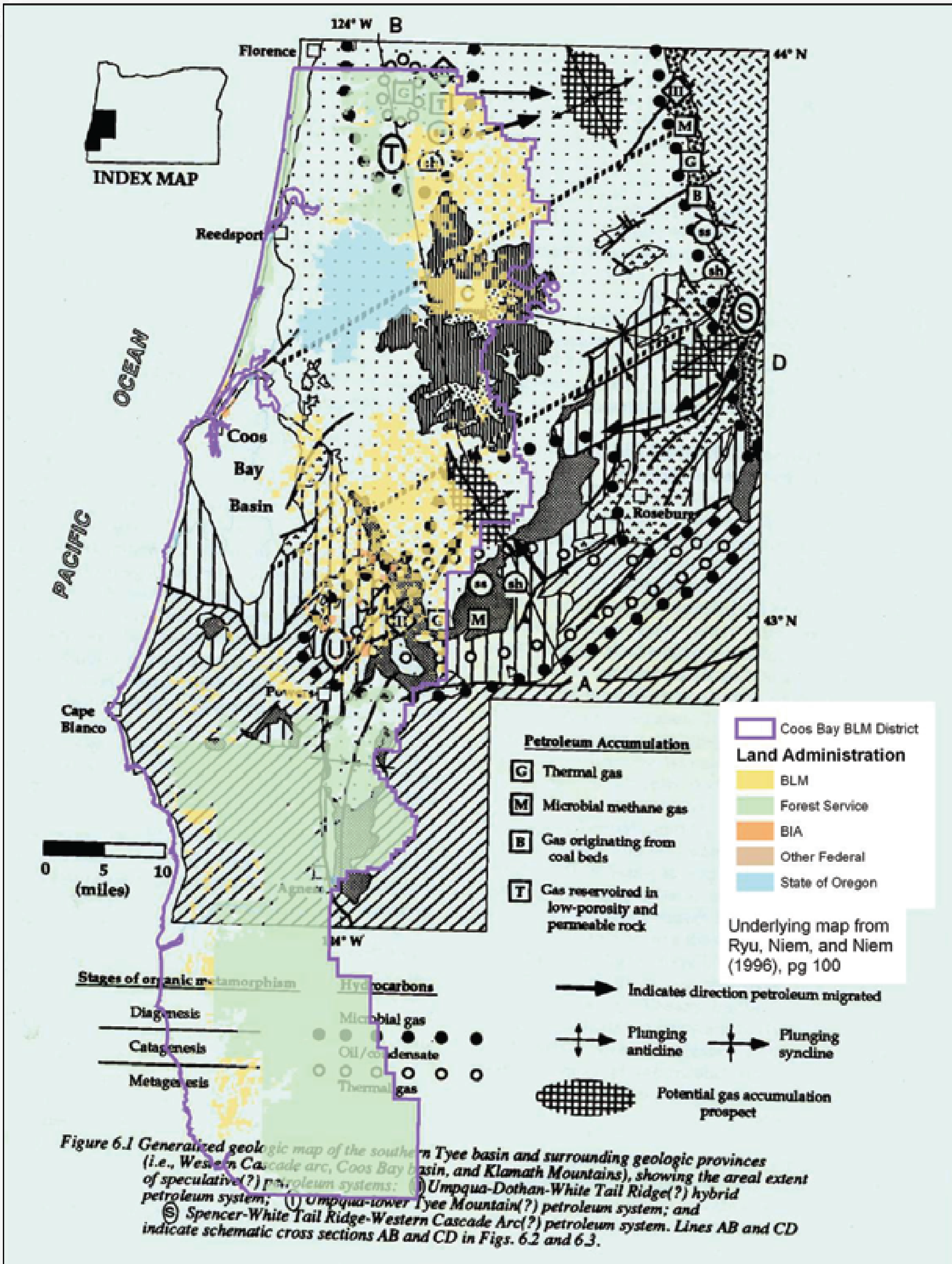
The Coos Bay District is located on the western edge of Southwest Oregon and encompasses lands in Douglas, Coos, Curry, Lane, and Josephine Counties. Conventional petroleum in the district has been the focus of numerous studies (Diller 1901 as found in Newton 1980, Niem and Niem 1990, and Ryu et al. 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 Tyee Mountain petroleum system. Both areas are contained in the southern Tyee sedimentary basin (Ryu et al. 1996) (see *Figure Q-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 Tyee 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 Q*-2), which is an area of approximately 250 square miles located on the western edge of the district.

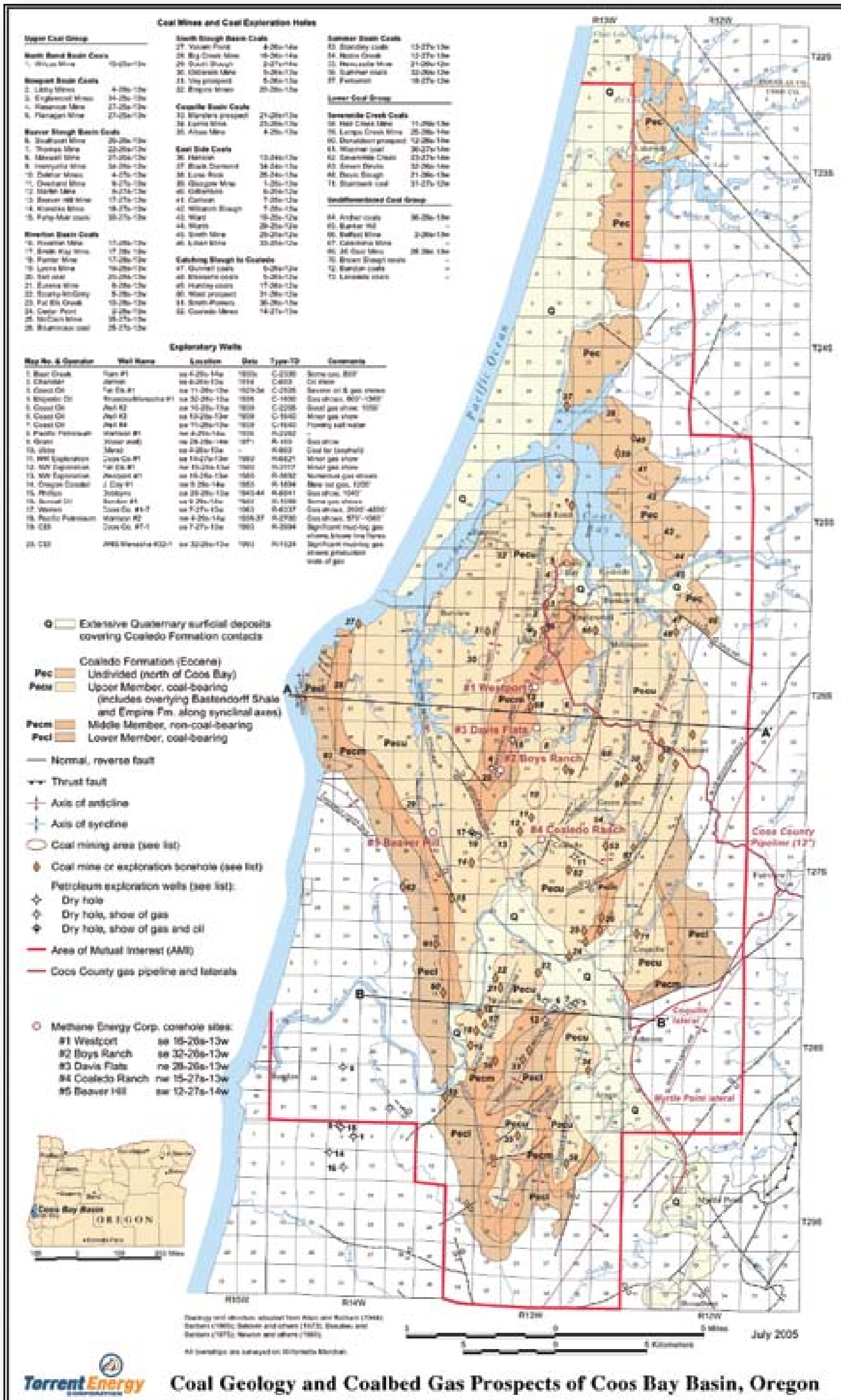
Although oil and gas exploration has been historically associated with these systems (Ryu et al. 1996, Newton 1980) and conventional oil and gas potential exists as identified speculative petroleum systems (Ryu et al. 1990), there is currently no known interest in exploration or development of these 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 Q-1. Southern Tyee Sedimentary Basin



Source: Ryu et al. 1996

Figure Q-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.

Common to All Alternatives

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-feet 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 cumulated 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 Q-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:

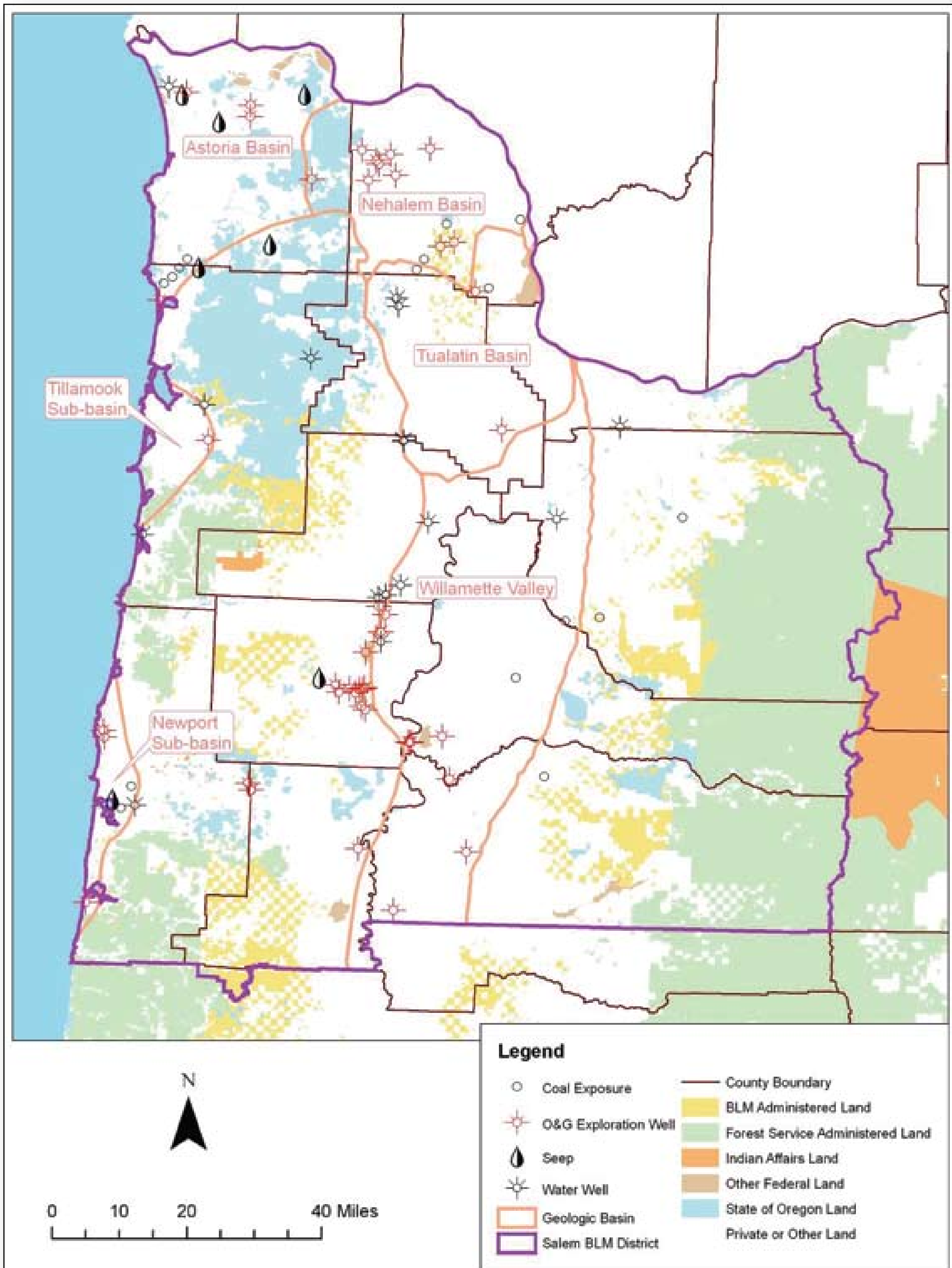
- Tualatin Basin, a sub-basin of the Willamette Valley
- Willamette Valley
- Newport Basin, a sub-basin of the larger off-shore Newport Basin
- Tillamook Basin, a sub-basin of the larger off-shore Newport Basin
- Astoria Basin
- Nehalem Basin or arch

See *Figures Q-3* and *Q-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 Q-4*). The Salem District manages a total of approximately 19,375 acres of surface estate within these basins (USDI BLM 2007).

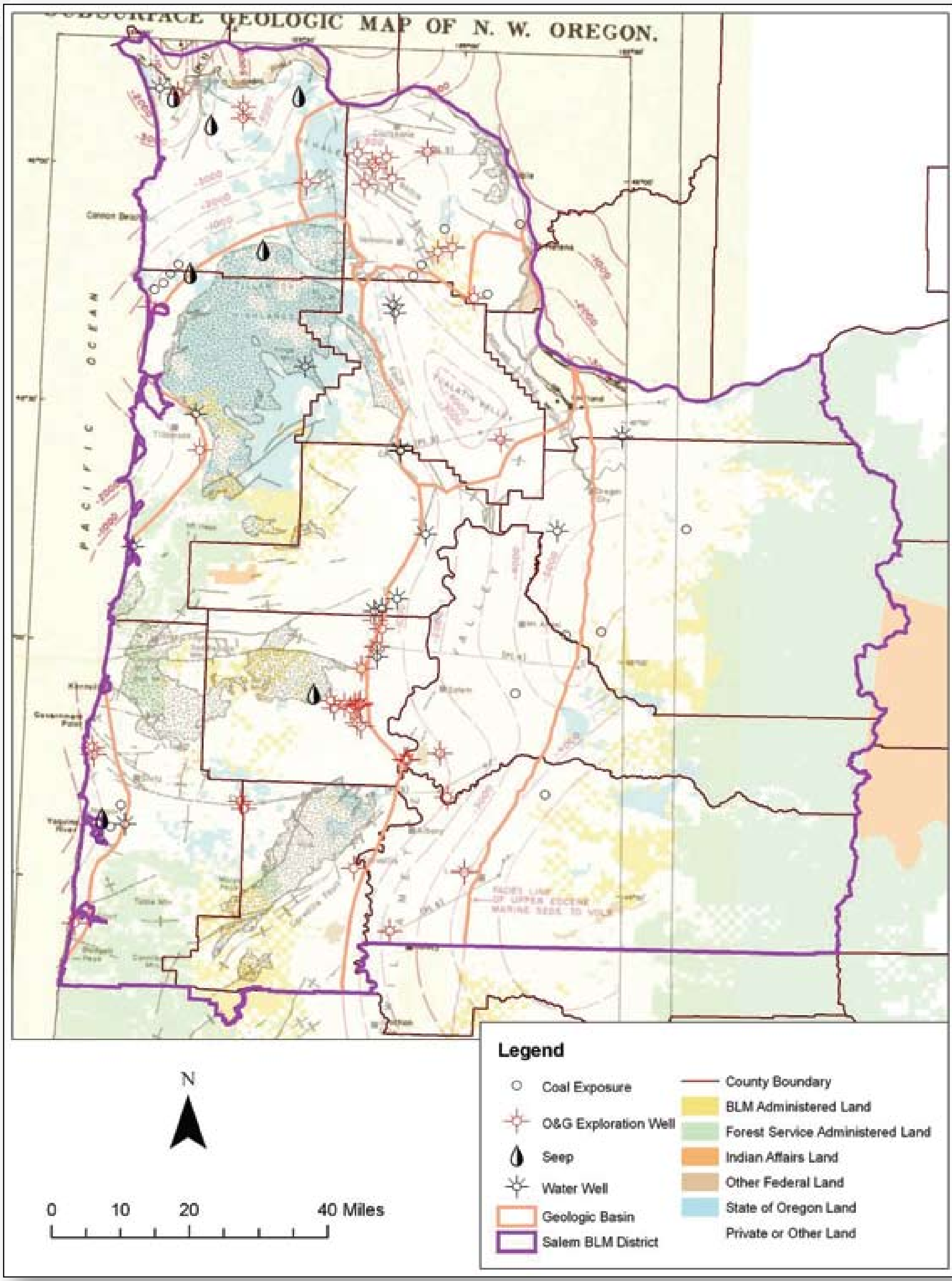
Tualatin Sub-Basin: The BLM manages approximately 8,858 acres of surface estate in the Tualatin Sub-Basin (USDI BLM 2007), which is considered part of the Willamette Valley. The lower rock is Eocene shale

Figure Q-3. BLM Oregon Salem District, Surface



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

Figure Q-4. Salem District BLM, 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 Q-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 Q-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 Q-3* and *Q-4*). The Eocene Nonconformity is at a maximum on-shore mapped depth of 2,000 feet below sea level (Newton 1969) (refer to *Figure Q-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 Q-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 Q-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 Q-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 Q-4*).

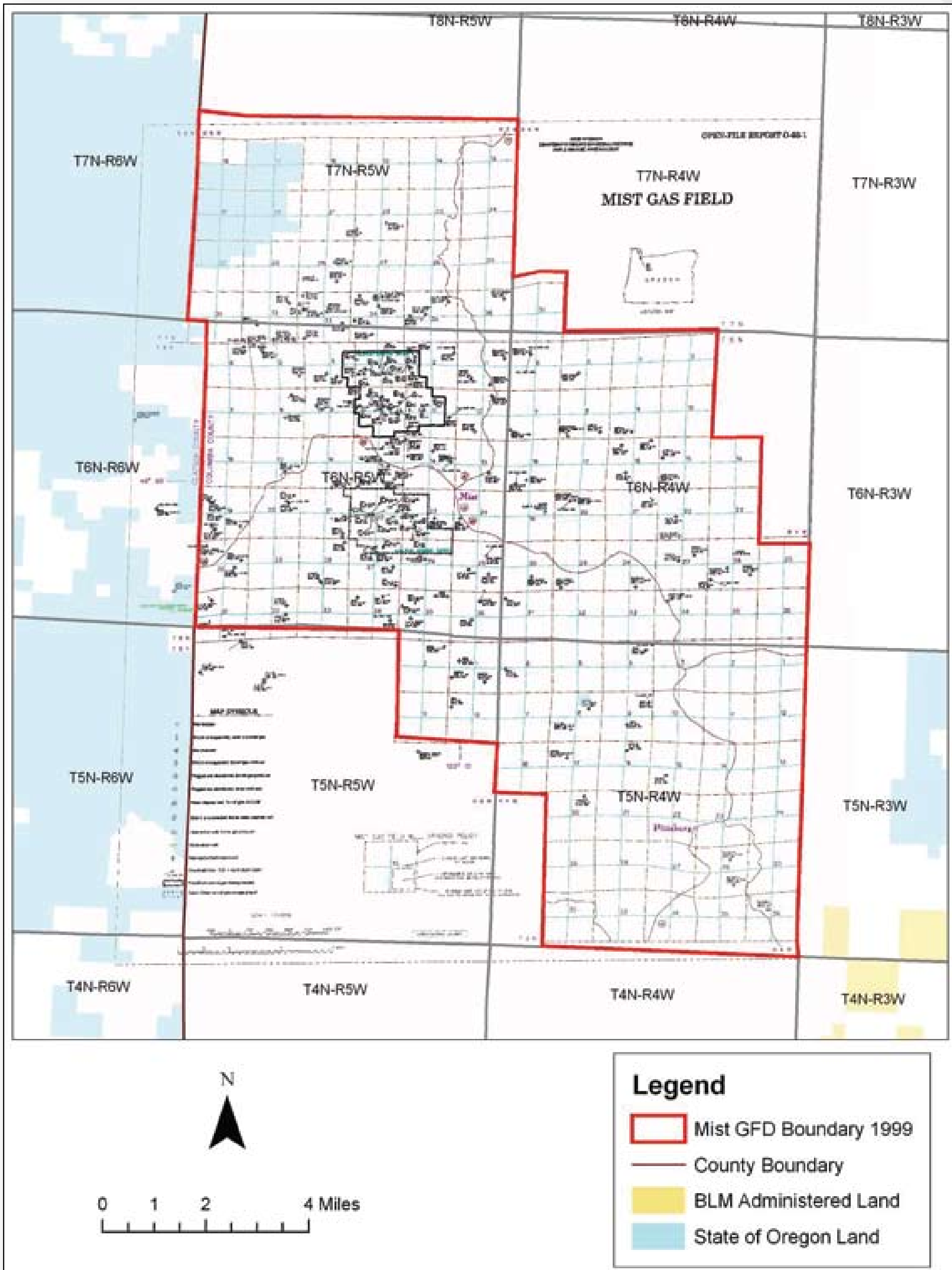
The Nehalem Basin consists of deltaic to shallow-marine and deep marine depositional environments, depositing thousands of feet of mud and sand. There was also intermittent volcanism (Houston 1997, Olmstead and Alger 1985). This lithified material creates the basin's stratigraphy. The oldest rock, considered 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 Q-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 Q-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 Q-7).*

Figure Q-5. Mist Gas Field, 1999 Boundary

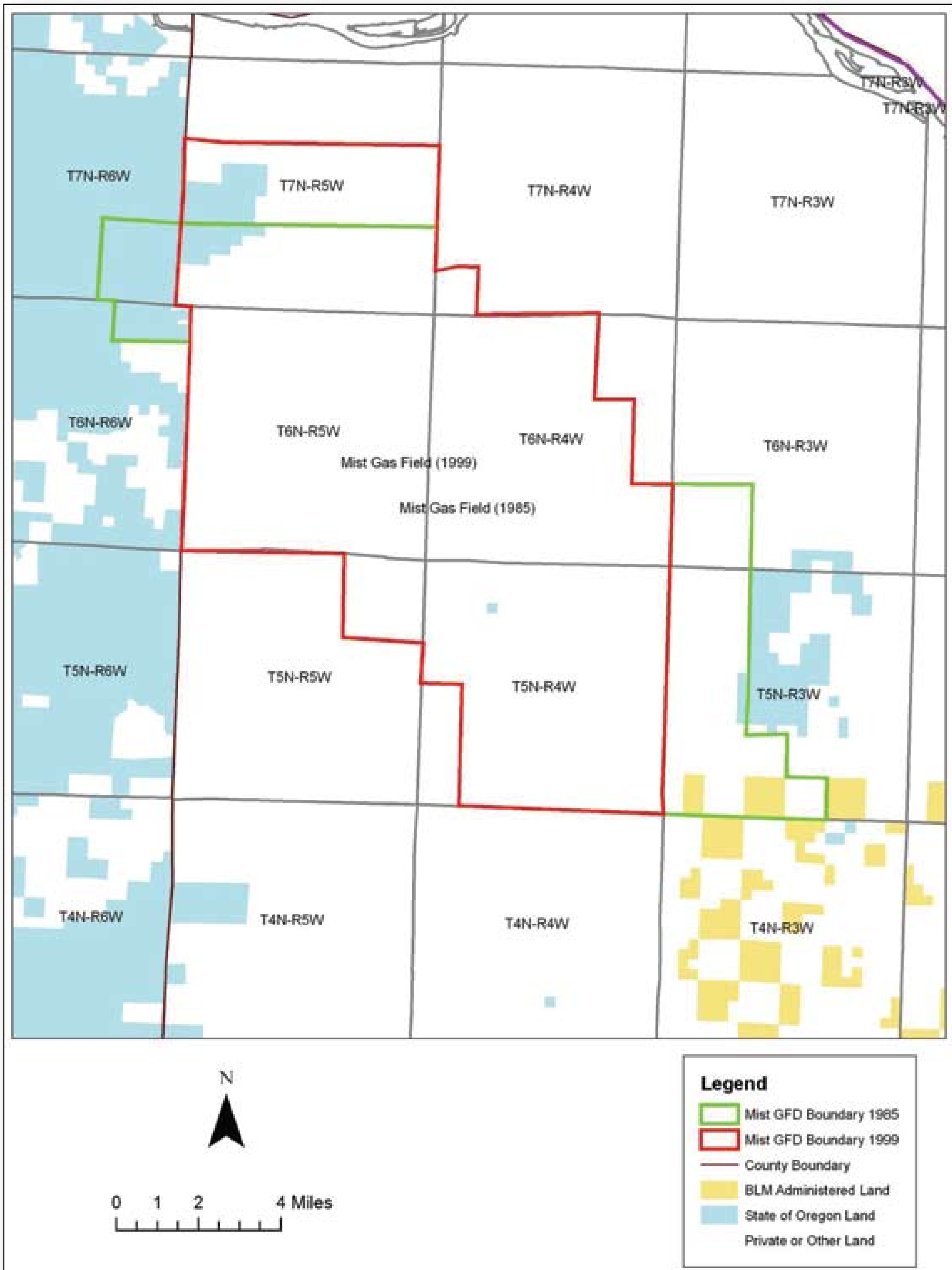


Source: DOGAMI 2003

Figure Q-6. Identified High Potential Area (This Report) And Bacona Geologic Quadrangle

Source: Houston 1997

Figure Q-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 Q-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 Q-4. Mist Gas Field 10-Year Production

Year	Cumulative Cubic Feet All Wells (million cubic feet)	Cumulative Therms All Wells (therms)
2006[a]	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
10-Year Total	11,214,114	86,864,912

[a]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 Q-5, Q-6*, and *Q-7* for estimates for the three groups:

Table Q-5. Isthmus Slough Group Near Federal Mineral Rights

Location	Gas Content (scf[2]/ton)	Total Gas (millions of cubic feet)	Acres Sampled	Average Gas Per Acre (mmcf/acre)[3]
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 Q-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 Q-7. Lower Coaledo Group Near Federal Mineral Rights[a]

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

[a]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 NW¼ 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 Q-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 Q-8).*

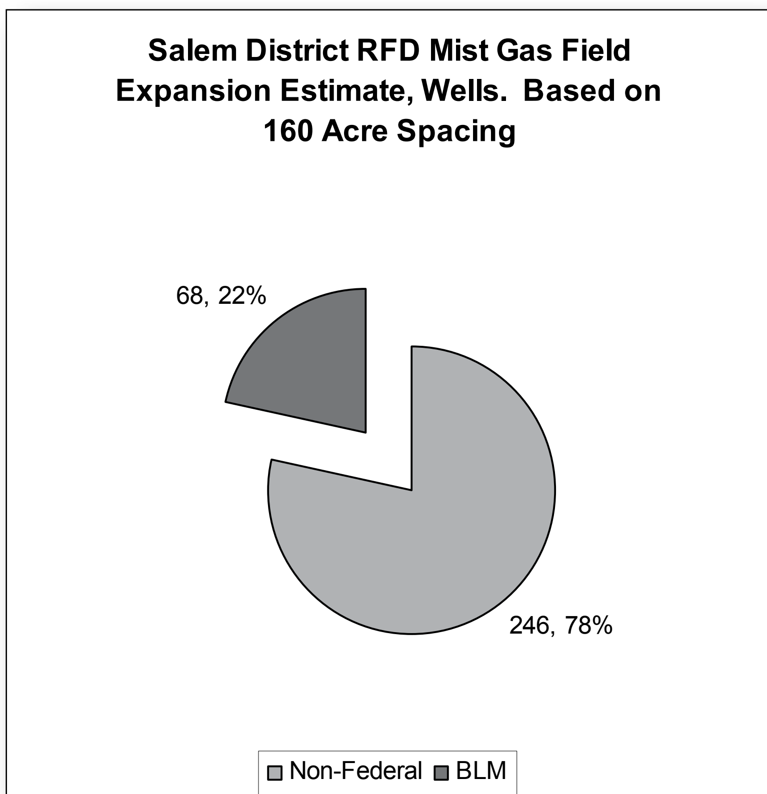


Figure Q-8. Salem District Mist Gas Field Expansion Estimate, 160-Acre Spacing

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 Tyee Mountain petroleum system, located in the northern portion of the Coos Bay District are contained in the southern Tyee sedimentary basin (Ryu et al. 1996) (refer to *Figure Q-1*).

<u>*System 1*</u>: The Umpqua-lower Tyee 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 Tyee 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.

<u>*System 2*</u>: The Umpqua-Dothan-White Tail Ridge Hybrid Petroleum System is in the southern portion of the Tyee Basin, with a southern boundary defined by the Tyee 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.

<u>*System 3*</u>: 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 Q-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

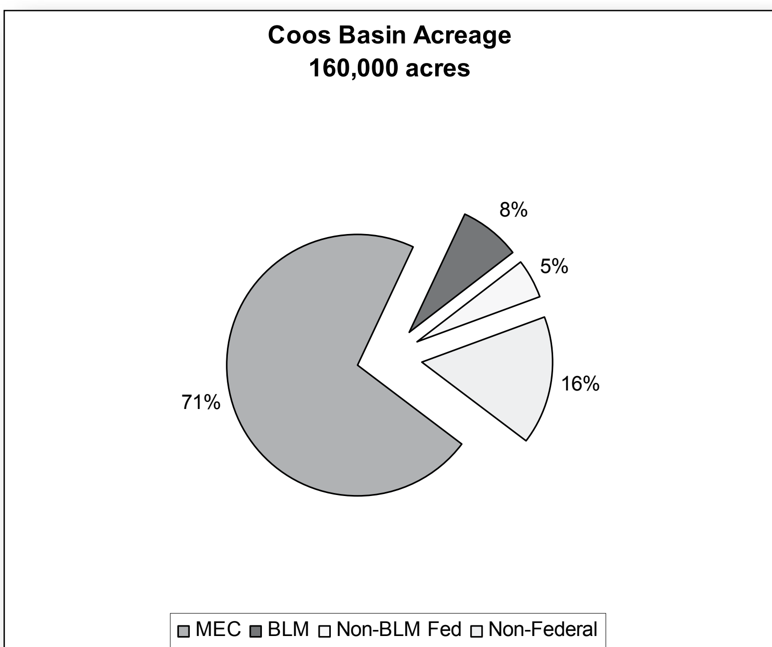


Figure Q-9. Coos Basin Acreage In Area Of Mutual Interest acres not yet controlled by lease agreements, the Federal Government manages approximately 19,694 acres or approximately 44 percent (see *Figure Q-10*). Federal mineral rights account for approximately 19,694 acres of the basin area, and BLM-administered 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.

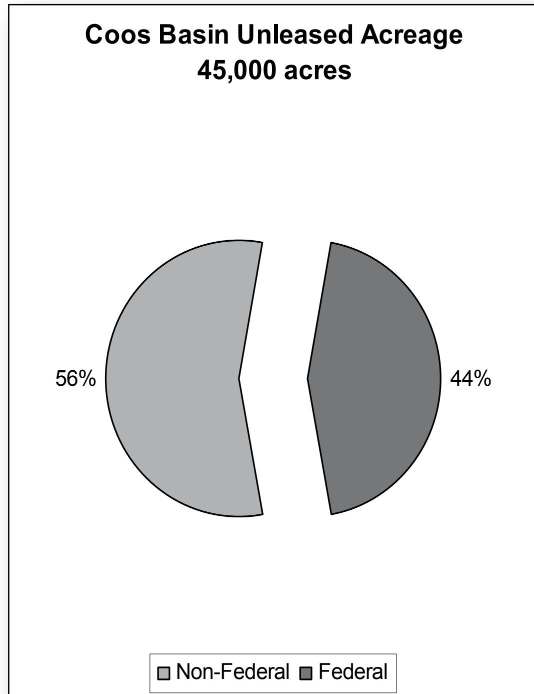


Figure Q-10. Coos Basin Unleased Acreage

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 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 Q-11* and *Q-12*).

Surface Impacts of Drilling and Production

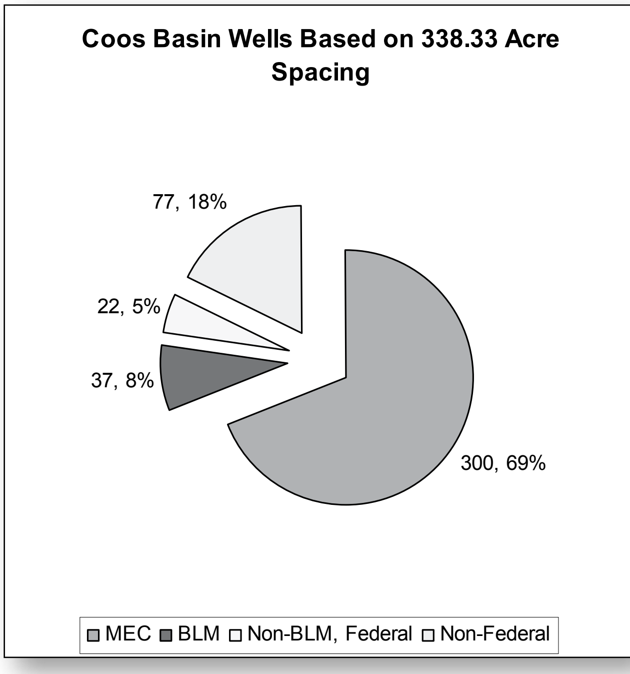


Figure Q-11, Coos Basin Wells Based On 338-Acre Spacing

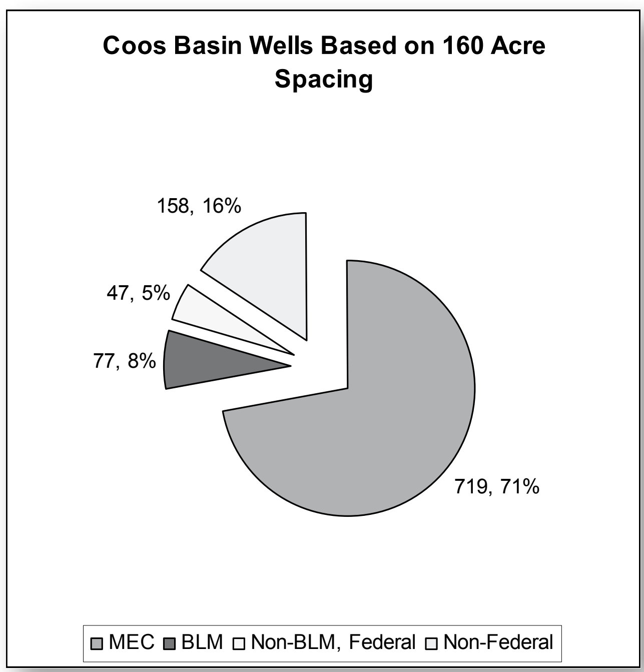


Figure Q-12. Coos Basin Wells Based On 160-Acre Spacing

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.

Ten-Year Reasonably Foreseeable Development Of Oil And Gas Resources Scenario For The BLM Eugene, Roseburg, And Medford Districts And The Klamath Falls Resource Area Of The Lakeview District

Summary

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

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

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

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

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

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

Common to All Alternatives

Introduction

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

Methodology

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

Scope

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

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

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

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

Historic And Current Development

Oil and Gas Occurrence Potential

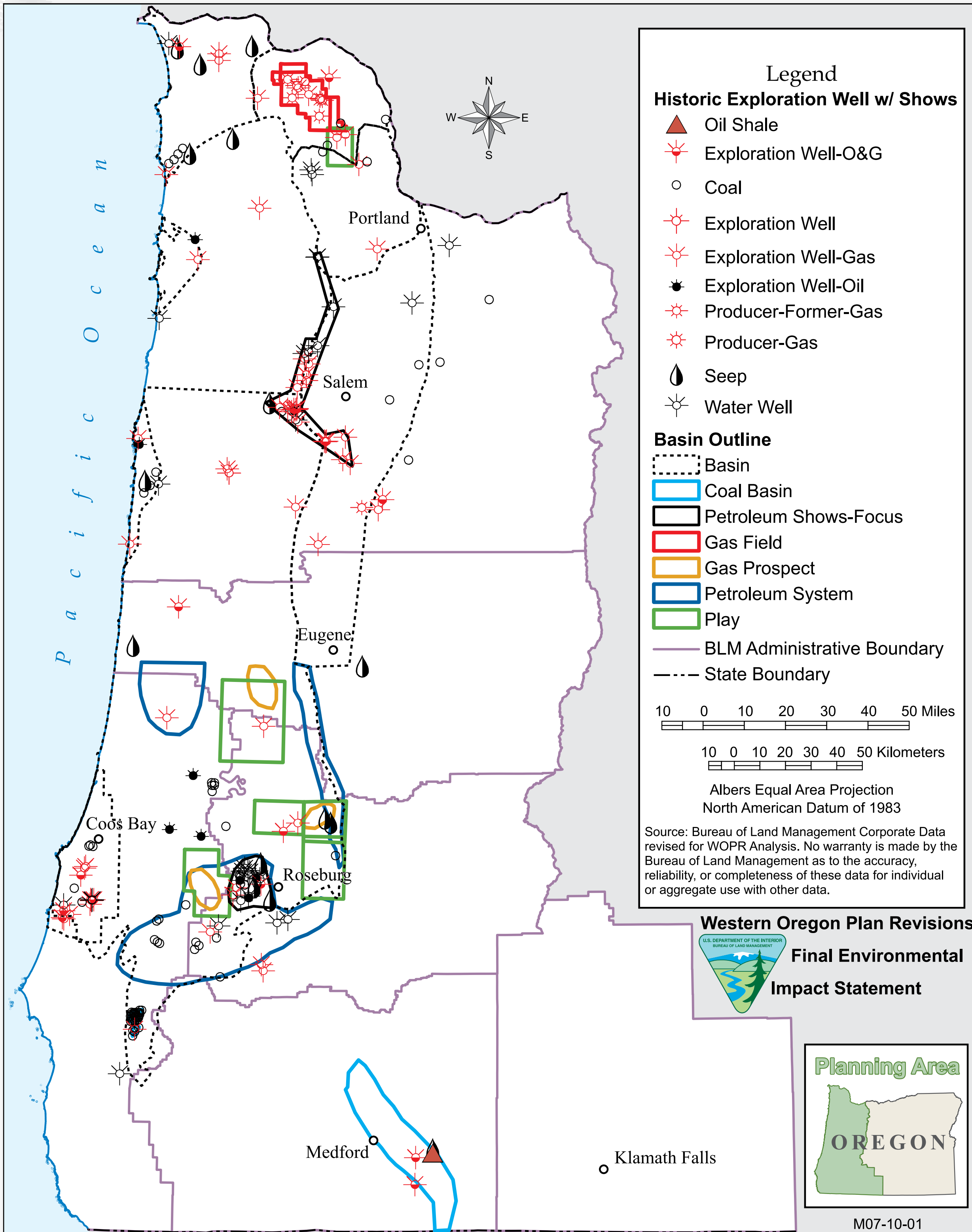
The districts encompass lands in eight counties, including Linn, Lane, Douglas, Jackson, Josephine, Curry, Coos, and Klamath counties. The districts are located in western, southwestern, and southern Oregon. The BLM-management extends to both Public Domain (PD) and revested Oregon and California Railroad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

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

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

Little oil and gas exploration has been conducted in the Medford District and Klamath Resource Area (Niewendorp 2008, Wiley 2008, Wells 2008). Oil and gas exploration wells have been drilled, with at least two shows (see *Figure Q-13*). A potential oil shale deposit was also been identified. These are located in or near a delineated coalfield, identified as the Rogue River Coalfield (Olmstead et al. 1989, Stewart 1954, Sidle 1981; Jackson County 1989, 2004, 2006). Most energy investigations have focused on geothermal explorations (Niewendorp 2008).

Figure Q-13. Western Oregon Oil and Gas Investigations and Projections



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

Oil and Gas System and Plays

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

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

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

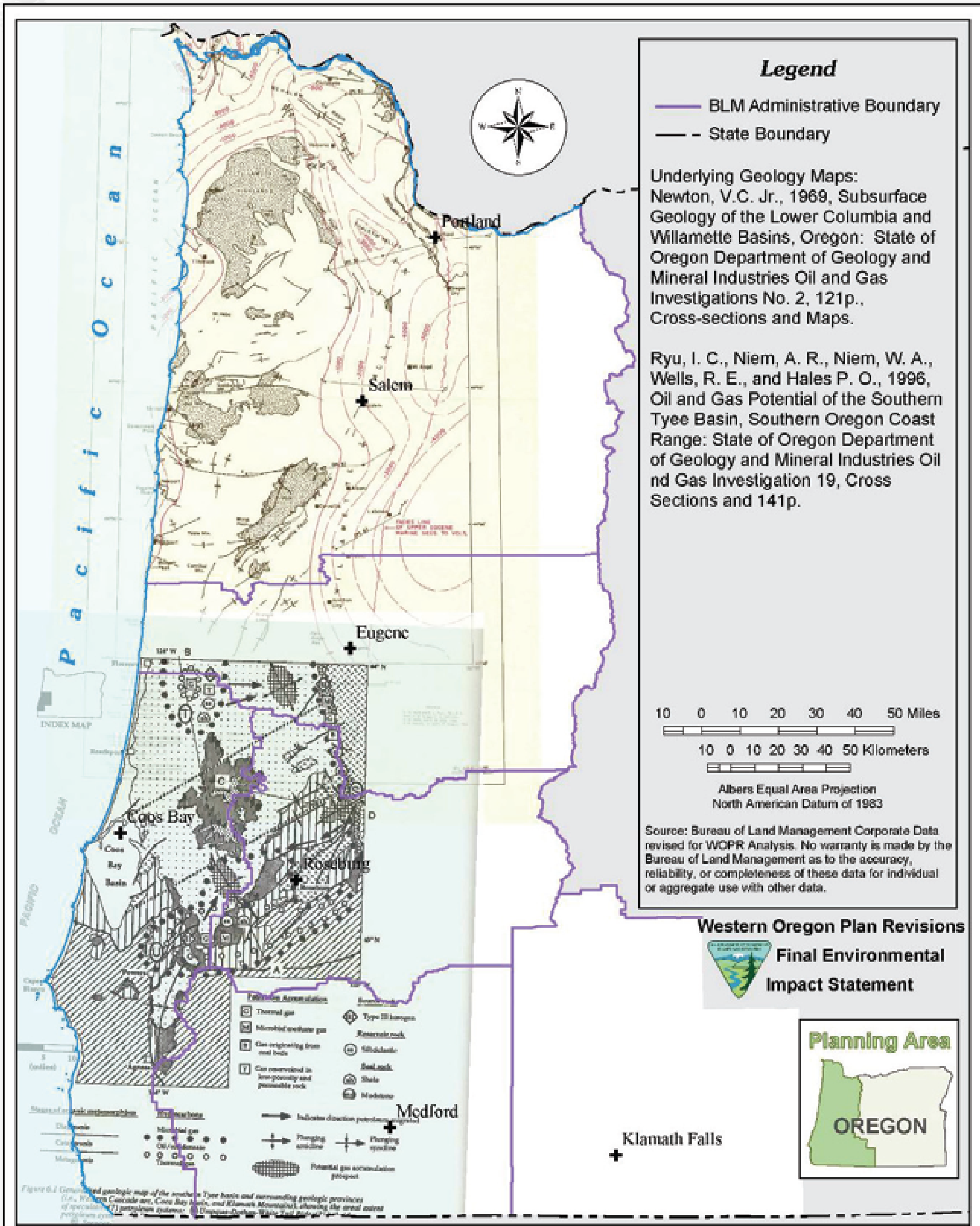
Of these, the Willamette Basin extends into the Eugene District (see *Figure Q-14*).

The Willamette Valley basin extends from the southern end of the Puget Sound Trough at the Columbia River south into the Eugene District. This basin is mapped adjacent to the Tyee Basin through parts of the Salem District and the Eugene District (see *Figures Q-14* and *Q-15*) (Newton 1969, Ryu et al. 1996). The lower rock, or basement rock, is the Eocene Siletz River Volcanics or Kings Valley Siltstone. Overlying these are sandstones and siltstones to the Eocene Nonconformity. This nonconformity is covered by volcanics, overlain by sandstone, limestone, and coal beds. The assemblage is capped by the Columbia River Basalts, which are covered by tuff and silt. The petroleum potential boundary in the Eocene rock is defined to the east by the change from marine sediment to volcanic sediment (facies change) (Newton 1969) (see *Figure Q-14*). Numerous wells with gas shows have been drilled within the valley. The eastern edge of the valley provides numerous possibilities for structural traps, with the marine beds providing source rock for petroleum accumulations. Even though numerous holes have been drilled and source and structure is present, true potential has not been clearly defined. The Eocene Nonconformity (marine facies) is at maximum the mapped depth of 5,000 feet below sea level (Newton, 1969).

The southern portion of the Western Tertiary Basin Province is identified as the Tyee Basin. This basin extends north from the Klamath Terrains to approximately the Lincoln City-Salem Latitude (Ryu *et al*, 1996). The Tyee Basin is actually composed of two basins: the NE-SW oriented Umpqua basin of early Eocene age and the north-south oriented Tyee Forearc Basin of middle Eocene age. The Umpqua Basin is divided by the Umpqua Arch, composed of a volcanic high. The two sub-basins include the Smith River Sub-Basin, located east of Florence and Reedsport, and the Myrtle Point-Sutherlin Sub-Basin along the southern boundary (Ryu et al. 1992, 1996). The Yaquina Sub-Basin of the Salem District could be considered as part of the Tyee Basin, as well as the southern portion of the Willamette Valley Sub-Basin (Ryu et al. 1996; Newton 1969). The Coos Basin overlies and bounds by mapping, the Tyee Basin to the west (Ryu et al. 1996) (refer to *Figure Q-14*).

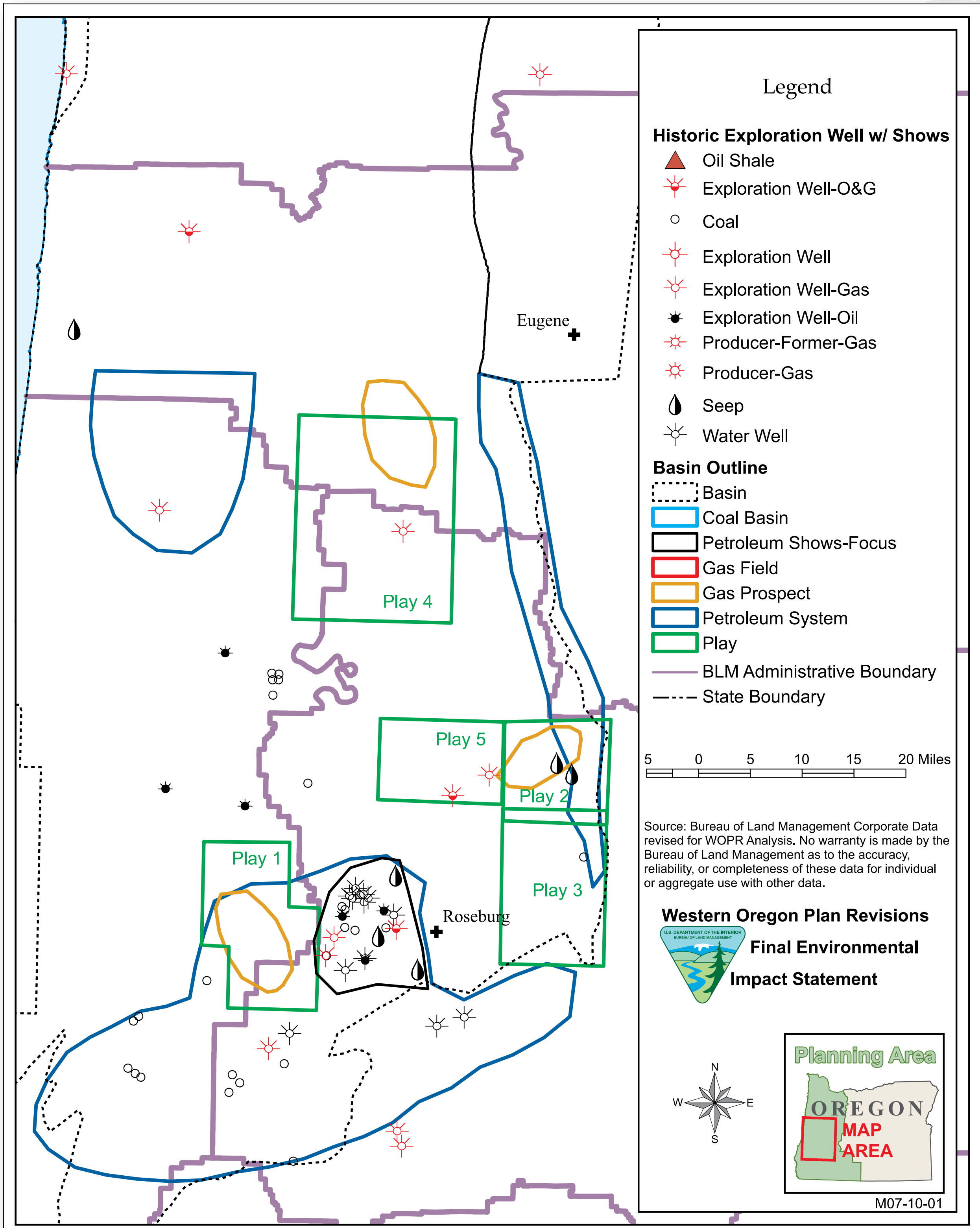
The basin structure is controlled by compression resulting from the subducting easterly moving Juan de Fuca plate in relation to the overriding westerly moving North American Plate. The fold axes are oriented north-south (Orr and Orr 2000). The northern basins are defined by the contact between the Miocene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

Figure Q-14. Basic Underlying Geology



Source: Newton 1969, Ryu et al. 1996

Figure Q-15. Basin, Petroleum Systems, Plays, and Prospects



Sources: USDI BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al. 1995, Mason and Erwin 1955 of petroleum exploration. The Eocene rocks consist of marine sediments, with latter sedimentation creating coal beds in many areas (Newton 1969) (refer to *Figure Q-14*).

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

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

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

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

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

Ryu et al. (1996) identified three distinct speculative petroleum systems, five distinct plays, and three distinct gas prospects within the Tyee Basin (refer to *Figure Q-15*). The identified petroleum systems include:

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

— The Umpqua-lower Tyee Mountain (?) Petroleum System; Basin Center Gas (?): This system may contain a tight-gas sandstone reservoir, collecting thermogenic (temperature-induced conversion to petroleum) wet-gas and oil derived from mudstone of the Umpqua Group. The model projects natural gas migrating along fractures to accumulate in Tyee Mountain turbidite sandstones. An unconventional mudstone reservoir is possible in the Umpqua Group. According to BLM GIS, the total acreage of this petroleum system is approximately 145,000 acres. Of this, approximately 116,000 are within the Coos Bay District and approximately 29,000 acres are within the Eugene District.

— The Spencer-White Tail Ridge-Western Cascade Arc (?) Petroleum System: The petroleum sources of this system are the coals and carbonaceous mudstone and sandstones of the Spencer Formation and White Tail Ridge Formation, generated by the deep burial and heating by the Western Cascades arc plutons. The reservoir rock would be the overlying sandstones and delta facies. According to BLM GIS, the approximate total acreage of this petroleum system is 119,000 acres. Of this, approximately 69,000 acres are within the Eugene District and approximately 50,000 acres are within the Roseburg District.

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

In addition to the three petroleum systems, Ryu et al. (1996) have identified five different plays described below in the *order of their potential to produce hydrocarbons,* as shown in *Figure Q-15*:

1. The Williams River-Burnt Ridge anticlinal Plays: This is a complex domal structure in the Tyee Formation (Play 1 of 5). Natural gas might be found in the lower Umpqua strata in the footwall beneath Siltez River Volcanics. The White Tail Ridge sandstone could also serve as a trap. Isolated faults and thrust faults, as well as pinchouts and unconformities, also provide potential traps. A gas prospect may exist within this play. According to BLM GIS, the total acreage of this play is approximately 94,000 acres. Of this, approximately 20,000 acres are within the Roseburg District and approximately 74,000 acres are within the Coos Bay District.
2. Western Cascades plays and Bonanza thrust near Nonpareil: This system incorporates anticlines and faults, including the extension of the Bonanza Fault, at the contact of the Tyee Basin and the Western Cascades (Play 2 of 5). The potential reservoir rocks include the Spence and White Tail Ridge formations. Source rock includes several one- to six-foot thick coal beds, carbonaceous sandstone, and mudstone. Other plays may exist in the foothills of the Western Cascades, with the buried Spencer Formation being the structural or stratigraphic play. The Spencer Formation is exposed from Glide to Cottage Grove. A gas prospect is projected within the play. According to BLM GIS, the total approximate acreage of this play is 64,000 acres, all of which is contained within the Roseburg District.
3. Klamath Mountains sub-thrust play, Glide area: It is interpreted that the Klamath Mountains (Klamath Terrains) are thrust over the Coast Range rocks, burying parts of the Southern Tyee Basin. Possible plays may exist in the underlying Tyee Basin stratigraphy in the areas of the Wildlife Safari fault and southeast and southwest of Glide (Play 3 of 5). The White Tail Ridge Formation is the potential reservoir unit with source being derived from the Remote Member and Tenmile Formations. However, it is debated whether the Tyee stratigraphy (Siletz River Basalts) formed in place through an abandoned rift zone. This would mean that there is no overthrusting of the Klamath Terrains over the Tyee Basin, and therefore no associated traps or plays (Ryu et al. 1996). However, more recent geology mapping has indicated that the overthrusting does exist (Well et al. 2000, DuRoss et al. 2002, Wells 2008). Therefore, while unexplored, potential for petroleum traps along the Klamath Terrains/Tyee Basin boundaries may exist. According to BLM GIS, the total approximate acreage of this play is 96,000 acres, all of which is contained within the Roseburg District.
4. Tyee Mountain anticlinal plays: Several untested anticlines exist in the Tyee Mountain and Baughman members of the Tyee Formation beyond the Williams River-Burnt Ridge anticlinal plays (Play 4 of 5). Stratigraphic traps could exist along the flanks of the Siletz River Volcanics in the Umpqua Arch. A specific untested anticlinal structure exists at Stony Point. While these untested structures exist, the potential of the northern anticlines is low when compared to the southern anticline systems, due to the lack of maturation, organic-rich source rock, and reservoir rocks.

However, a gas prospect may exist in the northern portion of the play. According to BLM GIS, the total approximate acreage of the play and prospect is 203,000 acres. Of this, approximately 25,000 acres are located within the Coos Bay District, approximately 91,000 acres are located within the Eugene District, and approximately 87,000 acres are located within the Roseburg District.

5. Anticlinal and subthrust plays in the Myrtle Point-Sutherlin Sub-Basin: These plays consist of thrust faults and anticlinal and synclinal folds of rock of the Umpqua Group, Bushnell, and White Tail Ridge formation in the Myrtle Point-Sutherlin Sub-Basins. The area of the play is the Roseburg-Sutherlin-Glide area (Play 5 of 5). Gas shows have been encountered in tight sandstones and methane emanations from water wells. However, there has been no commercial production. According to BLM GIS, the total approximate acreage of the play is 60,000 acres, all of which is contained within the Roseburg District.

Additionally, numerous exploration wells, seeps, and petroleum producing water wells exist within the districts. As shown in *Figure Q-15*, an area of concentration of petroleum shows is located within the Umpqua-Dothan-White Tail Ridge (?) hybrid petroleum system. Although shows are found throughout the four districts, this concentration provides a concentrated area of petroleum shows. According to BLM GIS, the total acreage of this focus of petroleum shows is approximately 68,000 acres, of which all is contained within the Roseburg District.

All of these structures and systems completely or in part underlay the Eugene and Roseburg Districts. Areas of gas and oil exploration and shows also exist throughout the Districts (Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Newton 1969, Sidle 1981, Kvenvolden et al. 1995) (refer to *Figure Q-15*).

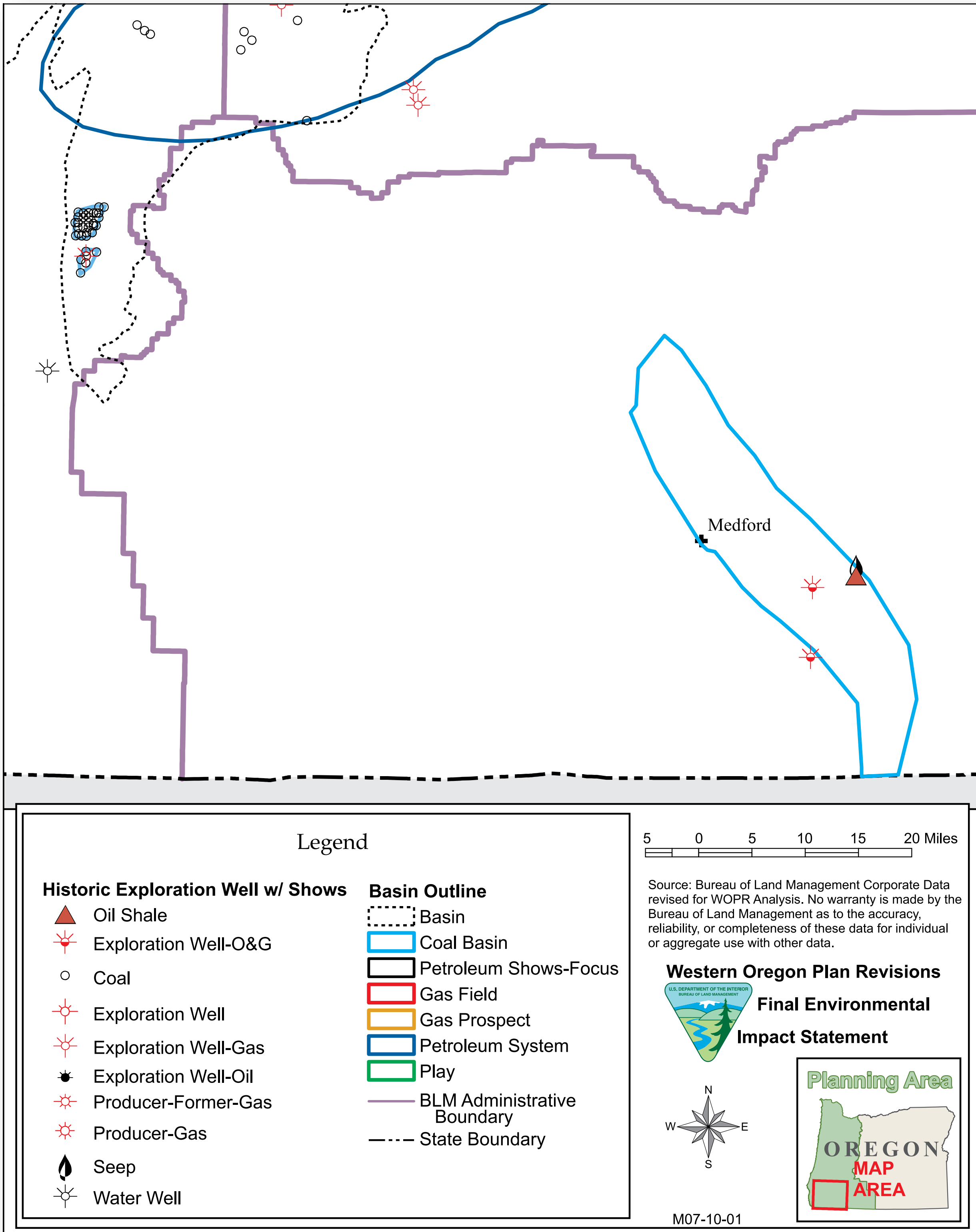
The Medford District is south and east of the Tertiary Basin System/Tyee Basin, incorporating Klamath accreted terrains in the west and the Cascade Volcanics and Basin and Range structures to the East. The Klamath Resource Area of the Lakeview District lies east of the Medford District and incorporates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

Coal exposures and basins exist throughout western Oregon (Mason and Erwin 1955) (refer to *Figure Q-13*). One major coal basin has been identified in the Medford District within Jackson County (Sidle 1981; Jackson County, 1989, 2004, 2006; Weissenborn 1969). This coal field is known as the Rouge River Coal Field. The field extends southward from Evans Creek to a point about 10 miles south of the Oregon-California border (Weissenborn 1969) (see *Figure Q-16*). According to BLM GIS, the total approximate acreage of the Rouge River Coal Field is 221,000 acres, all of which is contained within the Medford District boundaries (the portion in California is not analyzed).

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

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

Figure Q-16. Coal Basins



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

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

Eugene District

The Eugene District incorporates portions or all of Linn, Lane, and Douglas counties. At least one exploration well with shows of oil and gas (Fed-Mapleton 1) and two petroleum seeps are within the Eugene District boundary. Sedimentary basins underlying the Eugene District include both the Tyee Basin and the Willamette Valley Basin. Two Petroleum Systems extend into the district, as well as the Tyee Mountain anticlinal play and its associated Gas Prospect (see *Figure Q-17, later in this appendix*)

Table Q-8 represents the approximate acreage of the basins, systems, plays, and prospects located within the Eugene District.

Roseburg District

The Roseburg District incorporates the major portion of Douglas County, with minor portions of Linn and Jackson Counties. The district has been the focus of historical exploration with at least 2 oil and gas exploration well shows, 7 exploration gas well shows, 3 exploration oil well shows, 5 petroleum seeps, 12 petroleum shows in water wells, and 12 coal exposures. Sedimentary basins underlying the Roseburg District include the Tyee Basin. Two petroleum systems extend into the Roseburg District, as well as five projected plays. One complete gas prospect and another partial gas prospect associated with two plays exist, as well as one focused area of petroleum exploration (see *Figure Q-18*).

Table Q-9 represents the approximate acreage of the basins, systems, plays, and prospects within the Roseburg District.

Medford District

The Medford District incorporates portions or all of Jackson, Josephine, Douglas, Curry and Coos Counties. At least two oil and gas exploration wells with shows, one petroleum seep, one oil shale prospect, and one coal field exist within the Medford District boundary. A small portion of the Tyee Basin sedimentary basin and a petroleum system underlies the northwest part of the district. No plays or prospects have been mapped within the District (see *Figure Q-19*).

Table Q-10 represents the approximate acreages of basins, petroleum systems, and coalfields located within the Medford District.

Klamath Falls Resource Area of the Lakeview District

The Klamath Falls Resource Area of the Lakeview District incorporates Klamath County. No recorded exploration wells with shows, seeps, water wells with petroleum shows, or coal were found in the literature search or in agency communications (see *Figure Q-20*). Most energy wells drilled have been in the search and delineation of geothermal energy. It should be noted that the lack of exploration does not indicate a lack of petroleum potential, but simply a lack of information. Therefore, future potential cannot be analyzed. Gas and oil production has been located in similar basin and range provinces, such as in the state of Nevada (Hess 2001).

Table Q-8. Eugene District Acreages

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

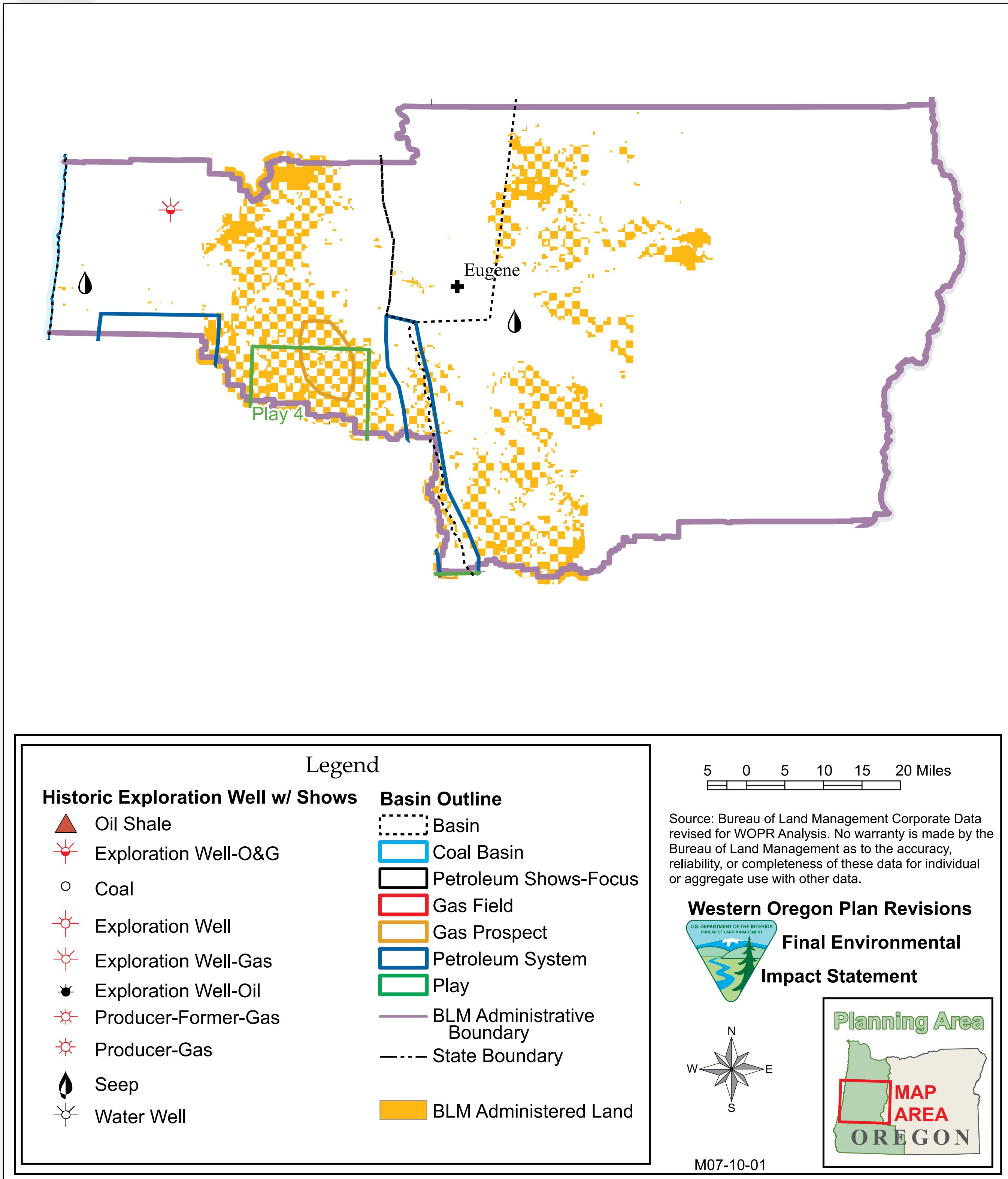
Table Q-9. Roseburg District Acreages

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

Table Q-10. Medford District Acreages

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

Figure Q-17. Eugene District



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

Oil and Gas Production

Conventional Oil & Gas Resources

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

The Mist Gas Field Designation (see Figure Q-21) was initiated with the discovery of natural gas in 1979. The main target zone is the reservoir rock of the Clark and Wilson Sandstone (Olmstead and Alger 1985). As of 2007, there have been over 45 separate pools identified (Meyer 2007) with two gas storage reservoirs (DOGAMI 2003). Locations of additional pools are expected with the use of 3-D Survey (Meyer 2007). Current exploration is focused to the northwest of the Mist Gas Field (Houston 2007). However, this is due to economics as opposed to existence of resource. All areas north of Vernonia, Oregon could be considered possible extensions of the Mist Gas Field (Meyer 2007).

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

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

Non-Conventional Petroleum (Coal Bed Natural Gas)

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

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

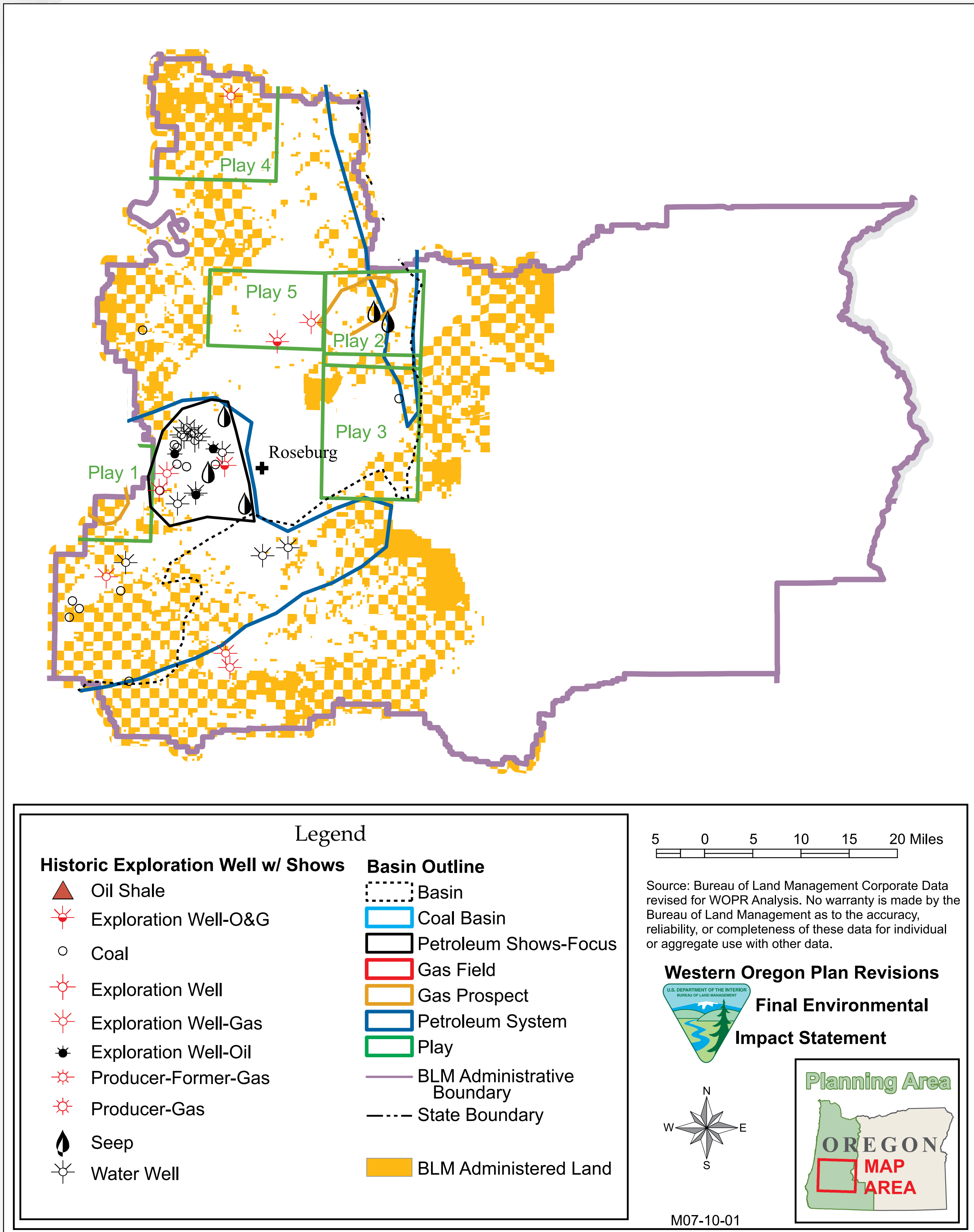
Coal bed natural gas development is also beginning in southwest Washington, approximately 20 miles north of the Salem District. Exploration is being completed by the Methane Energy Corporation's sister company (a subsidiary of Torrent Energy Corporation), Cascade Energy Corporation (Torrent Energy Corporation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

Potential for Resource Occurrence and Development

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

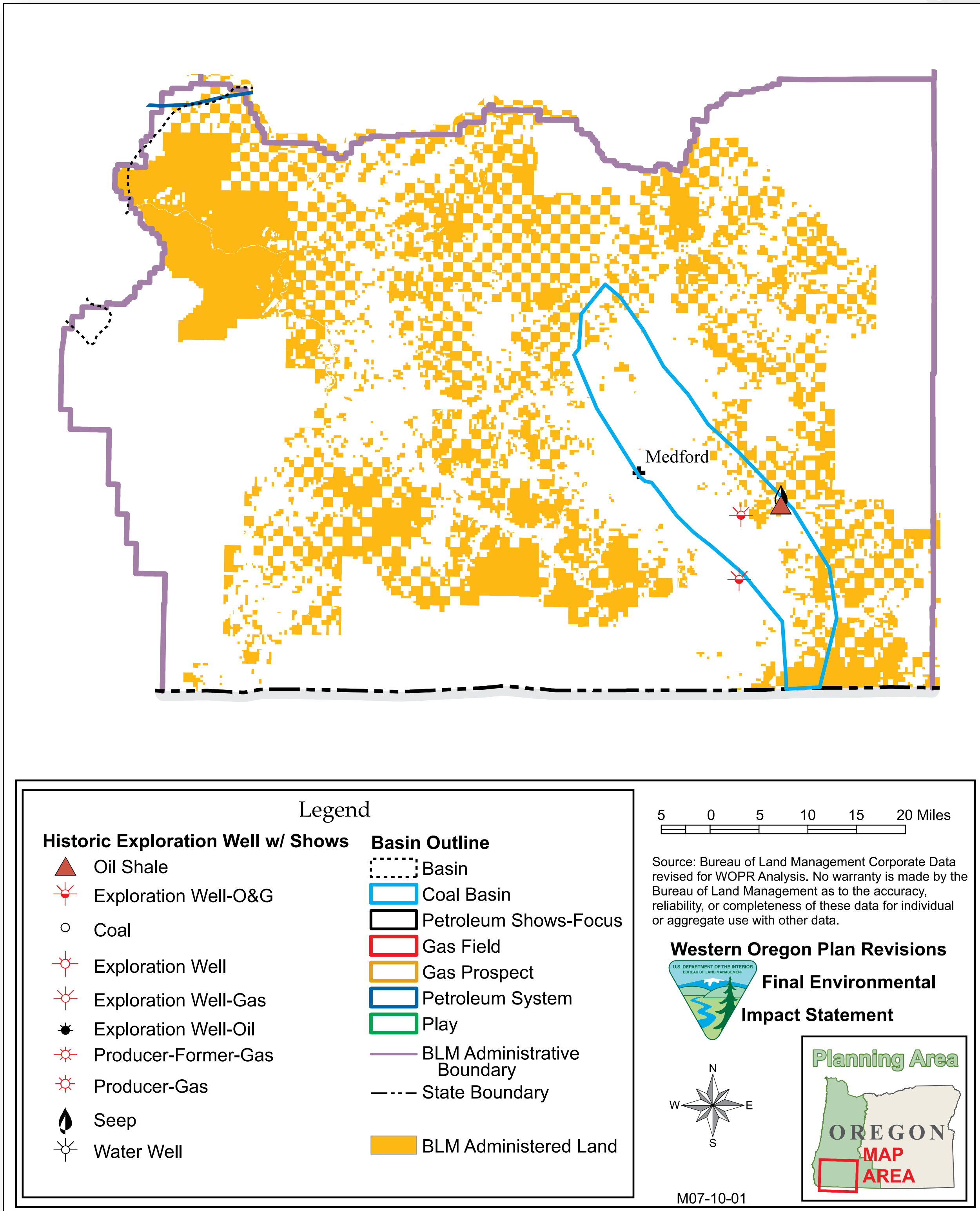
- Low Potential - Hydrocarbon occurrence is unlikely.
- Moderate Potential - Conditions exist for hydrocarbons to occur.
- High Potential - Hydrocarbon shows have been documented or production has been established.

Figure Q-18. Roseburg District



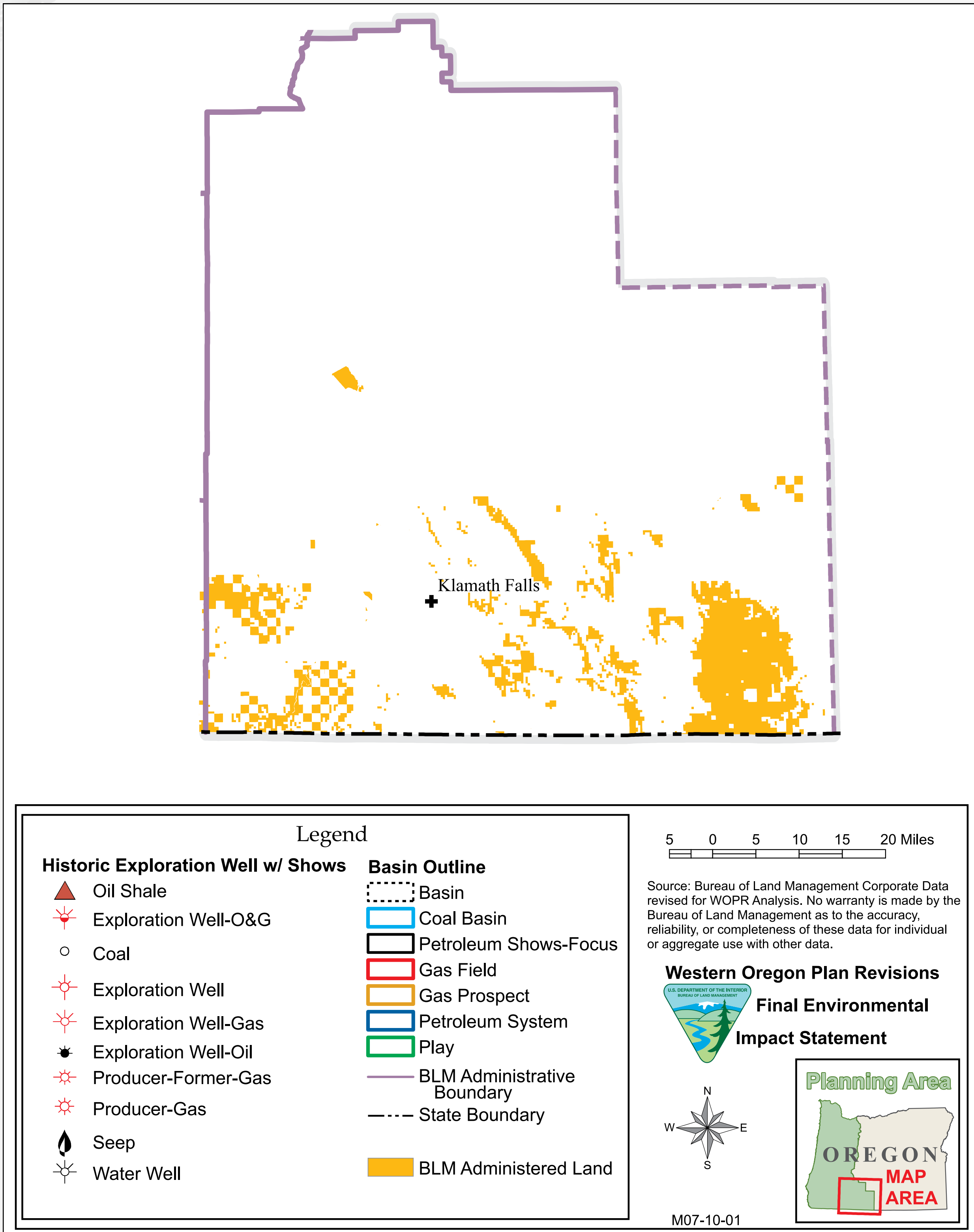
Sources: USDI BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al.1995, Mason and Erwin 1955)

Figure Q-19. Medford District



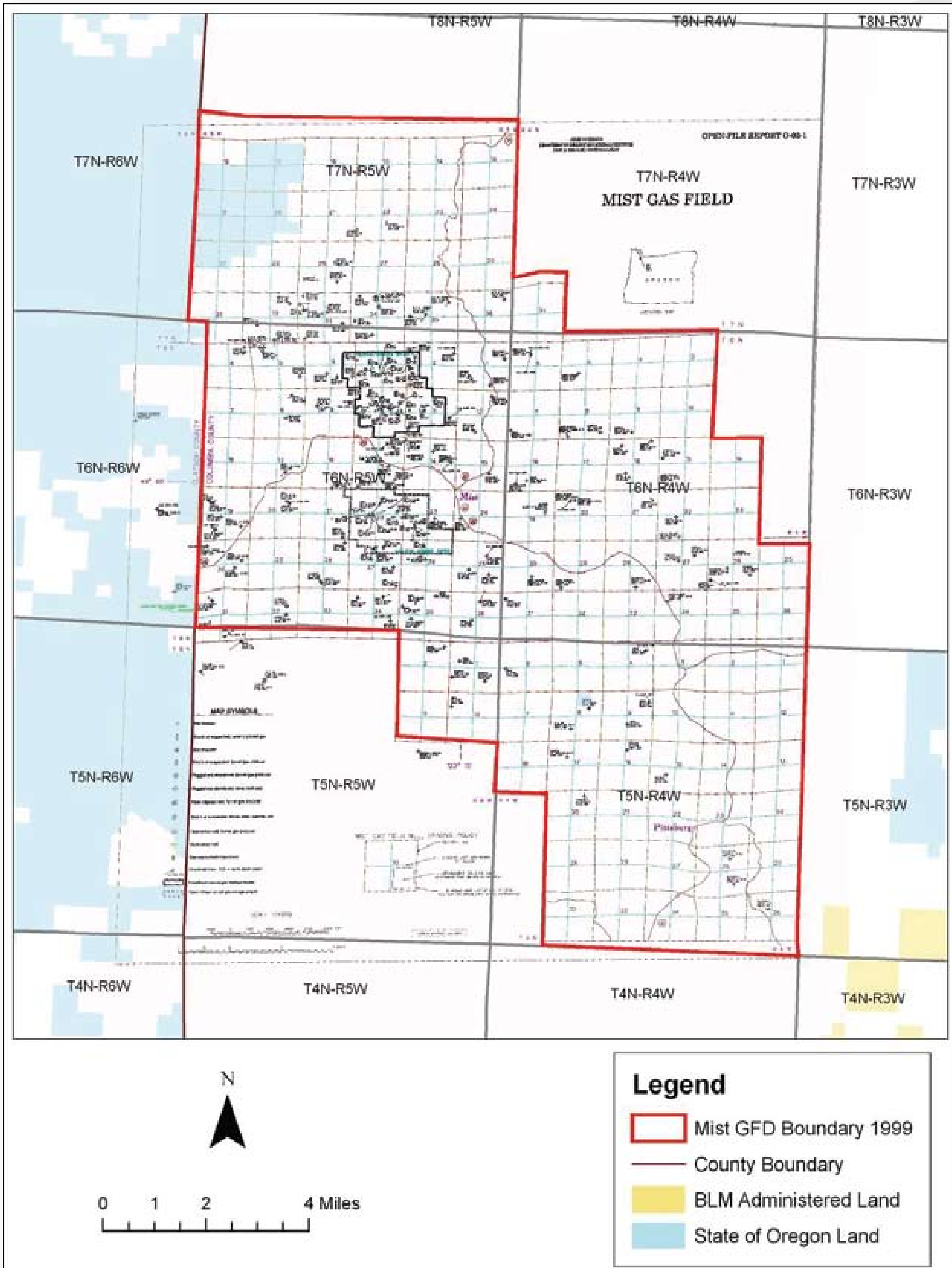
Sources: USDI BLM 2008, Olmstead et al. 1989, Niem and Niem 1990, Newton et al. 1980, Stewart and Newton 1954, Sidle 1981, Newton 1969, Kvenvolden et al.1995, Mason and Erwin 1955

Figure Q-20. Klamath Falls Resource Area



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

Figure Q-21. Mist Gas Field, 1999 Boundary



Source: DOGAMI 2003

Definitions for potential for resource development include:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Leasing

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

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

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

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

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

Future Trends And Assumptions

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

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

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

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

Geophysical Exploration

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

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

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

The small explosive method requires that charges be detonated on the surface or in a drill hole. Holes for the charges are drilled utilizing truck-mounted portable drills to create small-diameter (two or six-inch) holes, which are typically drilled to depths of between 50 and 100 feet. Generally 4 to 12 holes are drilled per mile of line and a 5 to 50-pound charge of explosives is placed in the hole, covered, and detonated. The created shock wave is recorded by geophones placed in a linear fashion on the surface. In rugged terrain, a portable drill carried by helicopter can sometimes be used. A typical drilling seismic operation may utilize 10 to 15 men operating five to seven trucks, although portable "buggies" that can be hauled behind smaller four-wheel drive All Terrain Vehicles are also commonly used in more sensitive areas.

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

Surface Impacts of Geophysical Explorations

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

Drilling and Production Phase

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

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

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

Surface Impacts of Drilling and Production

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

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

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

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

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

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

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

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

Plugging and Abandonment

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

Surface Impacts of Plugging and Abandonment

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

Limitations

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

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

Proposed Restrictions and Requirements on Mineral and Energy Exploration and Development Activity

Introduction

This section discusses the leasing stipulations as they will be applied to BLM-administered lands in the planning area under each alternative. 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 by alternative 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 that 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 mayor 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

On the following pages, the mineral leasing notices and stipulations are shown as common for all alternatives. These are considered to be the minimum necessary to issue leases in the operating area. Under all alternatives, 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) would 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 mayor 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.

Leasing Notices Common to All Alternatives

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 no 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 are to be utilized on specifically designated tracts of land as described under the various alternatives.

Leasing Stipulations Common To All Alternatives

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, gullying, 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.

***Note*: The following controlled surface use stipulations do not apply to the No Action Alternative.**

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 assist the miner in complying with the 43 CFR 3809 regulations, which apply to all mining operations on BLM administered lands. The manner in which the necessary work is to be done will be site specific, and all of the following standards may not apply to every mining operation. It is the mining claimant's and operator's responsibility to avoid "unnecessary or undue degradation," and to perform all the necessary reclamation work. Refer to the 43 CFR 3809 regulations for general requirements.

There is an intergovernmental agreement between the BLM and the Oregon Department of Geology and Mineral Industries that is designed to avoid duplication of regulations, inspections, and approval of reclamation plans as well as to minimize repetitive costs to mining operators. The following guidelines include some, but not all, of the requirements of the various State agencies overseeing mining operations.

Prospecting, Exploration, and Mining

Surface Disturbance

BLM Requirements

Operations ordinarily resulting in only negligible disturbance as defined in 43 CFR 3809.0-5(b) are considered to be casual use and no notification to or approval by the BLM is required. All operators proposing occupancy, timber removal, use of mechanized earth moving equipment, or suction dredges having hoses with an inside diameter greater than 4 inches which would cause a surface disturbance of 5 acres or less during any calendar year must provide written notice to the District Office at least 15 days prior to the commencement of any surface mining disturbance. For operations in sensitive areas or which will cause greater than 5 acres of surface disturbance, the operator is required to submit a plan of operations pursuant to the regulations in 43 CFR 3809.1-4.

State of Oregon Requirements

Any person engaging in mineral exploration that disturbs more than one surface acre or involves drilling to greater than 50 feet must obtain an exploration permit from the Oregon Department of Geology and Mineral Industries (DOGAMI). Mining operations involving 5,000 or more cubic yards of material per year or disturbing one or more acres of land will require an operating permit from DOGAMI.

Vegetation/Timber Removal

Remove only that vegetation which is in the way of mining activities. An application must be submitted to the Authorized Officer pursuant to 43 CFR 3821.4 describing the proposed use of merchantable timber from O&C lands for mining purposes. No merchantable trees may be cut until the application is approved and the trees are marked. The Roseburg BLM office recommends that small trees (less than 7 inches dbh) and shrubs be lopped and scattered, or shredded for use as mulch. Trees greater than or equal to 7 inches diameter breast height (dbh) are to be bucked and stacked in an accessible location unless they are needed for the mining operation

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. Permits will be limited to hardwoods or salvage timber which is not considered to be merchantable. 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

When mining will be in or near bodies of water, or sediment (or other pollutants) will be discharged, contact the Department of Environmental Quality. A settling pond is required when mining operations discharge turbid water. It is the operator's responsibility to obtain any needed suction dredging, stream bed alteration, or water discharge permits required by the DEQ or other State agencies. Copies of such permits shall be provided to the Authorized Officer when a Notice or Plan of Operations is filed. 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 on 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. Any operator engaging in mineral exploration that involves drilling to greater than 50 feet must obtain an exploration permit from the Oregon Department of Geology and Mineral Industries (ORS 517.962).

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

Under Public Law 167, the Government has the right to dispose and manage surface resources (including timber) on mining claims located after July 23, 1955. These rights are limited to the extent that they do not endanger or materially interfere with any phase of an ongoing mining operation or uses reasonably incident thereto. Claims located prior to July 23, 1955 may have surface rights, if such claims were verified as being valid under Sections 5 and 6 of the Act. Most of the claims of record do not have surface rights.

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 can be restricted only from specific dangerous areas (e.g., underground mines, open pits, and heavy equipment storage areas) by erecting fences, gates and warning signs. It is the operator's responsibility to protect the public from mining hazards. Gates or road blocks may be installed on existing or proposed roads only with BLM approval. Gates restricting public access onto a mine site will only be considered in such cases where there is a large area safety hazard created by the mining activity. The determination as to whether a safety hazard is large enough to warrant a gate will be determined on a case-by-case basis. Fences (rather than gates) or other approved barriers shall be utilized to protect the public from hazards related to small excavations, tunnels, and shafts.

Roads that cross private land to reach BLM-administered lands are controlled by the private parties. Although some of these roads have been assigned BLM road numbers, access may only be granted for administrative use to the BLM and its licensees and permittees under a nonexclusive easement. Mining claimants are not considered licensees or permittees and, therefore, must make their own arrangements with the private party to use such roads. No right is granted under any of the mining laws to use a road involved in a nonexclusive easement.

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. Out-houses and uncontained pit toilets are considered unnecessary and undue degradation and are not allowed. Uncontained pit toilets are not allowed for other users of the public land in this district. No special rights regarding this issue are granted under the mining laws. County sanitation permits are required for all other types of sanitation facilities.

Structures

Permanent structures will not be allowed for exploration or prospecting operations. Permanent structures are fixed to the ground by any of the various types of foundations, slabs, piers, poles, or other means allowed by State or County building codes. The term shall also include a structure placed on the ground that lacks foundations, slabs, piers or poles, and that can only be moved through disassembly into its component parts or by techniques commonly used in house moving. Any temporary structures placed on public lands in conjunction with prospecting or exploration are allowed only for the duration of such activities, unless expressly allowed in writing by the Authorized Officer to remain on the public lands. Temporary structures are defined as structures not fixed to the ground by a foundation and that can be moved without disassembly into their component parts.

Permanent structures (as described in the paragraph above) may be allowed for mining operations if they are deemed reasonably incident to conducting the operations. Mining operations are defined as all functions, work, facilities, and activities in connection with development, mining, or processing mineral deposits.

All permanent or temporary structures placed on public lands shall conform with the appropriate State or local building, fire, and electrical codes, and occupational safety and health and mine safety standards.

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. Equipment transportable by a pickup or small trailer or used only infrequently should not be stored on the claim and will not be considered as a justification for site occupancy. Accumulation of unused and/or inoperable equipment, materials not related to actual operations, and trash, garbage, or junk is not allowed on the public lands. The storage of such on the public land is unnecessary and undue degradation and will be treated accordingly.

Animals

If dogs or cats are to be present at the work site, the operator is required to keep them under control at all times so that they do not chase wildlife, or threaten other people, including government employees conducting site inspections on the public lands. Unless otherwise permitted, animals such as cows, chickens, goats, pigs or horses are not considered necessary to conduct mining operations and are not allowed on mining claims.

Suction Dredging

BLM Requirements

Cases Where a Notice or Plan of Operations is Required

Filing either a Notice or Plan of Operations may be required for all suction dredge operations where the dredge has an intake nozzle equal to or greater than 4 inches in diameter, or where any suction dredge operator proposes occupancy on BLM land (in excess of 14 calendar days per year) or the installation of structures of any kind. The determination of the need for a notice on smaller dredges will be made on a case by case basis.

No Notice or Plan of Operations Required

The use of a suction dredge in a stream, and having an intake nozzle of less than 4 inches in diameter, where no structures or occupancy beyond the 14 calendar day per year camping limit is proposed, will not generally require the filing of a Notice or Plan of Operations. Such activity is generally considered casual use.

State of Oregon Requirements

All suction dredge operations must be authorized by Permit #0700-J issued by the Department of Environmental Quality. This permit is issued free of charge for dredges having hoses with an inside diameter of 4 inches or less. Registration and a filing fee of $50 is required for suction dredges having hoses with an inside diameter greater than 4 inches. Mining operators should contact the Department of Environmental Quality, Water Quality Division, 811 S.W. Sixth Avenue, Portland, Oregon 97204, or the Roseburg DEQ office.

Suction dredging outside the “permitted work period” established for certain waterways by the Oregon Department of Fish and Wildlife (ODFW) will require written permission by an appropriate ODFW District Biologist.

The river beds of navigable waterways are controlled by the Oregon Division of State Lands.

Tailings Ponds

Settling ponds must be used to contain sediment, and any discharge must meet the standards of the Oregon Department of Environmental Quality.

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. Under Notice-level operations, if the review of the notice by BLM reveals that a potential conflict with a threatened or endangered species exists, the operator will be advised not to proceed and informed that a knowing violation of the taking provision of the Endangered Species Act will result in a notice of noncompliance and may result in criminal penalties. If the operator wishes to develop measures that will eliminate the conflict, then the Authorized Officer will arrange for the participation of BLM resource specialists and the U.S. Fish and Wildlife Service in reviewing the proposed revision to the Notice. If processing a proposed Plan of Operations indicates that a potential conflict exists with a threatened or endangered species or its habitat, the Authorized Officer shall notify the operator that the plan cannot be approved until BLM has complied with Section 7 of the Endangered Species Act. Special status species (Federal Candidate/ Bureau Sensitive) plants and animals, and their habitat will be identified by the Authorized Officer, and shall be avoided wherever possible.

Occupancy at Mining Sites

Living on public land in excess of 14 days per calendar year must be reasonably incident to and required for actual continuous mining or diligent exploration operations and will require either a Notice or Plan of Operations. In general, operations at the casual use level are not sufficient to warrant occupancy on a mining claim. The following discussion of occupancy only applies to those operators wishing to assert their right to live for an extended period or full-time on public lands pursuant to privileges granted under the mining laws. It does not apply to operators proposing to camp at prospecting or mining sites on weekends or one to two days during the week

Only those persons working on a continuous mining or exploration operation will be allowed to live on the claim beyond the 14-day per calendar year camping limit. A continuous mining or exploration operation is defined as an operation necessitating at least 40 hours of work per week at the operating site. The Oregon State Bureau of Labor and Industries generally considers that full-time work consists of a minimum of 40 hours worked per week. Each person proposing to live full-time at the site would be expected to conduct a minimum of 40 hours of work each week. Work hours are to be specified in the Notice or Plan of Operation at the time of submittal to the district BLM office. Should work hours be altered periodically or seasonally, it is the responsibility of the operator to notify the BLM (prior to the change) so that the Notice or Plan can be modified. Camping sites used in conjunction with mineral exploration or extraction operations are expected to be kept in a neat and orderly condition. If operations cannot be pursued due to high fire danger in forested areas, then living on the claim site will not be permitted. Any occupancy beyond 90 days must be in accordance with the requirements of the County Planning Department.

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. The need for a security guard shall be such that the person with those duties is required to be present at the site whenever the operation is shut down temporarily; or at the end of the workday; or whenever the mining claimant, operator, or workers are not present on the site. The proposed occupancy by a security guard must be described in the Notice or Plan of Operations.

Reclamation

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 BLM Handbook H-3042-1. 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.

When reclamation of the disturbed area has been completed, except to the extent necessary to preserve evidence of mineralization, the BLM must be notified so that an inspection of the area can be made.

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 or a citation under State law.

Backfilling and Re-contouring

The first steps in reclaiming a disturbed site are backfilling excavations and reducing high walls, if feasible. Coarse rock material should be replaced first, followed by medium sized material, with fine materials to be placed on top. Re-contouring means shaping the disturbed area so that it will blend in with the surrounding lands, minimize the possibility of erosion, and facilitate re-vegetation.

Seedbed Preparation

Re-contouring should include preparation of an adequate seedbed. This is accomplished by ripping or disking compacted soils to a depth of at least 6 inches in rocky areas and at least 18 inches in less rocky areas. This should be done following the contour of the land to limit erosion. All stockpiled settling pond fines, and then topsoil, shall be spread evenly over the disturbed areas.

Fertilizer

Due to the generally poor nutrient value of mined soils, it may be necessary to use fertilizer to ensure maximum yield from the seeding mixture. The fertilizer (16-16-16, or other approved mix) should be spread at the rate of 200 lbs/acre, but not allowed to enter streams or bodies of water.

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. Seeding should be done in September or October in the Roseburg District to ensure that seed is in the ground prior to the first significant winter rains. If seeding fails, or is done at the wrong time, the operator may be asked to reseed the area at the appropriate time, as determined by the Authorized Officer.

Broadcast seeding is preferable on smaller sites. When using a whirlybird type seed spreader, it is important to keep the different seeds well mixed to achieve even seed distribution. For the best results, a drag harrow should be pulled over the seeded area to cover the seed before mulching. The Authorized Officer may recommend hydro-seeding on critical sites for rapid coverage and erosion control on cutbanks, fill slopes, and any other disturbed areas.

Tree Replacement

Replacement of destroyed trees may be necessary with the planting of seedlings or container stock.

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. In some cases, erosion control blankets may be cost effective for use.

Roads

After mining is completed, all new roads shall be reclaimed, unless otherwise specified by the BLM. High walls and cutbanks are to be knocked down or backfilled to blend with the surrounding landscape. All culverts shall be removed from drainage crossings and the fill shall be cut back to the original channel. The roadbed should be ripped to a minimum depth of 18 inches to reduce compaction and provide a good seedbed. The road must then be fertilized, seeded and mulched if necessary. When necessary, water bars are to be used to block access and provide drainage.

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.

Visual Resources

To the extent practicable, the reclaimed landscape should have characteristics that approximate or are compatible with the visual quality of the adjacent area.

Guidelines for Development of Salable Mineral Resources

Proposed Operations

All proposed salable mineral developments, and any exploration that involves surface disturbance, should have operation and reclamation plans approved by the Authorized Officer. All proposals will undergo the appropriate level of review and compliance with the National Environmental Policy Act.

Quarry Design

Due to steep terrain in the operating area, most quarry developments would 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.

If at all possible, 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.

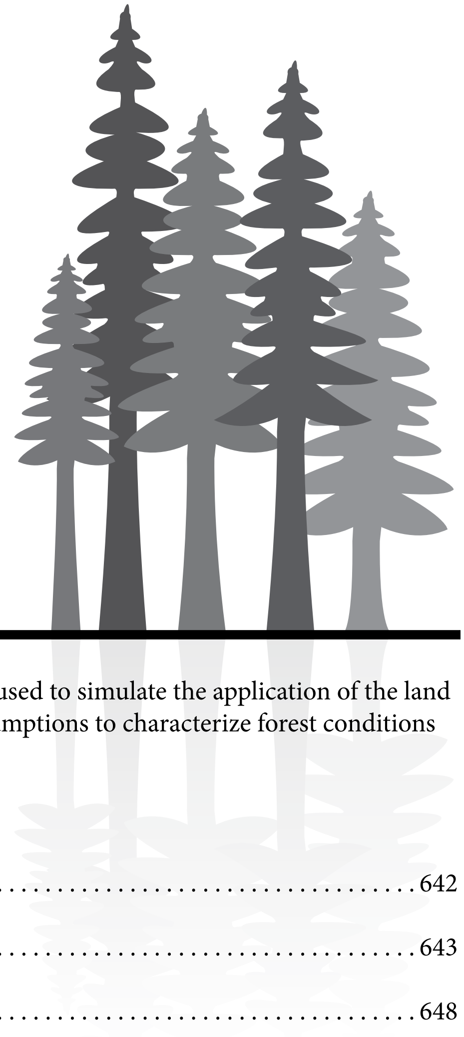
As a standard procedure, the excavation of the quarry floor should be designed with an outslope of approximately two percent to provide for adequate drainage of the floor. Compliance with this design should be made a requirement of all operators at the site.

Operating Procedures

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

- Oversized boulders shall not be wasted, but shall be broken and utilized concurrently with the excavated material unless otherwise specified.
- 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 would be authorized 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 R
Vegetation Modeling



This appendix provides background on the vegetation modeling used to simulate the application of the land use allocations, management action, and forest development assumptions to characterize forest conditions into the future.

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OPTIONS Modeling 683

OPTIONS Products 711

Introduction

The alternatives considered in the plan revisions outline a range of approaches for managing the BLM forest lands by varying the land allocations and intensity with which these forests are managed. These different management approaches result in a range of outcomes in terms of the structural stages of the forest over time, types of habitat that are developed, and the sustainable harvest levels. Models allow simulation of the development of the forest over time under these various management strategies. Models were used in the plan revision to simulate the application of the land use allocations, management action, and forest development assumptions to characterize forest conditions 10, 20, 30, 40, 50, and 100+ years into the future. The models are also used to determine the level of harvest that can be produced and sustained over time. The outputs from modeling form a factual basis for comparing and evaluating these different land management strategies at the strategic level.

Two primary vegetation models were used for the plan revisions:

- ORGANON - Individual tree growth model that was utilized for the development of growth and yield projections for the major species groups on the BLM lands. ORGANON was developed by Oregon State University. http://www.cof.orst.edu/cof/fr/ research/ORGANON/. In this appendix, ORGANON refers to the generic model available in the public domain. DBORGANON refers to the version of the model specifically modified for BLM's Western Oregon Plan Revision.
- OPTIONS - Spatially explicit strategic planning model that was utilized to project the forest conditions over time by simulating the land allocations and management action of the alternatives. OPTIONS is proprietary software created by DR Systems Inc. http:// www.drsystemsinc.com/ prod_options.html

Both of these models have been in use and under continued development for approximately 20 years, and provide a framework to bring the data and assumptions together to simulate these management scenarios. The extent of this modeling effort when looked at from an entire plan revision perspective can seem large and complex. It is easier to understand the modeling by looking at the major components used in the model formulation. These major components include; the GIS data that defines the land allocations and spatial representation of numerous resources, the forest inventory data, growth and yield projections, the definitions of habitats and structural stages, the assumptions on habitat and structural stage development, and management assumptions to simulate the alternatives.

This appendix provides an overview of the key components that were used in formulating the models used in the plan revision:

1. BLM Forest Inventory
2. Use of Inventory Data in Modeling
3. GIS – Defining the Land Base and Spatial Projections
4. Forest Growth and Yield Modeling
5. OPTIONS Modeling
6. OPTIONS Products

BLM Forest Inventory Data

Introduction

Three inventories of the BLM lands were used in the vegetation modeling for the plan revision:

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

GIS Vegetation Mapping – Forest Operations Inventory & Micro*Storms

The Forest Operations Inventory (FOI) is a GIS layer that delineates vegetation polygons across BLM lands within the planning area. There are approximately 80,000 stands identified that average 32 acres in size. The minimum mapping feature is generally five acres but some finer scale non forest and harvest features are identified. Polygons are delineated based on vegetation attributes of cover condition, size class, density of trees, and age. (See *Figure R-1* below for an FOI mapping example)

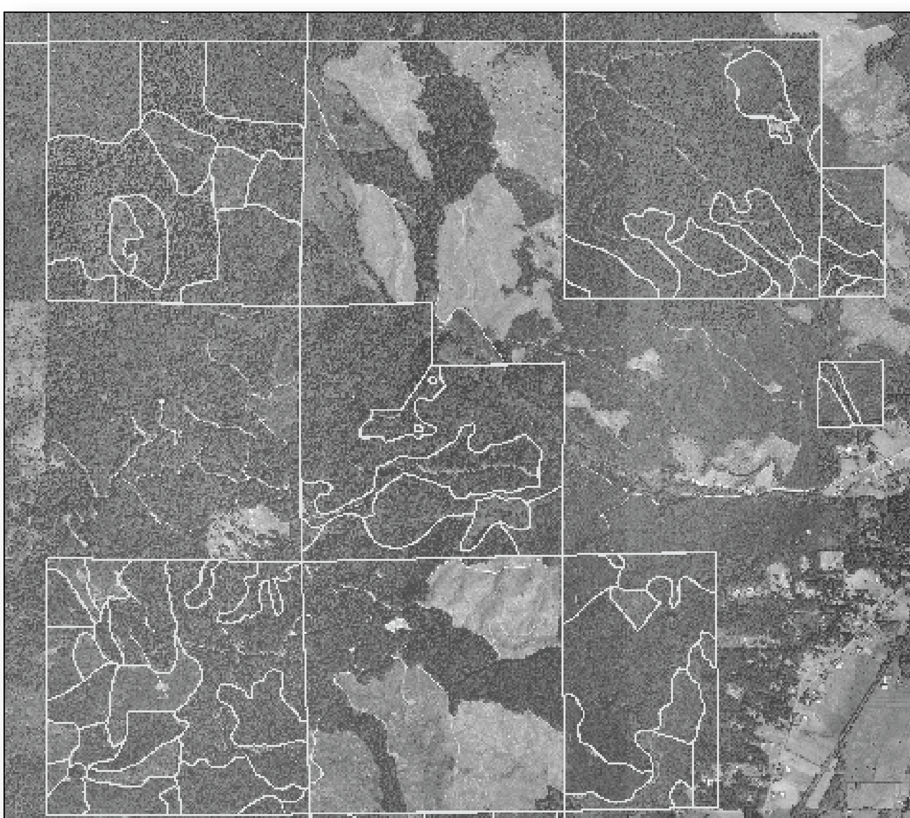


Figure R-1. Example Of FOI Mapping For Approximately A Three By Three Mile Area

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

- Cover Condition – Conifer, hardwood, mixed, or non forest.
- Single or Multi canopy stands.
- Species – Top five species with percent occupancy within a stand layer and listing of other species present.
- Stocking Class.
- Size Class – Diameter of the trees species by layer in 10” diameter classes.
- Birthdate of the layer.
- Ten-year age class.

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

The data is updated by the districts on a regular basis as treatments are implemented and as conditions change. The data is updated by a variety of inventory methods. The FOI and its companion database, Micro*Storms, are operational datasets that are in daily-use by the districts for planning and tracking purposes.

The FOI and Micro*Storms data, as used in the plan revision, reflects the conditions of the BLM lands as of October, 2005 (vintage 2006). The FOI data is the spatial representation of the forest conditions for the OPTIONS vegetation modeling. The Micro*Storms data was used to develop modeling stratification for: species groups, site productivity, existing stand conditions, and 10-year age class.

Timber Productivity Capability Classification

The Timber Productivity Capability Classification (TPCC) is a classification of BLM lands based on the physical and biological capability of the site to support and produce commercial forest products on a sustained yield basis. Each TPCC unit is classified based on four assessments.

1) Forest / Non Forest

- ***Forest*** - capable of 10% tree stocking
- ***Non forest***

2) Commercial Forest Lands

- ***Commercial forest lands*** - capable of producing 20 cubic feet of wood per year of commercial species.
- ***Non commercial forest lands*** – not capable of producing 20 cubic feet of wood per year of commercial species.
- ***Suitable Woodland*** – Non Commercial Species or Low Site

3) Fragile Conditions

- ***Non Fragile*** – forest yield productivity is not expected to be reduced due to soil erosion, mass wasting, reduction in nutrient levels, reduction in moisture supplying capacity, and or the rise of ground water.
- ***Fragile*** - forest yield productivity may be expected to be reduced by soil erosion, mass wasting, reduction in nutrient levels, reduction in moisture supplying capacity, and/or the rise of ground water table.

Fragile sites are classified as:

— ***Restricted*** – Special harvest and or restricted measures are required.

— ***Non Suitable Woodland*** – Future production will be reduced even if special harvest and or restricted measures are applied due to the inherent site factors. These lands are not biologically and or environmentally capable of supporting a sustained yield of forest products.

4) Reforestation

Reforestation problem sites are those where environmental, physical, and biological factors have the potential to reduce the survival and or growth of commercial tree seedlings. These factors include light, temperature, moisture, frost, surface rock, animals and disease.

- ***Non Problem*** – Sites that can be stocked to meet or exceed target stocking levels, of commercial species, within 5 years of harvest, using standard practices.
- ***Restricted*** – Commercial forest land where operational reforestation practices in addition to standard practices are necessary to meet or exceed the minimum stocking levels of commercial species within 5 years of harvest.
- ***Suitable Woodland*** - Operational practices will not meet or exceed minimum stocking levels of commercial species within 5 years of harvest. These sites are biologically capable of producing a sustained yield of timber products.

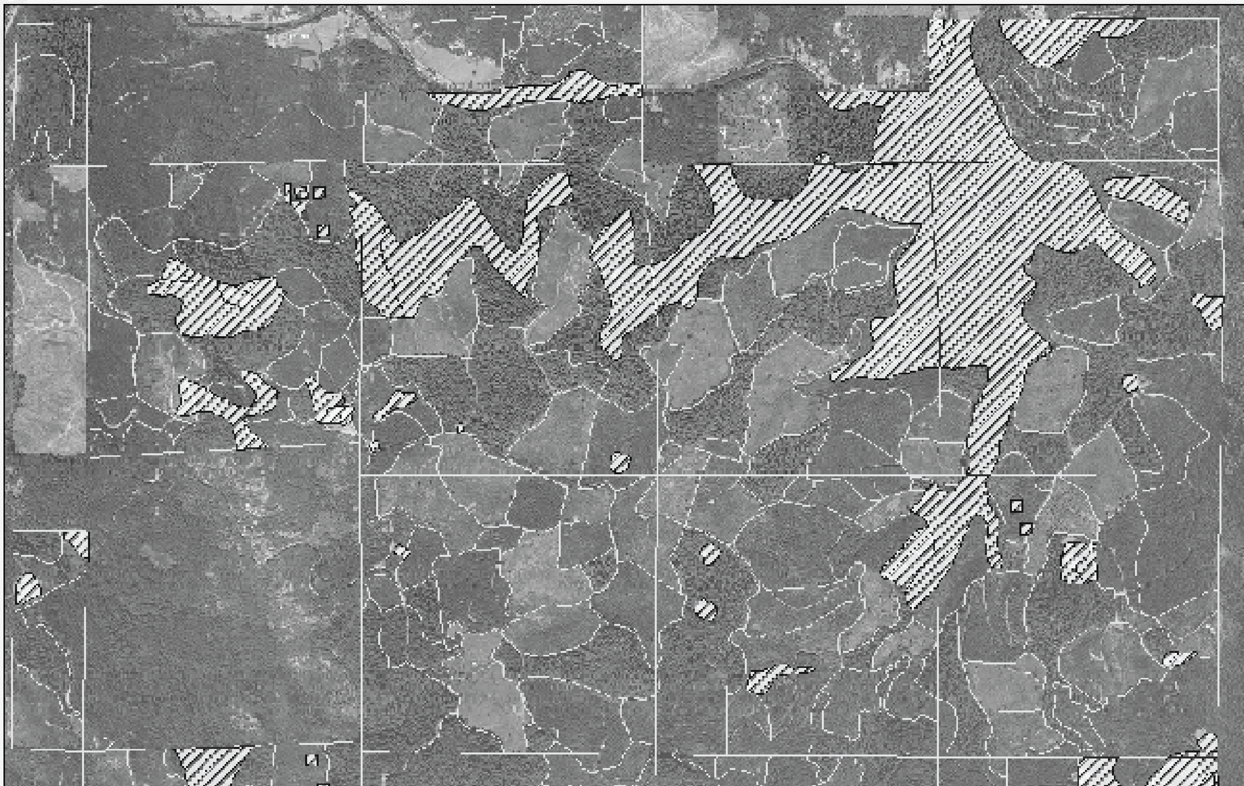
The BLM handbook 5251-1 (1986) provides the standards for the TPCC classification.

There are approximately 66,000 TPCC units mapped in GIS on the BLM lands within the planning area. The minimum mapping feature is generally five acres but some finer scale non forest features are identified in the data. The TPCC initial classification of all BLM lands in the planning area was performed in the late 1980s. The data is updated on an as needed basis as lands are acquired, and new information is obtained through field examination.

The data, as used in the plan revision, reflects the classification of the BLM lands as of October, 2005. For the Western Oregon Plan Revision the TPCC data is used to identify what portions of the BLM lands will contribute to the Allowable Sale Quantity. The non forest, suitable woodlands, and non suitable woodland categories are not included in the lands contributing to the Allowable Sale Quantity under the current plan.

In *Figure R-2,* the cross-hatched areas are examples of TPCC units withdrawn from the lands contributing to the Allowable Sale Quantity. The Forest Operations Inventory units are outlined for approximately a four by two mile area.

Figure R-2. Example Of TPCC Withdrawn Lands



Current Vegetation Survey – Measured Plot Inventory

The Current Vegetation Survey (Max, et al. 1996) provides comprehensive information on vegetative resources on BLM lands within western Oregon. The information was collected during the years 1997 to 2001. It consists of four 3.4-mile grids of field plots that are off-set from one another to produce one 1.7 mile grid across BLM lands for a total of 1,376 plots. The primary sampling unit is one hectare (approximately 2.5 acres) with five fixed-radius sets of subplots with trees 1.0 to 2.9 inches DBH measured on the 11.8 foot radius subplot, 3.0 to 12.9 on a 24.0 foot, 13.0 to 47.9 on a 51.1 foot and trees 48.0 and larger on the 1/5 hectare (approximately ½ acres) nested subplots. There is one subplot located at the plot center and four subplots each in a cardinal direction and 133.9 feet from the center of the plot (See *Figure R-3*). In addition, at each subplot, potential natural vegetation is determined using plant indicator keys, and coarse woody debris is measured along a transect. For specific information on the attributes that are collected refer to USDI BLM 2001).

The location of most of the plot centers have differentially corrected GPS coordinates. Since each subplot center was located at a precise distance from the plot center, the coordinates for the subplot centers were calculated and included in a GIS layer. The CVS layer was overlain on the Forest Operation Inventory GIS map. The CVS layer is independent of the FOI layer; consequently, the CVS data represents an unbiased sampling of the FOI layer. In *FigureR-3* below, the cross hair dot symbols are examples of CVS plot center locations on a 1.7 mile grid. The Forest Operations Inventory units are outlined for approximately a 4.5 by 3 mile area as shown in *Figure R-4.*

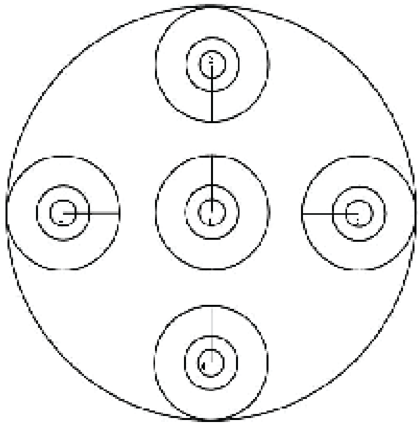
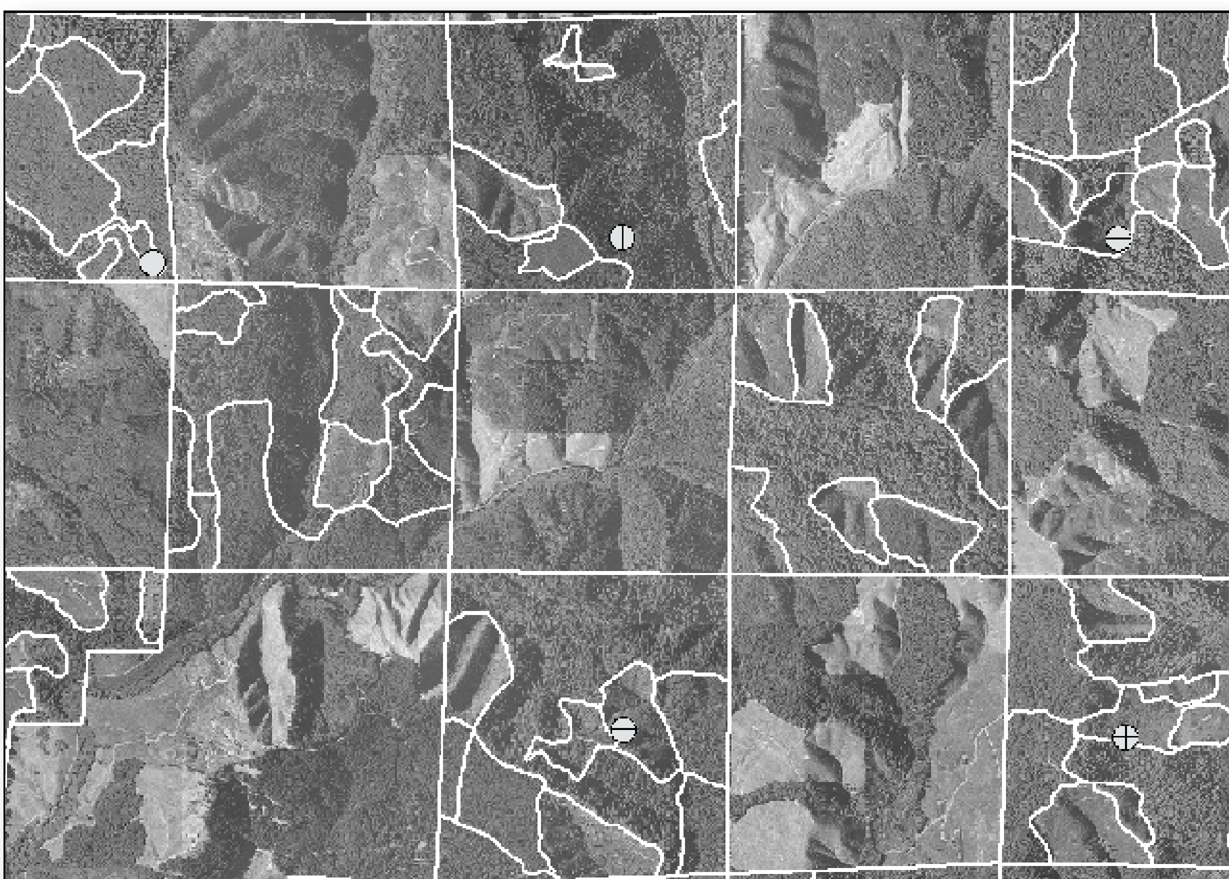


Figure R-3. CVS Plot Design

Figure R-4. CVS Plot Overlain With Forest Operations Inventory



Use of the Inventory Data in the Modeling

Introduction

The Forest Operations Inventory (GIS vegetation units) and the Current Vegetation Survey data (measured inventory plots) were divided into stratification units to identify groups of stands with like characteristics. The stratification was based upon Existing Stand Conditions (ESC), site class, stand age, and species groups. This stratification of the data carried forward into both the DBORGANON and OPTIONS modeling. DBORGANON is a version of the ORGANON growth and yield model customized for BLM by FORsight Resources. DBORGANON is discussed in more detail in the Growth and Yield section of this appendix.

Stratification of Forest Operation Inventory

Stand Age

For every Forest Operations Inventory unit there is a stand age recorded in the Micro*Storms database. (See *Figure R-5* and *Table R-1*) The stand ages reflect the conditions of the forest as of 2006. A Ten-Year age class was derived from these stand ages which served as the starting ages for the OPTIONS model. For multi-storied stands the Ten-Year age class was assigned to the predominant layer being managed. Stand ages over 200 years of age are in 50 year bands. All regeneration harvest timber sales sold by September 30, 2005 were considered depleted from the inventory and the stand ages were converted to year zero for OPTIONS modeling. Stand ages were not assigned to the Klamath Falls eastside management lands. Update instructions for the Forest Operations Inventory were issued to the districts through BLM Information Bulletin No. OR-2005–142 http://web.or.blm.gov/ records/ib/2005/ib-or-2005-142.pdf

Figure R-5. Western Oregon Age Class Distribution 2006 (Acres)

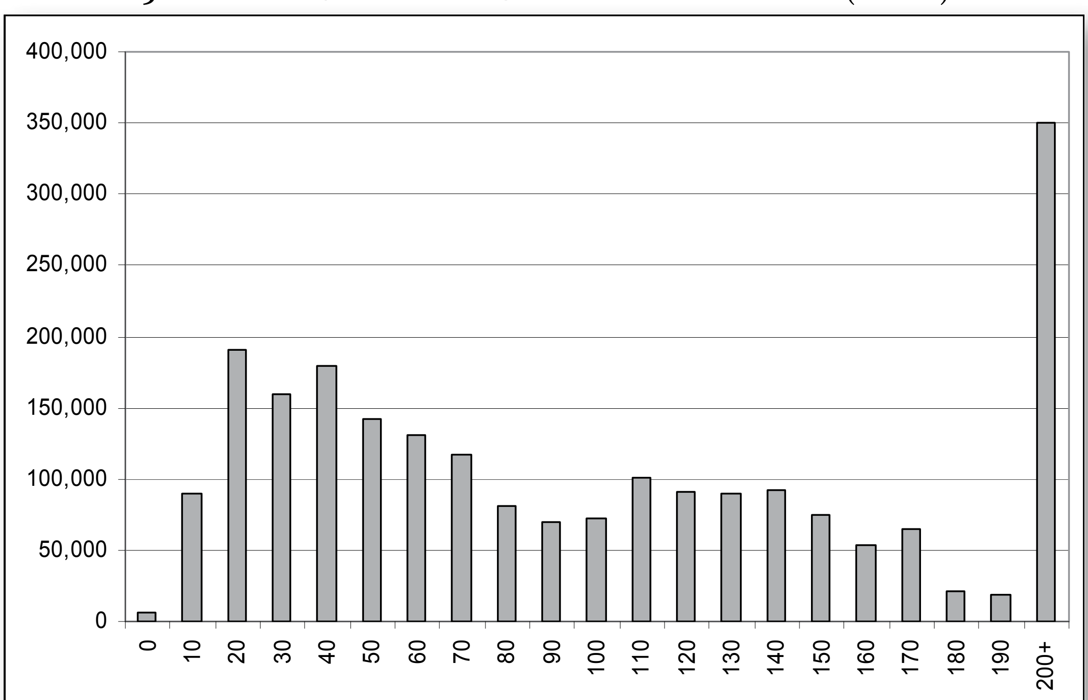


Table R-1. Western Oregon Age Class Distribution 2006 By Sustained Yield Unit (acres)

Age Class	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath	Total
0	273	110	1,374	1,311	3,654	0	6,722
10	13,172	12,108	23,079	16,176	24,742	969	90,247
20	32,098	30,163	37,483	31,292	56,403	3,483	190,922
30	34,395	31,666	39,203	32,757	20,328	1,595	159,944
40	35,946	32,071	32,483	37,476	38,329	2,578	178,883
50	23,067	27,581	29,673	28,794	30,865	1,731	141,710
60	41,409	41,547	13,198	12,676	20,213	1,913	130,956
70	30,922	29,659	8,997	15,946	28,680	2,699	116,902
80	22,908	12,567	5,387	9,272	26,627	3,905	80,667
90	13,738	6,701	5,584	3,519	35,325	5,365	70,232
100	12,047	4,423	5,607	4,161	42,860	3,421	72,519
110	12,393	6,021	12,661	3,576	62,101	4,216	100,968
120	20,751	7,949	6,573	9,223	44,948	1,908	91,353
130	20,598	6,204	7,679	10,557	43,225	1,048	89,311
140	9,165	1,623	11,233	5,528	62,066	2,797	92,412
150	7,502	1,223	25,360	8,570	30,226	2,046	74,927
160	1,876	2,073	2,310	7,321	39,218	455	53,253
170	2,756	400	8,285	3,810	49,008	396	64,655
180	429	424	1,552	635	17,796	70	20,906
190	201	3,952	2,497	1,739	9,969	92	18,450
200+	29,625	37,571	118,961	57,372	101,156	6,056	350,740
Total	**365,272**	**296,036**	**399,180**	**301,710**	**787,740**	**46,742**	**2,196,679**

Existing Stand Conditions (ESC)

The Existing Stand Condition coding aggregated Forest Operations inventory based on past management history and similar stand conditions. The Micro*Storms database was used to classify each of the Forest Operations Inventory units into one of the existing stand condition codes. This stratification was done prior to beginning the DBORGANON and OPTIONS modeling. Further collapsing of the ESC coding was done to formulate the DBORGANON and OPTIONS modeling groups. (See *Table R-2*)

Table R-2. Existing Stand Condition Codes

PROPOSED Existing Stand Condition (ESC) Codes - WOPR					REVISED as of 11/13/2005	
2005 ESC Code	1994 ESC Code	Description	Genetic Improved	Fertilized	Era Stand Created/ Treated	Remarks
1	1	GFMA target stocking (>= 80%) & 250 to 400 TPA density (unimproved TI)			1950 to 1995	previously regen harvested without retention trees including pre-RMP stands with 2 dispersed retention trees per acre
2	6	GFMA target stocking (>= 80%) & 250 to 400 TPA density (unimproved TI) FERTILIZED		X	1950 to 1995	
3	2	GFMA minimum stocking (60-79%) - 150 to 249 TPA density (unimproved TI)			1950 to 1995	
4	6	GFMA minimum stocking (60-79%) - 150 to 249 TPA density (unimproved TI) FERTILIZED		X	1950 to 1995	
5	3	GFMA below minimum stocking (< 60%) - 50 to 149 TPA density (unimproved TI)			1950 to 1995	
6	4	GFMA Overstocked/overdense - > 400 TPA density (unimproved TI)			1950 to 1995	
7	5	GFMA target stocking (>= 80%) & 250 to 400 TPA density (TI genetic stock)	X		1950 to 1995	
8	6	GFMA target stocking (>= 80%) & 250 to 400 TPA density (TI genetic stock) FERTILIZED	X	X	1950 to 1995	
9	5	GFMA minimum stocking (60-79%) - 150 to 250 TPA density (TI genetic stock)	X		1950 to 1995	
10	6	GFMA minimum stocking (60-79%) - 150 to 250 TPA density (TI genetic stock) FERTILIZED	X	X	1950 to 1995	
11	5	GFMA below minimum stocking (< 60%) - 50 to 149 TPA density (TI genetic stock)	X		1950 to 1995	
13	n/a	6-8 retention trees - at GFMA target stocking & density (TI genetic stock)	X		1996 to 2005	previously regen harvested with low (6-8 TPA) retention trees level
14	n/a	6-8 retention trees - at GFMA minimum stocking & density (TI genetic stock)	X		1996 to 2005	
15	n/a	6-8 retention trees - below GFMA minimum stocking & density (TI genetic stock)	X		1996 to 2005	
16	n/a	6-8 retention trees - Overstocked GFMA standard- need PCT (TI genetic stock)	X		1996 to 2005	
17	n/a	6-8 retention trees - at GFMA target stocking & density (unimproved stock TI)			1996 to 2005	
18	n/a	6-8 retention trees - at GFMA minimum stocking & density (unimproved stock TI)			1996 to 2005	
19	n/a	6-8 retention trees - below GFMA minimum stocking & density (unimproved stock TI)			1996 to 2005	
20	n/a	6-8 retention trees - overstocked GFMA standard- need PCT (unimproved stock)			1996 to 2005	

PROPOSED Existing Stand Condition (ESC) Codes - WOPR					REVISED as of 11/13/2005	
2005 ESC Code	1994 ESC Code	Description	Genetic Improved	Fertilized	Era Stand Created/ Treated	Remarks
21	n/a	12-18 retention trees - at GFMA target stocking & density (TI genetic stock)	X		1996 to 2005	previously regen harvested with moderate (12-18 TPA) retention trees level
22	n/a	12-18 retention trees - at GFMA minimum stocking & density (TI genetic stock)	X		1996 to 2005	
23	n/a	12-18 retention trees - below GFMA minimum stocking & density (TI genetic stock)	X		1996 to 2005	
25	n/a	12-18 retention trees - at GFMA target stocking & density (unimproved stock TI)			1996 to 2005	previously regen harvested with moderate (12-18 TPA) retention trees level
26	n/a	12-18 retention trees - at GFMA minimum stocking & density (unimproved stock TI)			1996 to 2005	
27	n/a	12-18 retention trees - below GFMA minimum stocking & density (unimproved stock TI)			1996 to 2005	
28	n/a	12-18 retention trees - overstocked GFMA standard- need PCT (unimproved stock TI)			1996 to 2005	
30	n/a	Density Mgt at age class 30			1996 to 2005	low/variable residual density commercial thinnings (immediate post- thin Curtis RD < 35)
31	n/a	Density Mgt at age class 40			1996 to 2005	
32	n/a	Density Mgt at age class 50			1996 to 2005	
33	n/a	Density Mgt at age class 60			1996 to 2005	
34	n/a	Density Mgt at age class 70			1996 to 2005	
35	n/a	Density Mgt at age class 80			1996 to 2005	
36	n/a	Density Mgt at age class 90 Plus			1996 to 2005	
37	10	CTed at age class 30			1950 to 2005	moderate/high residual density commercial thinnings (immediate post- thin Curtis RD > 35)
38	11	CTed & fertilized at age class 30		X	1950 to 2005	
39	12	CTed at age class 40			1950 to 2005	
40	13	CTed & fertilized at age class 40		X	1950 to 2005	
41	14	CTed at age class 50			1950 to 2005	
42	15	CTed & fertilized at age class 50		X	1950 to 2005	
43	16	CTed at age class 60			1950 to 2005	
44	17	CTed & fertilized at age class 60		X	1950 to 2005	
46	19	CTed & fertilized at age class 70		X	1950 to 2005	
47	20	CTed at age class 80			1950 to 2005	
48	22	CTed at age class 90			1950 to 2005	
49	n/a	CTed at age class 100			1950 to 2005	
50	n/a	CTed at age class 110			1950 to 2005	moderate/high residual density commercial thinnings (immediate post- thin Curtis RD > 35)
51	30	Mortality Salvaged or Sanitation Cut			Pre-RMP	

PROPOSED Existing Stand Condition (ESC) Codes - WOPR					REVISED as of 11/13/2005	
2005 ESC Code	1994 ESC Code	Description	Genetic Improved	Fertilized	Era Stand Created/ Treated	Remarks
52	40	56 to 500 years-old, no past silvicultural treatment			< 1950	unmanaged stands created prior to 1950
53	50	Brushfield, hardwood, noncommercial conifer or backlog conversion opportunity			Any	
54	60	Sold but not cut - regeneration harvest			Any	includes all unharvested litigated & unawarded sales
55	61	Cut, needs site preparation			Any	
56	62	Site prepped, needs regeneration			Any	
57	99	Nonforest			Any	
58	n/a	> 18/15 retention trees/acre - at GFMA target stocking & density (TI genetic stock)	X		1950 to 2005	Non SW Oregon - previously regen harvested with high (19-25 TPA) retention trees level SW Oregon - previously regen harvested with high (16-25 TPA) retention trees level
59	n/a	> 18 /15 retention trees/acre - at GFMA minimum stocking & density (TI genetic stock)	X		1950 to 2005	
60	n/a	> 18/ 15 retention trees/acre - below GFMA minimum stocking & density (TI genetic stock)	X		1950 to 2005	
61	n/a	> 18 /15 retention trees/acre - Overstocked GFMA standard-need PCT (TI genetic stock)	X		1950 to 2005	
62	n/a	> 18 /15 retention trees/acre - at GFMA target stocking & density (unimproved stock TI)			1950 to 2005	
63	n/a	> 18 /15 retention trees/acre - at GFMA minimum stocking & density (unimproved stock TI)			1950 to 2005	Non SW Oregon - previously regen harvested with high (19-25 TPA) retention trees level SW Oregon - previously regen harvested with high (16-25 TPA) retention trees level
64	n/a	> 18 /15retention trees/acre - below GFMA minimum stocking & density (unimproved stock TI)			1950 to 2005	
65	n/a	> 18 /15 retention trees/acre - overstocked GFMA standard-need PCT (unimproved stock TI)			1950 to 2005	
66	80	Hardwood-Suitable Woodland CFL			Any	Woodland
67	81	Conifer-Suitable Woodland CFL			Any	
68	85	Hardwood-NonSuitable Woodland CFL			Any	
69	86	Conifer-NonSuitable Woodland CFL			Any	
70	89	Hardwood-Suitable Woodland NonCFL			Any	

PROPOSED Existing Stand Condition (ESC) Codes - WOPR					REVISED as of 11/13/2005	
2005 ESC Code	1994 ESC Code	Description	Genetic Improved	Fertilized	Era Stand Created/ Treated	Remarks
71	90	Conifer-Suitable Woodland NonCFL			Any	
72	n/a	GFMA target stocking (>= 80%) & 250 to 400 TPA density (unimproved TI) PRUNED			1950 to 1995	previously regen harvested without retention trees including pre-RMP stands with 2 dispersed retention trees per acre PRUNED for wood quality only
73	n/a	GFMA target stocking (>= 80%) & 250 to 400 TPA density (unimproved TI) FERTILIZED PRUNED		X	1950 to 1995	
74	n/a	GFMA minimum stocking (60-79%) - 150 to 249 TPA density (unimproved TI) PRUNED			1950 to 1995	
75	n/a	GFMA minimum stocking (60-79%) - 150 to 249 TPA density (unimproved TI) FERTILIZED PRUNED		X	1950 to 1995	
77	n/a	GFMA target stocking (>= 80%) & 250 to 400 TPA density (TI genetic stock) FERTILIZED PRUNED	X	X	1950 to 1995	previously regen harvested without retention trees including pre-RMP stands with 2 dispersed retention trees per acre PRUNED for wood quality only
78	n/a	GFMA minimum stocking (60-79%) - 150 to 250 TPA density (TI genetic stock) PRUNED	X		1950 to 1995	
79	n/a	GFMA minimum stocking (60-79%) - 150 to 250 TPA density (TI genetic stock) FERTILIZED PRUNED	X	X	1950 to 1995	

Medford and Klamath Falls common codes from 1994 PRMP & Proposed ESC for Southern GFMA

Woodland codes may be applicable to all districts

Table R-3. No Action Alternative Existing Stand Condition Acres By Sustained Yield Unit

ESC	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath	E. Mgt. lands	Grand Total
1	83,348	60,695	57,832	31,920	92,475	6,635	398	333,303
2	14,241	11,706	32,549	29,367	9,614			97,476
3	30,299	31,441	28,320	29,331	18,634			138,026
4	1,662	6,464	6,502	16,663	5,269			36,559
5	2,004	222	644	8,383	6,012			17,266
6	14,057	1,269	23,182	6,899	1,811			47,218
7	4,034	13,481	2,158	6,615				26,288
8	338			487	2,037			2,862
9	1,132	231	870	4,576	539			7,348
10	18			380	15			413
11	43	314	1,023	910	211			2,501
12	2,789		1,346	3,443				7,578
13	512	1,983	342	153				2,989
14	13		154					167
16	672		557	778				2,007
17	200		1,135	157	12,178			13,670
18	37		152	20	5,717	19		5,946
19			19		2,254			2,273
20	275		218	424				917
21	62	430						491
22	250							250
24	86		37					123
25	18		19		617	189	2,750	3,592
26	3				225			228
27					77			77
28	46		212					258
30				908	7	683		1,598
31		72	201	1,853	206	2,214		4,547
32	39	676	507	1,139	229	1,437	112	4,138
33	1,123	990	845	809	149	1,362	782	6,059
34	297	754	102	316	839	2,384	629	5,321
35				330	822	3,485	1,183	5,820
36	49			148	9,473	18,482	9,811	37,962
37	458	52	159	313	105			1,087
38	35			131	98			264
39	3,277	851	2,218	992	145			7,483
40	16	283		956				1,255
41	8,935	4,163	3,154	1,919	238			18,408
42	1,766	856	9	2,633				5,265
43	8,201	5,683	2,023	843	204			16,955
44	824	1,049		831				2,704

ESC	Salem	Eugene	Roseburg	Coos Bay	Medford	Klamath	E. Mgt. lands	Grand Total
45	5,674	2,778	1,438		876			10,765
46	354	445	121					919
47	8,252	519	595	120	993			10,480
48	6,643	247	156	6	1,166			8,218
49	824	37	32		2,732			3,624
50	779		170	36	6,793			7,778
51		888	5,330	125	20,481	4,546		31,370
52	186,872	154,570	224,927	144,923	376,391	1,445	171	1,089,298
53		5,248	2,659	8,598	5,906	676	1,265	24,351
54	147		548	909	1,320			2,924
55	133	71		307				511
56		30	249	167				446
57	10,500	2,790	7,711	4,499	42,014	2,131	74,399	144,045
62					53			53
64					79			79
66					2,353			2,353
67					67,045	152	24	67,221
68			5,661		715	62		6,439
69		7	1,145	1,046	39,161	414	4,289	46,063
70					40,972	947	64	41,984
71					87,314	4,043	77,026	168,383
72	622	939	1,471	754	58			3,845
73	224	25	731	1,117	12			2,109
74			2,206	766	56			3,028
75			1,705	2,242				3,947
76			166	467				633
77				46				46
78				349				349
79			82	65				147
Total	**402,184**	**312,261**	**423,589**	**321,167**	**866,694**	**51,306**	**172,903**	**2,550,103**

Species Groups

The Micro*Storms database has a listing of the top 5 species within each stand layer with a ranking of relative abundance. This data was utilized to classify each Forest Operations Inventory Unit into one of the following species groups for modeling purposes. The Micro*Storms species group stratification was a starting point. For the OPTIONS and DBORGANON modeling some species groups were combined to attain adequate representation by the Current Vegetation Survey plots. (See *Figure R-6*)

Douglas-fir (DF)

This species group includes stands with single species DF listed, and those stands with minor quantities of other conifers or hardwoods. They would typically be "FCO" stands (forest conifer), and have either single or multiple sizes and ages indicated.

Northern True Fir (N_TF)

Stands of Noble or Silver fir, including other species mixed in such as Douglas- fir, western hemlock, or western red cedar, but where Silver or Noble are dominant.

Northern Mixed Conifer (N_MX_CON)

This species group includes stands with single species of western hemlock, western red cedar, Sitka spruce, or mixed conifer stands where Douglas-fir would not be the dominant species. They would typically be "FCO" stands (forest - conifer).

Northern Conifer / Hardwood Mix (N_CON_HWD)

These stands would have both conifer and hardwood species listed. Neither conifer nor hardwood would dominate these stands. Conifers or hardwoods could be indicated in the dominant or secondary position. Hardwoods would include big leaf maple and red alder mixed with conifer species. Many FMX stands (forest - conifer and hardwoods) would be located here.

Northern Hardwood (N_HWD)

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

Southern Mixed Conifer (S_MX_CON)

Stands containing incense cedar, sugar pine, Ponderosa pine, Douglas-fir and white fir in varying fractions, but not including pure types without any secondary species indicated. This type may include some hardwood component but less than the southern conifer/hardwood mix. Hardwoods would not be listed as the dominant species.

Southern Conifer / Hardwood Mix. (S_CON_HWD)

This type consists of stands with the mixed conifer species, but with southern hardwoods such as oak, madrone, tanoak, myrtle, etc mixed in. The hardwoods may be in the majority or minority. FMX types (forest - conifer and hardwoods) are here.

Southern Hardwood (S_HWD)

This type consists primarily of southern hardwood species with limited mixed conifer component. Hardwoods would comprise the dominant species, possibly FHD types (forest - conifer and hardwoods).

Southern True fir (S_TF)

This type includes Shasta red fir and white fir types. White fir types could have other secondary species such as Douglas-fir.

Ponderosa Pine (PP)

These are stands with dominant Ponderosa pine. Stands with Douglas-fir or other species in the understory would be here, if not the dominant species. This would include dryer types with juniper as long as the Ponderosa pine was the dominant species.

Juniper (J)

This type is juniper dominant. This type would contain some limited pine on dryer lower site types.

Depending on the district and the DBORGANON variant used, lodge pole pine and knob cone pine types would go into Northern Mixed Conifer or Southern Mixed Conifer. Jeffery pine would go into a low site Ponderosa pine type. Mountain hemlock would go into northern true fir. Port-Orford-cedar would go into Southern Mixed Conifer.

Site Class

Site Class data in the Micro*Storms database / Forest Operation Inventory (FOI) come from a variety of sources, including estimations, measured on site, and/or soils mapping. The site class data in FOI is adequate for a general portrayal of productivity but due to the variety of sources it is of varying accuracy.

Site index data was measured on the CVS inventory at the plot level. Assignment of site index to the subplot level was made at the time of data collection. Using a site index conversion routine created by Mark Hanus (FORSight Resources), all measured site data for all species and base ages was converted to a Douglas-fir, 50-year base index, using King (1966) for Northwest Oregon, and Hann-Scrivani (1987) for SW Oregon.

Figure R-6. Species Group By District – Forested Acres

Frozen Micro*Storms 4/7/2006

Species Group	Salem	Eugene	Roseburg	Coos Bay	Medford	Kfalls	W. Oregon	
DF	284,856	247,212	300,796	250,087	396,459		1,479,411	64%
N_CON_HWD	54,316	40,127	8,883	27,751			131,076	6%
N_HWD	12,506	4,473	596	5,929			23,504	1%
N_MX_CON	17,163	8,127	327	1,818			27,434	1%
N_TF	9,935						9,935	0%
PP			1,437		57,445	33,544	92,426	4%
S_CON_HWD			28,341	11,206	159,802	2,125	201,474	9%
S_HWD			2,768	2,214	39,740		44,722	2%
S_MX_CON			57,653	734	118,473	29,262	206,122	9%
S_TF					21,170	8,277	29,446	1%
J						71,891	71,891	3%
Total	378,775	299,939	400,802	299,738	793,089	145,098	2,317,442	100%

It was assumed that the best representation for range of site productivity values and relative proportions of these values are the CVS data for areas as large as those occupied by combined species group within an SYU. The Measured CVS data was used to re-distribute the FOI site class data to reflect the profile of the measured data. Assignment from the CVS to the FOI was based on a set of rules. These data were apportioned to each sustained yield unit forest land base at the FOI unit level. Existing measured site index data from the Micro*Storms / FOI were retained for individual FOI units. For the remaining FOI units, site productivity values were assigned to all stands in the forest land base in such a manner to approximate the expanded CVS distribution for species groups at the SYU level. These FOI unit-level productivity assignments were held constant for the OPTIONS modeling of all alternatives.

Methodology for Site Class Re-Distribution - CVS to the FOI

The following methodology was applied at the district level to achieve a similar distribution of acres by species group and site productivity in the inventory as was present within the CVS information.

Source Information

A Microsoft Excel spreadsheet, with the following information, was prepared for each district:

- CVS Plot Number – unique plot number
- CVS District – the district for the plot
- CVS Species Group – the super species group for the plot
- CVS Site Productivity – the site productive class for the plot
- FOI Number – unique inventory number
- FOI Site Index Conversion Code – the conversion method used to calculate the Douglas-fir, 50-year base index
- FOI District – the district for the FOI
- FOI Species Group – the super species group for the FOI
- FOI Site Productivity – the site productivity class for the FOI
- FOI Acres – the acres for the FOI
- FO DBORGANON Variant - the DBORGANON Variant for the FOI

Assumptions

- FOI with measured site index information are not redistributed.
- FOI polygons are treated as whole units. An FOI polygon cannot be split in order to achieve desired acre redistribution.
- Redistribution of acres cannot result in an excess of acres over the desired target.
- Species Groups identified as 'NF' (non-forest) were not redistributed
- If either CVS or FOI information was not available, then no redistribution would occur, i.e. both CVS and FOI information must be available for redistribution to occur.

Methodology

1. Using the source CVS information, for each district (SYU) and species group (SSPG) combination, determine the percent distribution of plots within each site productivity class (SP). (See *Table R-4*)

2. Using the FOI information, for each district (SYU) and species group (SSPG) combination, determine percent distribution of acres within each site productivity class (SP). (See *Table R-5*)

3. Redistribute FOI acres between site productivity classes within the district species group to obtain the same percent distribution as indicated by the CVS information. Beginning redistribution starting with the highest site (1) and progress to the lowest site (5) as follows:

    a) Identify initial acres based on FOI information for the desired site productivity class
    b) Determine target acres based on percent distribution from CVS information for the desired site productivity class.
    c) If the initial acres are less then the target acres, then reassign acres from the next lowest site productivity class to the desired site productivity class until the target acres are met (but not exceeded). Acres from each subsequent site productivity class are reassigned until the target acres are achieved.

        In our example, for site productivity class 1, the initial 38,372 acres is less than the target acres of 50,869. Therefore, approximately 12,500 acres from productivity class 2 are reassigned to site productivity class 1. (See *Tables R-5* and *R-6* and *Figure R-7*)

    d) If the initial acres are greater then the target acres, then reassign acres from the current site productivity class to the next successively lower site productivity class until the target is met (but not exceeded).

        If our example was reversed and the initial acres for site productivity class were 50,869, then approximately 12,500 acres would be reassigned to site productivity class 2.

Table R-4. Example Of Distribution Of Plots By Site Productivity Class

SYU_SSPG	SYU_SSPG_SP	# of Plots in SYU_SSPG	# of Plots in SYU_SSPG_SP	% Distribution
Coos Bay_NDF	Coos Bay_NDF_1	673	132	20
Coos Bay_NDF	Coos Bay_NDF_2	673	273	41
Coos Bay_NDF	Coos Bay_NDF_3	673	182	27
Coos Bay_NDF	Coos Bay_NDF_4	673	61	9
Coos Bay_NDF	Coos Bay_NDF_5	673	25	3

Table R-5. Example Of Percent Distribution Of Acres Within Site Productivity Class

SYU_SSPG	SYU_SSPG_SP	Total Acres SYU_SSPG	Total Acres SYU_SSPG_SP	% Distribution
Coos Bay_NDF	Coos Bay_NDF_1	254347	38372	15
Coos Bay_NDF	Coos Bay_NDF_2	254347	133575	53
Coos Bay_NDF	Coos Bay_NDF_3	254347	68960	27
Coos Bay_NDF	Coos Bay_NDF_4	254347	13440	5
Coos Bay_NDF	Coos Bay_NDF_5	254347	0	0

Table R-6. Example Of Reassignment Of Productivity Class Acres To Match Percent Of CVS Plot Distribution

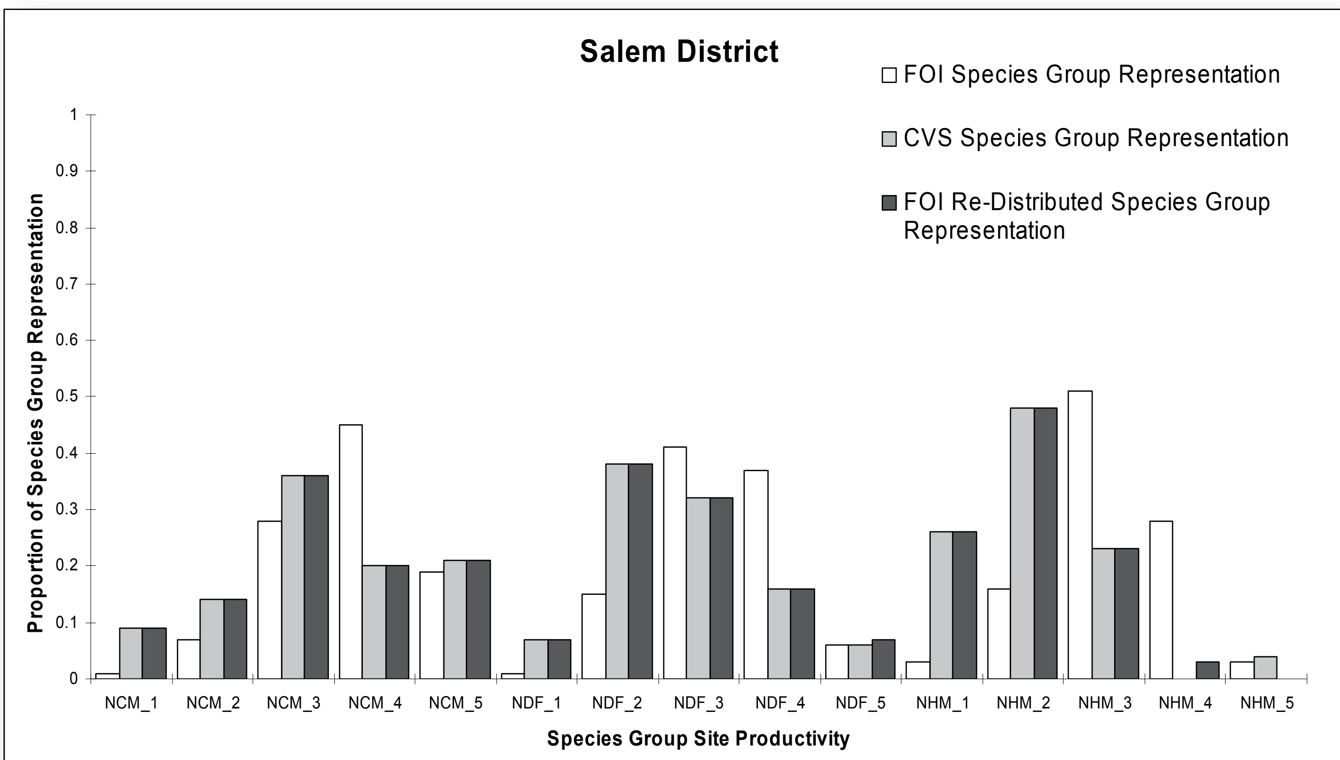
SYU_SSPG_SP	Total Acres in SYU_SSPG	Target %	Target Acres	Resulting Redistributed Acres	Resulting Redistributed % Distribution
Coos Bay_NDF_1	254347	20	50869	50884	20
Coos Bay_NDF_2	254347	41	104282	104224	41
Coos Bay_NDF_3	254347	27	68674	68324	27
Coos Bay_NDF_4	254347	9	22891	22538	9
Coos Bay_NDF_5	254347	3	7630	8376	3

4. For each FOI, reassign the corresponding mid-point site index value based on the new site productivity class and DBORGANON variant code. (See *Table R-7*)
   a) Southwest Oregon (SWO)
   b) Northwest Oregon (NWO)

Table R-7. Reassigning Mid-point Site Index Values

Site Productivity Class Midpoints by DBORGANON Variant Code	2	1
5	70	60
4	85	75
3	105	95
2	125	115
1	140	130

Figure R7. Salem District Site Class Re-Distribution Example (Species Groups NCM – Northern Conifer Mixed, NDF – Northern Douglas-Fir, NHM – Northern Hardwood Mixed)



Collapsing the Stratification into Modeling Groups

Both the Forest Operation Inventory (FOI) and Current Vegetation Survey (CVS) had an initial stratification based on stand age, existing stand condition (ESC), site productivity class, and species groups. Modeling Groups were developed to aggregate like types which represented significant quantities of the FOI acres and to assure there was sufficient measured data from CVS for each group.

The modeling groups were developed to:

- Classify the CVS data for the development of growth and yield curves with the DBORGANON model for each Modeling Group.
- Provide a consistent linkage between the growth and yield data from DBORGANON with the Forest Operation Inventory (FOI) for configuration, projection and the OPTIONS modeling.

The first step in the process involved grouping the CVS subplots, by DBORGANON variant, into strata of similar forest, past treatment, and productivity types. For each CVS subplot, the forest type and past treatment data was extracted from the FOI. The forest type was an assignment of a species group which had been derived by district personnel thru a series of queries on stand level information.

The past treatment groupings consisted of stands with similar management histories or trajectories. This designation was based on their existing stand condition data which had been reviewed and brought up to date (as of September 30, 2005) by district personnel. The third consideration used in this stratification process was the productivity level (50-year Douglas-fir Site Class) assigned to each CVS subplot.

The DBORGANON variants for Northwest (NWO) and Southwestern Oregon (SWO) were split primarily on District boundaries. (See *Figure R-8*) The Salem, Eugene and Coos Bay districts are being assigned to the NWO variant, with one exception. The southern portion of Coos Bay District which lies primarily in the Tanoak Zone was assigned to SWO for modeling. The Roseburg and Medford Districts and The Klamath Falls Resource Area were assigned to the SWO variant, again with one exception. Within the northwest portion of Roseburg district, some CVS subplots and a companion set of FOI units were within stands designated as species groups modeled only in the NWO variant.

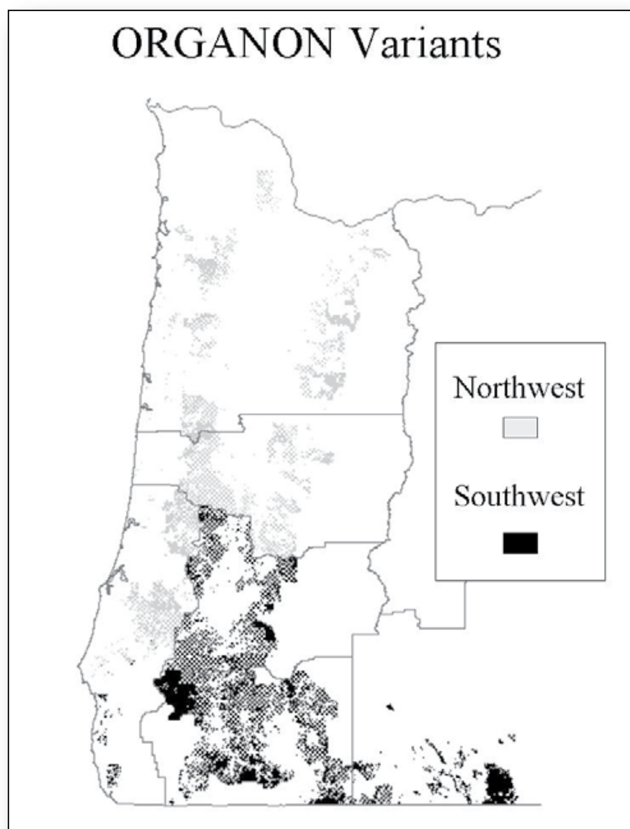


Figure R-8. Organon Variants

The stratification process involved partitioning the entire planning area; sampled by the over 5,300 forested CVS inventory plots, into logical modeling groups. This process involved a multi-day session with a workgroup of district personnel including but not limited to silviculture, timber and inventory specialists. A majority of these same district personnel were in a subsequent stage of the project, involved in development of the

Guide and Treatment Curves modeling the grouped CVS data with DBORGANON. Through an iterative process, the number of modeling groups with fewer than 30 subplots was minimized. Out of the final 53 existing-stand modeling groups, 22 for NWO and 31 for SWO, only 2 had fewer than 30 subplots.

Imputing Data from Current Vegetation Survey (CVS) to the Forest Operation Inventory (FOI)

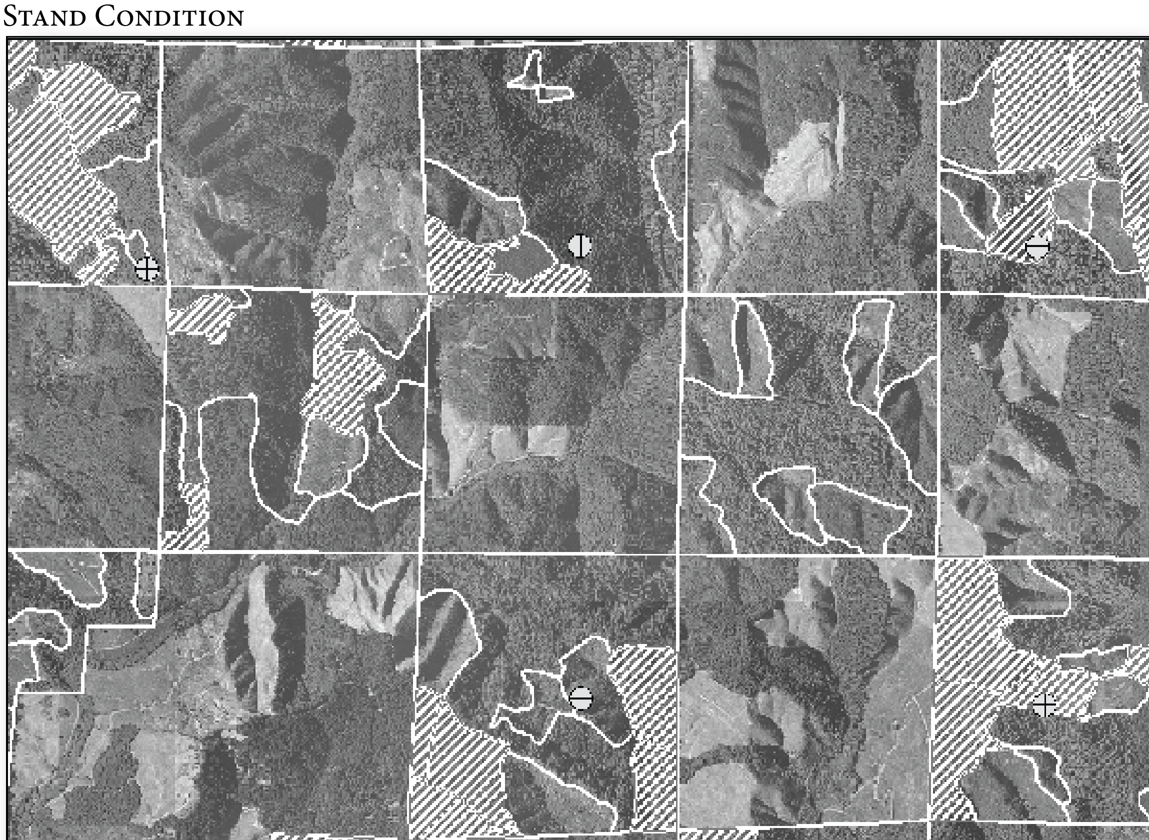
The objective was to create summary information for each Forest Operation Inventory (FOI) unit within the forested land base and to mimic the natural variation that exists among the FOI units. There is information to stratify each of the FOI units into Existing Stand Condition (ESC), Site Class, Age and Species Groups. There is CVS data for nearly every combination of characteristics found on BLM lands but there are FOI units without CVS data.

Information from the FOI: Existing Stand Condition (ESC), redistributed site productivity, stand age and species group, were used to stratify both the FOI and CVS. The combination of ESC, site class, age and species groups are non-overlapping strata. The resultant spatial relationship between the CVS plots and the FOI creates a stratified random sample of the plots with unequal number of subplots per plot. The CVS data within each of the characteristic combination represents an unbiased collection of data for that stratum.

In *Figure R-9*, the two plots on the right fall within the selected stratum (cross- hatched). These represent stands with common ESC, site productivity class and species groups.

The collection of CVS subplots that fell within the same stratum (defined by ESC, site productivity class and

Figure R-9. Example Of CVS Plots And FOI Units With A Common Existing Stand Condition



species groups but including different age categories) were projected with no future silvicultural treatments applied. This produced a smooth empirical curve that borrowed strength from adjacent age categories with more data to predict the current inventories for ages with less data.

To derive a set of stand attributes for each forested FOI unit, the subplots that fell within each stratum (ESC, site class, species group and age) were pooled and the subplots were drawn with replacement equal to the number of subplots within the category. If the number of subplots exceeded 30, then the summary information was calculated using the tree lists associated with each selected subplot and the summary information was assigned to an FOI unit. This process was repeated for each FOI unit within the stratum. This technique imputes values into each FOI unit.

Figure R-10 is an example of two FOI units that have been assigned 10 subplots with replacement from an original list of subplots numbered from 1 to 10.

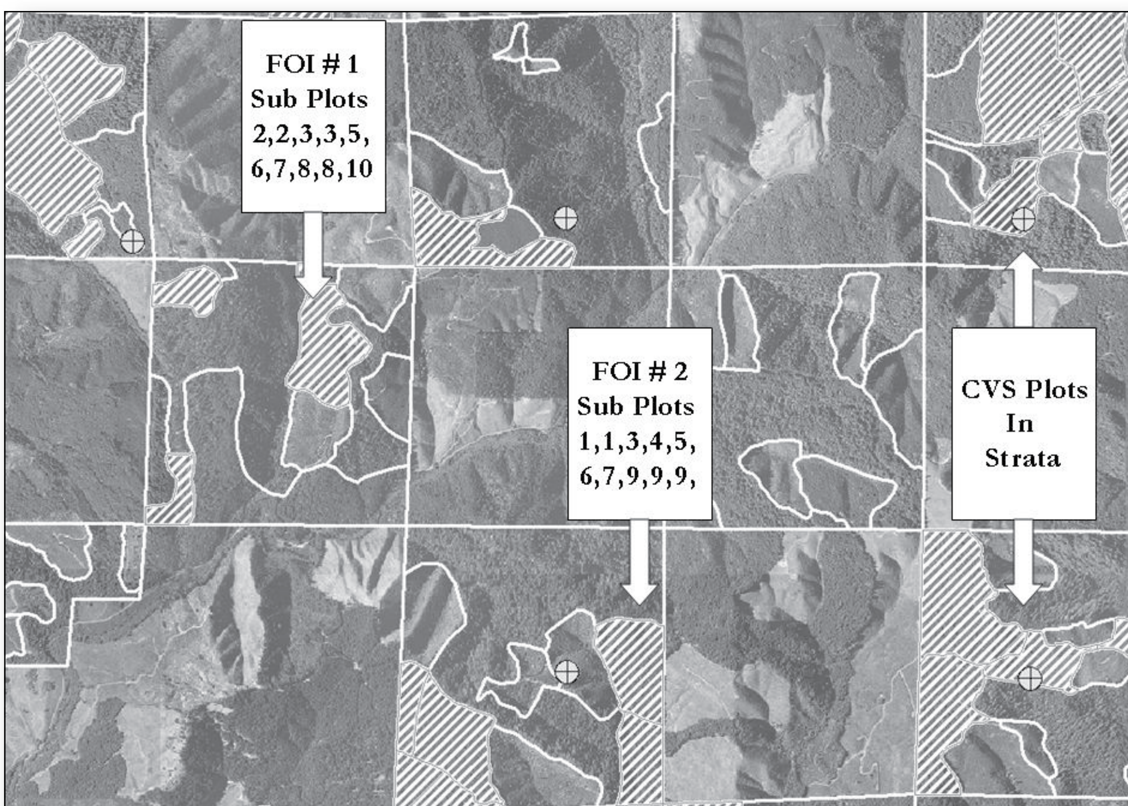
If the number of subplots within a stratum was less than 30, a shrinkage estimate was employed where the predicted attributed associated with the category was combined with the imputed summary statistic and combined estimate was assigned to the FOI unit. The shrinkage estimate can best be illustrated by an example. If there were 20 CVS subplots within a category, the shrinkage estimate is:

20/30 x CVS statistics + (30-20)/30 x modeled predicted values

As the number of subplots approach 30, most of the information comes from the CVS data. Conversely if there were relatively few CVS subplots, then the majority of the information came from the DBORGANON model. This method was repeated for each FOI unit with the category.

The stratification for the forested FOI units was the basis for applying the CVS derived values for basal

Figure R-10. Examples Of Subplot Data Imputed Into FOI Units



area, trees per acre, height, quadratic mean diameter, and board foot volume for the initial inventory in the OPTIONS modeling. The imputed initial inventory dataset provided a consistent basis for the OPTIONS modeling of all alternatives.

The use of the imputation provided attributes to the OPTIONS model that did not exist in the Forest Operations Inventory. Attributes assigned through imputation will not match the characteristics of each individual stand as measured on the ground but the statistics applied to the grouping of stands in the population, is statistically sound. The use of imputation is an attempt to mimic the natural variation that exists among the stands. Although, no process can accurately reflect the actual variation short of conducting a 100 percent cruise, this process is seen as more realistic than assigning the mean value for these statistics to all FOI units within a group.

Application of the Stratification in Growth and Yield Modeling

Each CVS subplot tree list within an existing stand modeling group was projected in the DBORGANON growth and yield model individually to simulate future development with and without future silvicultural treatments. Results from the simulations were averaged together to predict stand attributes at any point in time and to define an average yield function. This method is based on the fact that the CVS data represents a random sample of the modeling group hence the average of all projected curves for a modeling group represents the average projection for the FOI units within the modeling group. In OPTIONS terminology these average yield functions are the Guide Curves.

GIS – Defining the Land Base & Spatial Projections

Introduction

The Geographic Information System (GIS) data provides the OPTIONS model with a set of polygons with unique identifiers (WPR_ID), covering BLM lands in the planning area. Each of these polygons has attribute data which is used in defining the land base for application of modeling rules for simulation of the alternatives. GIS is also used for mapping the OPTIONS projections results of the forest conditions over time. This section provides an overview of the GIS process. The type of GIS data that was used for analyzing the alternatives and how it was applied is covered in the OPTIONS modeling section. Details on the GIS processing and datasets themselves are recorded with the GIS metadata.

Defining BLM Lands

The land lines theme (LLI) is the BLM's corporate GIS layer for land status - O&C, Public Domain, Coos Bay Wagon Road. The Forest Operations Inventory (FOI) is the spatial vegetation layer used for the OPTIONS modeling. The Forest Operations Inventory and Land Lines themes are not vertically integrated in GIS that results in slivering in the areas of misalignment. (See *Figure R-11* and *Table R-8*) For analytical purposes, BLM-administered lands are defined by the area in which the FOI and LLI overlap. This FOI & LLI mask was subsequently used to minimize the slivers from all GIS layers used in the analysis.

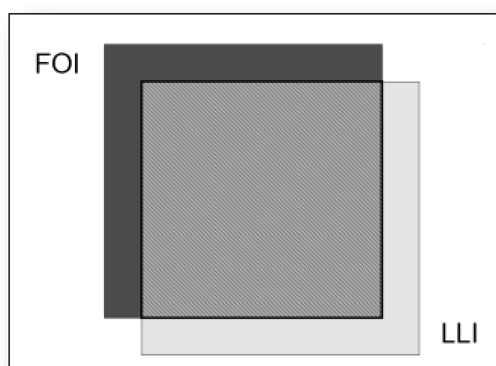


Figure R-11. Differences Between The FOI And LLI Themes

Table R-8. Acres Of Misalignment Between The FOI And LLI

FOI or LLI	Acres	Percent
FOI and LLI	2,550,000	100%
FOI only	9,200	0.36%
LLI only	8,200	0.32%

Intersection/Majority Rules

Where the subdivision of the FOI was important for simulating different modeling rules within each stand, within, the data layers were intersected in GIS to create unique areas. Riparian reserves and roads are good examples of this within stand subdivision that was important for simulating different modeling rules.

Some data layers came from external sources which were captured at coarser scales than the FOI mapping and do not align well with BLM checkerboard ownership. Northern Spotted Owl Critical Habitat Units is an example of this disparity between GIS data layers. In these situations, a majority rules analysis was performed where 50% or more of the FOI unit would need to coincide with the data theme, such as critical habitat, to receive the designation. This majority rules process was also applied to themes where spatial subdivision of FOI polygons was not needed and stand level designation was sufficient for the analysis.

Rasterizing and Unique ID Assignment

To facilitate GIS processing, all vector GIS data layers were converted to a 10 by 10 meter raster cell (1 cell = .025 acres – UTM zone 10, NAD83) and the data was partitioned into tiles which were based on 24K USGS Quads (~ 35,000 acres, 6 miles east/west by 8.5 miles north/south). Within each tile, every unique combination of GIS data layers was intersected with the Forest Operations Inventory and received a unique identifier (WPR_ID). The example in *Table R-9* illustrates one FOI unit (840369) being subdivided into 4 unique areas based on how riparian reserves and roads intersected the forest stand. This GIS subdivision of the forest stands allows the OPTIONS model to simulate how each portion of the stand would develop.

The unique ID (WPR_ID) carries through the OPTIONS modeling projections for the purpose of tracking each spatial entity. OPTIONS classification of allocations or projections of forest conditions were returned to GIS as attributes with the unique IDs which were linked back to the original grid to produce spatial products.

Table R-9. Example of Subdivision Of An FOI Unit And Assignment Of Unique Identifier

WPR_ID	FOI #	GIS ACRES	RIPARIAN RESERVE	ROAD BUFFER	DESCRIPTION
124000005	840369	28.84	N	N	Outside riparian reserve Outside of road buffer
124000008	840369	0.99	N	Y	Outside riparian reserve Within road buffer
124000004	840369	10.90	Y	N	Inside riparian reserve Outside of road buffer
124000013	840369	0.49	Y	Y	Inside riparian reserve. Within road buffer

Data Vintage

A snap shot of the Forest Operations Inventory (FOI), Land Use Allocation (LUA), Timber Production Capability Classification (TPCC), Occupied Marbled Murrelet Sites (OMMS), and the Landlines (LLI) data were captured for the Western Oregon Plan Revision (WOPR) analysis. The data represents the conditions as of 10/1/2005 (vintage 2006). The guidance on capture of this data was issued in the 2005 Information Bulletin IB-OR- 2005-142. The other GIS datasets reflect the best available information at the time of the analysis.

GIS Data Themes

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

Forest Growth and Yield Modeling

Introduction

The purpose of simulating forest stand growth and development is to permit analysis of the effects of different silvicultural systems and silvicultural practices on timber yield and stand structure. Modeling estimates are not intended to describe the structures and volumes of current stands that may be quite different (higher or lower in volume) than projected future stands depending on the kind of management questions explored in the analysis.

The yield tables described in this section were used in the OPTIONS model to produce a series of different Allowable Sale Quantity (ASQ) estimates for different management alternatives.

Silvicultural Systems, Practices and General Modeling Approaches

Silvicultural Systems

A silvicultural system is 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. Three recognized silvicultural systems are applicable to the land use allocations with a primary emphasis of timber management. These are the even-aged, two-aged and uneven-aged systems (Helms 1998)**.** Each of these systems is applied depending on the alternatives and the land use allocations objectives. (See *Figure R-12*)

These general silvicultural systems were modeled using CONIFERS young-stand model in concert with DBORGANON

The even-aged system uses the clearcutting or shelterwood cutting method to regenerate existing stands. Clearcutting essentially removes all trees from an area in a single harvest operation. Shelterwood harvest initially retains a number of shelter trees and has a similar visual appearance to a regeneration harvest using the two-aged silvicultural system (see *Figure R-13*). Unlike the two-aged system, the shelter trees are only temporarily retained and are harvested when they no longer are required for protection of the new regeneration.

The two-aged system uses a variable-retention harvest method to achieve the goal of establishing new regeneraton. At regeneration harvest, live trees are retained long-term (reserved from harvest) to facilitate the development of two-aged structure. The retained trees may be left in a dispersed, aggregated or combination of the two (see *Figure R-14*). For modeling purposes, dispersed retention was assumed for regeneration harvests in the No Action Alternative and Alternative 3. Aggregated retention was assumed for partial harvest in Alternative 3.

The uneven-aged system achieves regeneration through selection harvest. Trees are harvested singly or in groups (See *Figure R-15*).

Timber harvests on land managed for purposes other than timber employ an approach commonly referred to as variable-density thinning (USDA 2002). This approach combines elements of the two-aged and uneven-aged approaches for the purpose of promoting 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 variable-density thinning to encourage understory development to contribute to stand heterogeneity. Variable-density thinning was modeled as a series of proportional commercial thinnings with simulated regeneration following the thinning harvests.

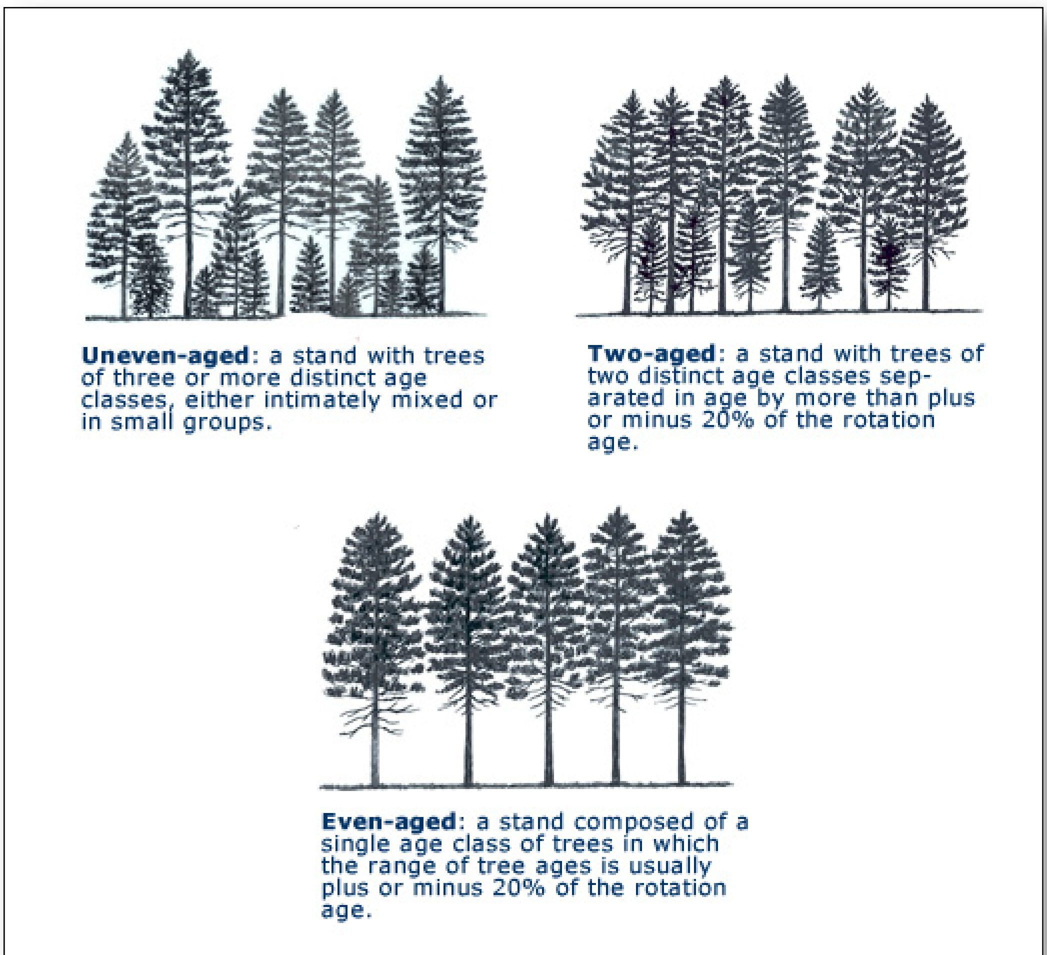
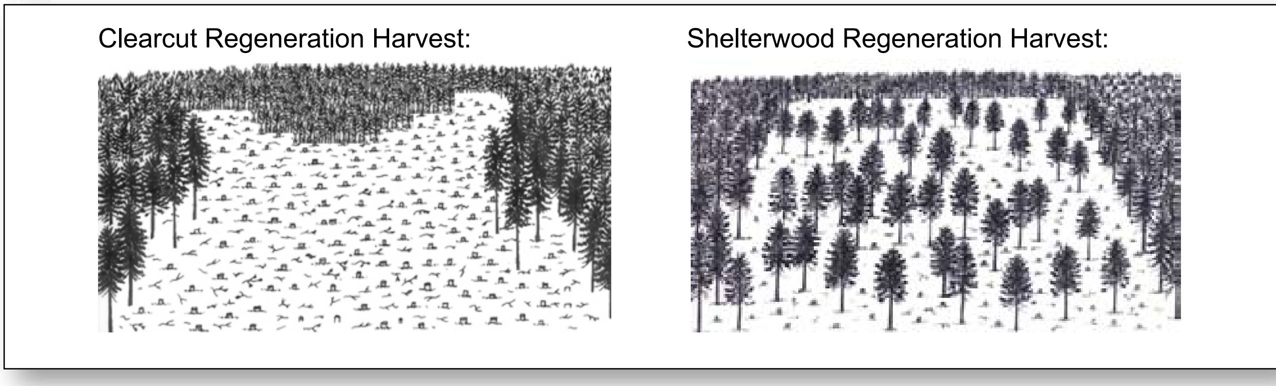


Figure R-12. Silvicultural Systems, Stand Structure Types

Figure R-13. Clearcut Regeneration Harvest Under Alternatives 1, 2, And The PRMP And Shelterwood Regeneration Harvest Under The No Action Alternative And PRMP



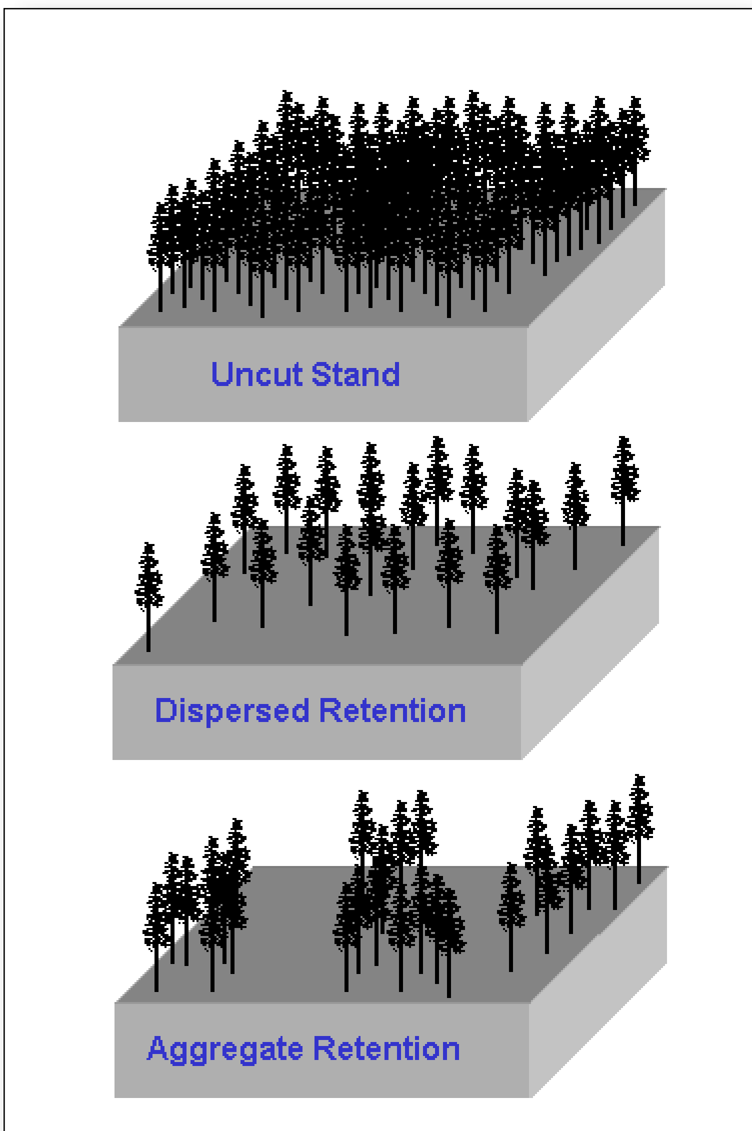
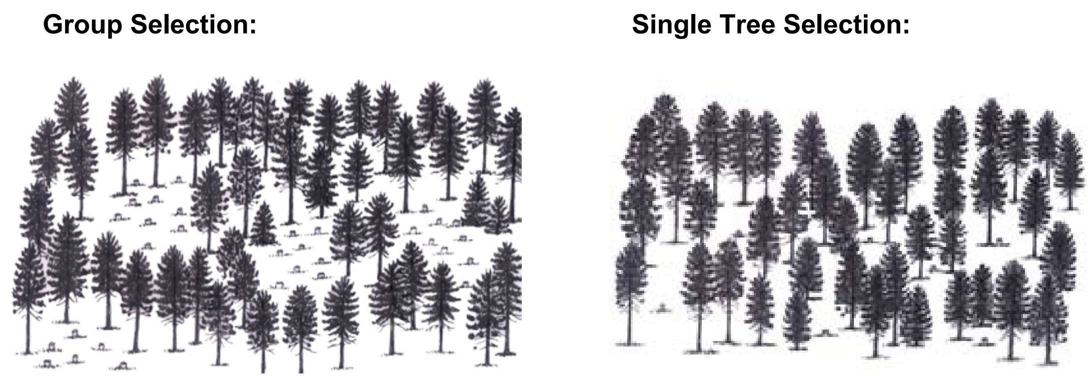


Figure R-14. Two-Aged Regeneration Harvest, Retention Tree Spatial Distribution Types Under Alternative 3 And The No Action Alternative

Figure R-15. Group Selection And Single-Tree Selection Regeneration Harvests Under Alternative 3



Silvicultural Practices

For each silvicultural system, a variety of practices other than harvesting, may be planned for specific periods in the life of the stand. These practices keep forest stands on desired developmental trajectories, speed the development of desired habitat components, and maintain or improve stand vigor. Silvicultural practices in this region have traditionally been applied to conifer stands, however, many of the same principles and treatments have application for the growth and development of other desired vegetation.

While both the types of practices used and timing vary between systems, most silvicultural systems require the full range of forest management tools and practices for their successful implementation. To predictably direct forest stands so that structural and other objectives are met may require some level of intensive stand tending practices whatever the system employed.

There are seven major silvicultural practices besides regeneration harvesting that affect forest stand growth, value, and structure. These are site preparation, regeneration, stand maintenance and protection, precommercial thinning and release, commercial thinning, fertilization, and pruning.

Site Preparation

If needed, site preparation procedures are used to prepare newly harvested or inadequately stocked areas for planting, seeding, or natural regeneration. Site preparation methods are selected to provide physical access to planting sites, control fire hazard, provide initial physical control of the site to channel limited resources on the site into desired vegetation, influence the plant community that redevelops on the site, influence or control animal populations, and ensure the retention of site productivity. Three types of site preparation techniques will be used. These are prescribed burning, mechanical, and manual methods.

Future site preparation treatment needs were based on historical experience.

Regeneration

Silvicultural systems would utilize existing regeneration, natural seeding, and prompt planting of desired conifer species to assure that regeneration targets and timeframes are met in timber emphasis land use allocations. Where available, the planting of genetically improved seedlings is emphasized. Planting may also be done in non-timber emphasis land use allocations to supplement, or in lieu of natural regeneration to enhance development of complex stand structure. Existing vegetation would be used to the extent possible in meeting management objectives dependent upon non-conifer vegetation. Where necessary to meet objectives, non-conifer vegetation would be established through seeding or planting.

The species composition, size, density and age of trees for development of tree lists representing future stands following a regeneration harvest were based on CVS subplots in the 20 years-old and younger age classes. Plots were stratified so as to have each species group and site class represented where possible. A basic modeling assumption was that future young stand species composition would be similar to current young stand composition.

Stand Maintenance & Protection

Stand maintenance and protection treatments occur after planting or seeding and are designed to promote the survival and establishment of trees and other vegetation by reducing competition from undesired plant species. Maintenance and protection techniques include actions such as mulching, cutting or pulling of unwanted species, placing plastic tubes/netting over seedlings to protect from animal damage, and animal trapping.

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

Precommercial Thinning and Release

Precommercial thinning and release are treatments used to reduce the densities of tree and shrub densities, manipulate species composition, or promote dominance and/or growth of selected species. Species selection criteria can vary by vegetation zone and land use allocation management objectives. Treatments are usually implemented during the mid-range of the stand establishment structural stage. These treatments are used to influence stand developmental pathways so that desired stand and tree level characteristics result in the future.

Precommercial thinning and release treatments may be done by completely severing and/or girdling the stems of trees and shrubs with manual or mechanical tools.

Precommercial thinning enhances the growth and vigor of the residual trees by reducing inter-tree competition for growing space. The primary goal of precommercial thinning is to maintain high growth rates by effecting density control. This involves the removal of excess stocking which may consist of both desirable and undesirable species. The average number of trees remaining following treatment varies by alternative, land use allocation and species group as shown in *Table R-10.*

Release treatments are implemented to remove or reduce the competitive status of shrubs and undesirable tree species competing with desirable tree species. Thinning and release may occur simultaneously or as separate treatments.

Commercial Thinning

Commercial thinnings are implemented to recover anticipated mortality; control stand density for maintenance of stand vigor, place or maintain stands on developmental paths so that desired stand characteristics result in the future. Commercial thinnings are scheduled after developing stands reach a combination of relative density stem diameter and timber volume to permit a harvest entry that is economical. Generally, uniform tree spacing, more or less is implemented in stands on land use allocations with a timber emphasis. Generally, a variable-density approach is used in stands on land use allocations with a non-timber management emphasis as shown in *Table R-11* and as described further in the "Treatment Response Curves" section of this appendix.

Table R-10. Precommercial Thinning (PCT) Modeling Assumptions[a]

Species Group	Alternatives	Land Use Allocation	Post-PCT TPA Target
All except Pondersosa pine	No Action	Northern General Forest Mgt. Area	260
	No Action	Southern General Forest Mgt. Area	260
	No Action	Connectivity/Diversity Block	220
	No Action	Late-successional Reserve	Variable[b]
	No Action	Riparian Reserve	Variable[b]
	1, 2, PRMP	Timber Management Area	260
	1, 2, PRMP	Late-successional Mgt. Area	Variable[b]
	1, 2, 3, PRMP	Riparian Management Area	Variable[b]
	3	General Landscape Area	260
	3, PRMP	Uneven-aged Management Area	Variable[b]
Ponderosa Pine	No Action	Northern General Forest Mgt. Area	200
	No Action	Southern General Forest Mgt. Area	200
	No Action	Connectivity/Diversity Block	150
	No Action	Late-successional Reserve	Variable[b]
	No Action	Riparian Reserve	Variable[b]
	1, 2, PRMP	Timber Management Area	200
	1, 2, PRMP	Late-successional Mgt. Area	Variable[b]
	1, 2, 3, PRMP	Riparian Management Area	Variable[b]
	3	General Landscape Area	200
	3, PRMP	Uneven-aged Management Area	Variable[b]

[a] These are broad based modeling assumptions. Targets are residual densities reflecting current and anticipated future treatment targets averaged for all districts for particular species groups. Actual densities implemented may vary around the average by approximately 20±%.
[b] For modeling purposes, existing and/or post-harvest natural or planted regeneration density levels are assumed to average approximately 75-150 trees. Actual implementation target densities will vary depending on amount and spatial distribution of residual overstory trees, species mix and anticipated understory reduction due to future timber harvest entries.

Table R-11. Commercial Thinning (CT) Modeling Assumptions[a]

Species Group	Alternatives	Land Use Allocation	Pre-CT RD[b] Threshold	Post-CT RD[b] Target
All except Pondersosa pine	No Action	Northern General Forest Mgt. Area	55	35-40
	No Action	Southern General Forest Mgt. Area	55	35-40
	No Action	Connectivity/Diversity Block	55	35-40
	No Action	Late-successional Reserve	45-50	25-35
	No Action	Riparian Reserve	45-50	25-35
	1, 2, & PRMP	Timber Management Area	55	35-40
	1, 2, & PRMP	Late-successional Mgt. Area	45-50	25-35
	1, 2, 3, & PRMP	Riparian Management Area	45-50	30-40
	3	General Landscape Area	55	35-40
	3 & PRMP	Uneven-aged Management Area	55[c]	15-25[c]
Ponderosa Pine	No Action	Northern General Forest Mgt. Area	50-55	35-40
	No Action	Southern General Forest Mgt. Area	50-55	35-40
	No Action	Connectivity/Diversity Block	50-55	35-40
	No Action	Late-successional Reserve	50-55	35-40
	No Action	Riparian Reserve	50-55	35-40
	1, 2, & PRMP	Timber Management Area	50-55	35-40
	1, 2, & PRMP	Late-successional Mgt. Area	50-55	35-40
	1, 2, 3, & PRMP	Riparian Management Area	50-55	30-40
	3	General Landscape Area	50-55	35-40
	3 & PRMP	Uneven-aged Management Area	55[c]	15-25[c]

[a] These are broad-based modeling assumptions. Targets represent stand level averages. Thinnings for late-successional, riparian and uneven-aged management objectives may vary considerably on an acre-by-acre basis.
[b] Relative Density (RD) – The level of competition among trees or site occupancy in a stand relative to some theoretical maximum based on tree size and species composition. The values in this table are Curtis relative density basis. (Curtis 1982)
[c] Alternative 3 is based on basal area guidelines, not relative density. The PRMP is based on relative density.

Fertilization

Stand growth in western Oregon is often limited by the supply of available nutrients, particularly by available nitrogen. The supply of soil nutrients can be augmented through fertilization (Miller, Glendenen and Bruce 1988). Fertilization actions are usually designed to apply 200 pounds of available nitrogen with helicopters in the form of urea based prill (46 percent available nitrogen) group. See this appendix "Treatment Response Curves" section for additional information.
Occasionally, fertilizer may be applied in a liquid urea-ammonia form or with a mixture of other nutrient elements in addition to nitrogen.

Pruning

The primary objective of pruning is usually the improvement of wood quality, i.e., "clear knot free" wood for lumber and veneer production. Pruning for wood quality usually removes the live and dead limbs on selected trees up to height of about 18 feet. Treatments are generally implemented as a two-phase process or lifts between stand ages of approximately 15-40 years-old. Timing varies by site productivity, i.e. treatments occur earlier on stands of higher site productivity. Pruning is also used for disease and fuels management purposes.

Removal of up to one-third to one-half of the live tree crown at each lift is not expected to significantly affect diameter growth at breast height or height growth (Staebler 1963; Stein 1955; BCMOF 1995). Since pruning treatments are expected to be implemented within this range, no impact on growth and yield is assumed. Therefore no treatment response curves were developed that incorporated a growth effect for pruning treatments.

Modeling Assumptions by Alternative

Common to All Alternatives

An uneven-aged management system is assumed for the eastern portion of the Klamath Falls Resource Area.

Fertilization is modeled only on land use allocations with a timber management emphasis.

Variable-density thinning is the form of timber harvest used on land use allocations with non-timber management objectives.

No Action Alternative

The No Action Alternative employs a two-aged silvicultural system on the General Forest Management Areas, Southern General Forest Management Area and Connectivity/Diversity Block land use allocations. Regeneration harvests were modeled with the retention of a specific number of the largest overstory trees for non-timber objectives. The number of retention trees per acre totaled 7, 16 or 12 respective of the Northern General Forest Management Area, Southern General Forest Management Area, and Connectivity/Diversity Blocks land use allocations. In addition, 0, 3 and 4 hardwood trees were retained respectively. The spatial arrangement of retention trees was modeled as dispersed retention.

The OPTIONS model simulates retention trees by assuming that the retention trees continue to grow on the pre-harvest existing stand guide curve generated by DBORGANON while the regenerated portion of the stand follows a new DBORGANON generated future guide curve. The amount of green tree retention is determined on the basis of pre-harvest basal area being retained. For each land use allocation a single percent basal area was applied to all age groups, site classes, and modeling groups.

For The No Action Alternative the amount of retention tree basal area was determined by simulating the growth of a young stand modeling group of average density and site productivity to age 100 years-old, at which time a harvest treatment leaving the largest 7, 12 or 16 retention trees representing the Northern General Forest Management Area, Connectivity/Diversity Blocks, and Southern General Forest Management Area respectively is done. The percentage of the retention tree basal area divided by the pre-harvest total stand basal area at age 100 years-old determines the appropriate allocation for modeling green tree retention in OPTIONS.

Alternatives 1 and 2

Application of even-aged systems without green tree retention was modeled in the Timber Management Area land use allocation.

Alternative 3

Alternative 3 employs a two-aged silvicultural system in the General Landscape Area generally north of Grants Pass, Oregon. Depending on landscape structural stage criteria and vegetation zone, regeneration harvests were modeled with varying amounts of retained overstory trees as dispersed retention or aggregated retention. An uneven-aged management silvicultural system is applied in the zone south of Grants Pass, Oregon on the Medford and Lakeview Districts.

The dispersed retention approach used the DBORGANON yield functions derived for the No Action Alternative, Northern General Forest Management Area land use allocation which closely approximated (seven trees per acre) the Alternative 3 retention tree requirements for regeneration harvests of six trees per acre in the western hemlock zone or nine green trees per acre in the Douglas-fir and tanoak zones.

Aggregated retention is designated as partial harvest to further distinguish the difference in Alternative 3 with the dispersed retention harvest method. Partial harvests retained retention tree blocks constituting 18%, 33% or 37% of the existing stand in the Douglas-fir, tanoak, and western hemlock zones respectively. The proportion of the pre-harvest stand basal area retained was determined using similar methodology to that used for The No Action Alternative described above with the following exceptions. Simulated harvest ages were 80 years-old for the Douglas- fir and tanoak zones, and 120 years-old for the western hemlock zone. Also, the retention tree basal area was estimated using Alternative 3 retention tree minimum size classes definitions, which varied by vegetation zone. The basal area calculations also included some merchantable trees which did not meet the minimum retention tree size. Inclusion of these smaller trees was done based on the assumption that little or no harvest would generally occur within the aggregated retention blocks.

Future growth of the aggregated retention blocks was represented by their continued growth using the pre-harvest existing stand guide curve. Growth of the harvested portion was represented by Alternative 1 even-aged future stand guide curves with no retention. However, a reduction in timber yields is taken to account for the "edge effects" from the aggregated retention blocks.

The uneven-aged management zone harvests consist of periodic selection cuttings applied to stands from each representative modeling group. Harvest frequency ranged from 20 years to 60 years with harvests generally occurring more frequently on higher sites. Selection cutting was modeled as a proportional commercial thinning at regular intervals using residual basal area targets which varied by modeling group. Predominantly Ponderosa pine stands were managed at lower residual basal area levels than mixed-conifer groups. After each harvest a regeneration tree list was added to the simulation to reflect natural and artificial reforestation occurring. Regeneration tree lists generally included a proportional representation of species included in the stand's original species mixture.

Special adaptations to cutting practices were applied to the various modeling groups. For example, in the Ponderosa pine modeling groups, some stands were managed to reduce the proportion of Douglas-fir to favor pine growth.

PRMP

Application of even-aged systems using clearcutting and shelterwood regeneration harvest methods were modeled in Timber Management Area land use allocation.

Timber harvests on the Uneven-aged Timber Management Area land use allocation on the Medford District and the westside of the Klamath Falls Resource Area consisted of periodic selection cuttings applied to stands from each representative modeling group. Harvest and other silvicultural treatment frequency generally ranged from 20 years to 60 years with harvests generally occurring more frequently on higher sites. Selection cutting was modeled as proportional and low commercial thinnings at regular intervals using residual relative density targets to maintain stand average relative density between 25-55.

After each timber harvest, a regeneration tree list was added to the simulation to reflect natural and artificial reforestation occurring. Regeneration tree lists generally included a proportional representation of species included in the stand's original species mixture.

Special adaptations to cutting practices were applied to the various modeling groups. For example, in the Ponderosa pine modeling groups, some stands were managed to reduce the proportion of Douglas-fir to favor pine growth.

Stand Modeling Process

The prediction of forest stand development requires the growth projection of BLM's existing forest stand types into the future, with and without further silvicultural treatments, and the simulation of stands which represent future stands, i.e., new stands created following timber harvest. Depending on the management direction of the alternatives, both existing and future stands may be subject to different intensities of silvicultural treatments.

The results of DBORGANON growth projections are used to develop guide and treatment response curves for use in the OPTIONS modeled. See the "Types of Growth Curves" section in this appendix for more detail.

Two computer growth and yield simulation models, DBORGANON and CONIFERS were used to project the growth and development of forest stands under various silvicultural prescriptions.

Organon Model Description

ORGANON is an individual-tree, distance-independent model developed by Oregon State University from data collected in western Oregon forest stands (Hann 2005). The architecture of the model makes it applicable for simulations of traditional and non-traditional silviculture (Hann 1998).

Three variants of ORGANON are available for use in western Oregon. The northwest Oregon variant (NWO-ORGANON) and southwest Oregon variant (SWO-ORGANON) were deemed appropriate for modeling the stand types found on BLM-administered lands and the proposed management actions.

The standard ORGANON configuration is not conducive to the efficient processing of large numbers of individual tree lists representing forest stands within a stratum. It is not configured to merge multiple simulation results into average timber yield functions. Also, the standard model does not produce specific stand structural characteristics that have utility for effects analysis on resources other than timber production, or for the incorporation of factors to simulate growth improvement of trees due to genetic improvement programs. FORsight Resources developed a version of ORGANON for the BLM, referred to as DBORGANON, which incorporates all the basic ORGANON functions and equations and which meets the additional BLM requirements. DBORGANON was used to project the growth of forest stands greater than or equal to 15 years-old.

The BLM modified northwest Oregon variant (NWO-ORGANON) was used to project the growth of forest stands located on the Salem, Eugene, Coos Bay and Roseburg Districts. The basic data underpinning of this variant of the model is from predominantly conifer forest stands with ages ranging from about 10 to 120-years-old breast height age (Hann 2005).

The BLM modified southwest Oregon variant (SWO-ORGANON) was used to project forest stand growth on the Roseburg, Coos Bay and Medford Districts and the Klamath Falls Resource Area. The original basic data underpinning this variant of the model is from mixed-conifer forest stands with ages of the dominant trees ranging from about 13 to 138-years-old breast height age (Ritchie and Hann 1987). Subsequently, additional new data was collected and used to extend the applicability of the model to stands with older trees (250+ years-old), with higher proportions of hardwoods and with more complex spatial structure (Hann and Hanus 2001).

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

Conifers Model Description

The CONIFERS model is an individual-plant growth and yield simulator developed from young mixed-conifer stands in southern Oregon and northern California by the U.S. Forest Service. CONIFERS provides growth forecasts for young plantations of single or mixed-species growing with or without competition from shrubs (Ritchie 2006). The growth of forest stands less than 15 years-old were simulated using the CONIFERS young stand growth model. The tree lists were exported to DBORGANON at stand age 15 years-old for further simulation.

Existing Stands Modeling Groups Description

The land base consists of existing forest stands, the result of past harvests and natural disturbances, of various ages, structures, past management histories and potential for forest management. Tree lists from Current Vegetation Survey (CVS) inventory subplots were stratified into modeling groups as described elsewhere in this appendix. Using DBORGANON, these modeling groups were used for depicting current stand condition and simulating future development with and without future silvicultural treatments.

Each individual CVS subplot tree list within a modeling group was projected by DBORGANON subject to a common silvicultural prescription to stand ages 200 or 400 years-old, depending on the initial range of stand ages in the various modeling groups or the requirements of an alternative. Modeling groups consisting of younger managed stands, generally less than 60 years-old, were projected to stand age of 200 years. Older stand modeling groups were projected to a stand age of 400 years to insure that all CVS plots would be incorporated into the simulation.

Each individual tree list entered the simulation at its current age. This resulted in some stands having a greater weight on the overall group average characteristics, depending on the distribution of plot ages in a particular modeling group and the length of the growth projection. *Figure R-16* shows a simplified example of individual plot growth trends and the modeling group average.

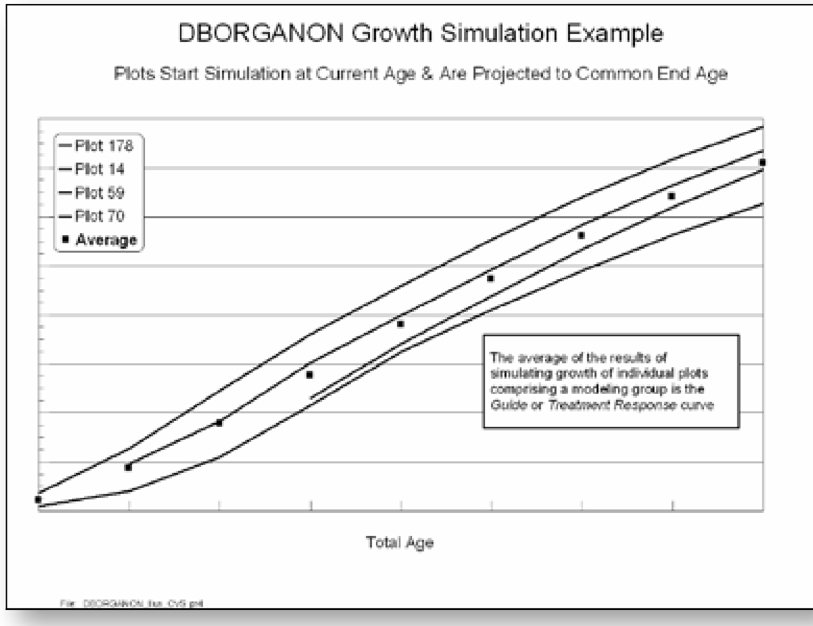


Figure R-16. Example of DBORGANON Simulation

Future Stands Modeling Groups Description

Modeling groups and tree lists for forest stand types or silvicultural prescriptions for which little or no specific CVS data existed, were developed from subsets of the CVS data and growth was modeled with CONIFERS.

Initial stand attributes for the future stands tree lists were derived from the 10 and 20 years-old age class CVS subplots, stratified by DBORGANON variant, species group and site class. It was assumed that the future young stand management intensity and tools available would be similar to the past two decades.

Review of the data indicated that the future stands could be represented by three basic modeling groups for the northwestern Oregon and six groups for the southwestern Oregon. A single future stand tree list based on the characteristics of existing CVS plots for each modeling group and site productivity was grown in CONIFERS to age 15 years-old, at which time the tree lists were exported to DBORGANON for further simulation. Projections were simulated to a stand age of 200 years-old, except for Alternative 3 where 400-year projections were required.

These future stand projections formed the basis for initiating new stands following regeneration harvests in all alternatives and the partial harvests in Alternative 3. The future stands category includes existing stand types created as a result of regeneration harvest prescriptions with green-tree retention under the current BLM Resource Management Plans. There were an insufficient number of CVS subplots with this type of management for Guide Curve modeling. Therefore, it was necessary to create tree lists for simulating those silvicultural prescriptions for existing and future stands under the No Action Alternative.

For all alternatives, a special subset of modeling groups was developed for modeling future stands within geographic areas currently identified with a high incidence of Swiss needle cast disease on the Salem District. Future tree lists species composition in the Swiss needle cast zone was based on an assumption of higher proportions of disease resistant species being used for the reforestation of future harvested areas.

Types of Growth Curves

Two types of curves are produced from DBORGANON simulations for further use by the OPTIONS model. The curves are referred to as guide and treatment response curves.

Guide Curves

Guide curves are used to provide guidance to the OPTIONS model with respect to the growth curve shape and projection values. Simply stated, guide curves represent the growth projection of forest stands without any additional silvicultural treatments. Individual guide curves are developed for each modeling group which incorporates geographical province, species groups, current stand condition, and site productivity class. Existing stand guide curves developed from CVS data were applicable to all alternatives. Future stand guide curves were developed specific to the management direction of the various alternatives   Two-aged silvicultural prescriptions were developed for the No Action Alternative and Alternative 3. Even-aged curves were developed for Alternatives 1, 2, 3 and the PRMP. Uneven-aged curves were developed for Alternatives 3 and the PRMP.

Treatment Response Curves

Treatment Response curves were used to adjust the guide curves to reflect the effects of various silvicultural treatments (see discussion of Treatment Response). Growth projections were done to produce curves that simulated commercial thinning, fertilization, and uneven-aged management treatments. Precommercial thinning of future stands was incorporated into the initial ORGANON guide curve tree lists, so no growth response curves were necessary for that treatment type.

Within the constraints of other modeling assumptions, all possible combinations of treatments were simulated for each modeling group to allow a wide range of treatment timing, combination and flexibility within the OPTIONS model.

Commercial Thinning

Silvicultural prescriptions incorporating commercial thinning were developed using the modeling groups with stands less than 60 years-old. Guide curve simulations were examined for each modeling group to determine the earliest average age when an initial commercial thinning was feasible.

Evaluation criteria included four factors:

1) stand relative density (Curtis 1982),
2) attainment of minimum average stand diameter,
3) minimum harvestable volumes, and
4) residual canopy cover or shade requirements (late-successional and riparian areas only).

Relative density thresholds were based on published recommendations, such as Curtis and Marshall 1986; Hayes et al. 1997; and Chan et al. 2006 and professional judgment. Minimum diameter and volume thresholds were based on historical BLM timber sales.

For each modeling group, simulations were done to determine the appropriate timing of treatment based on relative density rules. Thinning was simulated when minimum criteria were met.

Relative density rules can vary by land used allocation within alternatives. Silviculture prescriptions for land use allocations with timber objectives including the Northern General Forest Management Area under the No Action Alternative, the Timber Management Areas under Alternatives 1, 2, and the PRMP, and the General Landscape Area under Alternative 3 were thinned to maintain relative densities between approximately 35 and 55. The timing of the final thinning is designed so that relative density recovers to a minimum of 55 at rotation age. Assumed rotation ages for treatment response simulations in land use allocations with timber objectives were based on culmination of mean annual increment (CMAI) and range from 100 to 125 years.

Commercial thinnings have been found to contribute to the establishment of conifer regeneration in the understory of thinned stands (Bailey and Tappeiner 1998). Simulation of the recruitment of this regeneration in the growth simulations was done to reflect expected stand dynamics following commercial thinning harvests. The ORGANON growth and yield model (Hann 2005) does not recognize trees with diameters less than 4.5 feet at breast height. Therefore, regeneration tree lists were developed using existing CVS data and growth relationships from current published and unpublished studies. The regeneration trees were added to DBORGANON simulations 20 to 25 years following any commercial thinning. The time lag represented the estimated time for all trees in the regeneration tree list to reach 4.5 feet tall.

Silviculture prescriptions for land use allocations with objectives other than timber were thinned to maintain relative densities between approximately 25 to 50 to a maximum age of 80 years-old in No Action Alternative, or until minimum desired stand structural class is attained in Alternatives 1, 2, 3, and the PRMP.

Fertilization

Fertilization with 200 pounds of active nitrogen per acre is simulated to occur after thinning in all alternatives. Fertilization was modeled for land use allocations with timber objectives where the stand was even-aged, two-aged with low green tree retention (≤ 8 dispersed retention trees per acre), two-aged with aggregated retention, i.e. partial harvested areas in Alternative 3, and when DBORGANON criteria were met. DBORGANON criteria for treatment were when the stand contains 80% or more Douglas-fir by basal area and total stand age is less than 70 years-old.

The fertilization equations in ORGANON were revised for the Final EIS growth simulations. A sensitivity analysis was done to compare differences in outputs. Differences between the estimated yield and other stand attributes varied by 1% or less from stand age 40 years-old and older. This level of change was not considered substantial enough to warrant new growth and yield simulations.

Growth and Yield Adjustments

The DBORGANON model projections of timber yields needed to be adjusted to account for increased growth due to genetic tree improvement and reduced to account for the effects of additional overstory mortality in older and partial cut stands. Adjustments for factors which could substantially affect stand dynamics including genetic tree improvement, Swiss needle cast disease, and other overstory mortality were accomplished by means of factors applied within the DBORGANON model. Other factors affecting recoverable commodity volumes were modeled as a percent reduction in volume. Timber defect and breakage, endemic insects and disease, soil compaction, future snag creation, future coarse woody debris creation, green tree retention were applied in the OPTIONS data preparation program to account for guidance requirements specific to each alternative.

Tree Improvement

Conifer species such as Douglas-fir and western hemlock have been selected for genetically controlled characteristics such as high growth rates and tree form. The BLM in cooperation with other landowners have established field test sites using progeny from the selected trees. These progeny test sites have been measured at regular intervals and the data collected has been used to select those parent trees which are ranked highest in growth rates. Seed orchards have been established to produce locally adapted seed from these selected trees for reforestation of harvested stands and natural deforestation.

The increased growth and yield effects from utilization of genetically improved seedlings was accomplished by the use of a one-time growth increase to tree lists exported from CONIFERS and the application of growth modifiers applied to future stand modeling groups in DBORGANON.

Height and diameter of genetically improved species exported from CONIFERS at age 15 years-old were increased before importation into DBORGANON by 7% and 8% respectively based on the observed height and diameter percentage increase of the top one-quarter trees in the progeny tests. After importation of the tree lists into DBORGANON, growth modifiers were applied to future stand modeling groups to account for incremental genetic gain expected to accrue beyond age 15 years-old. Growth modifiers have been found to be an effective way to incorporate genetic gain from tree improvement programs into growth models (Carson 2003).

Growth modifiers have not been publicly developed for Pacific Northwest tree improvement programs, although work is currently underway (USDA 2006b). Finalized growth modifiers for regional growth and yield models are expected within a year or perhaps more.

In the interim, growth modifiers were adapted from the preliminary feasibility work of Johnson and Marshall (2005) by BLM personnel. These factors are used to modify growth and mortality rates of genetically improved seedlings for simulations of the future stands modeling groups. The DBORGANON model was specifically configured to allow the use of growth modifiers for simulation of genetic gain and other purposes.

Growth modifiers are applied in DBORGANON as described below.

1) Growth modifiers apply to Douglas-fir within timber management land use allocations for all alternatives, when stands are managed under even-aged silvicultural systems, two-aged systems with aggregated overstory retention, or dispersed retention with low overstory density. No increased growth from genetic improvement is simulated for lands managed using uneven-aged silvicultural systems, or with high levels of dispersed retention overstory
2) Growth modifiers apply to western hemlock using the criteria as Douglas-fir except that it is confined to area designated as the Swiss needle cast zone on the Salem District only (see Disease section).
3) Growth modifiers were calculated for each BLM district, but since no significant difference was observed, average westside BLM growth modifiers were used.
4) Existing BLM seed orchards have the biological capability to produce improved seed in excess of probable BLM needs.
5) Growth modifiers were reduced to account for pollen contamination from non- genetically improved trees adjacent to and within the BLM seed orchards.
6) Growth modifiers are applied from stand age 15 to 100 years-old.

Analyses were updated for the Final EIS growth simulations to produce revised genetic improvement factors. A sensitivity analysis was done using five modeling groups representing both DBORGANON variants and a range of site productivity classes to simulate guide curves incorporating the new genetics factors. An additional simulation was done utilizing the new factors to test impacts on commercial thinning.

Within the range of assumed rotation ages (80-120 years), the yield differences varied from less than 1 to 4%. Changing the genetic factors did not change the timing of potential commercial thinning opportunities or result in a substantial change in yields or other stand attributes. In general, the magnitude of change in yields from the revised genetics factors alone was not considered substantial enough to warrant new growth and yield simulations. An exception to this was made for the Swiss needle cast disease zone on the Salem District; where new simulations were necessary due to changes in the Swiss needle cast disease growth adjustment factors (see the Swiss Needle Cast Disease section of this appendix).

Defect and breakage

A proportion of harvested trees can contain defects which reduce its utility from a commodity standpoint. Also, damage can occur during harvesting, that results in breakage which reduces recoverable timber volume. The proportion of volume which is not recoverable for commodity use generally increases with stand age. DBORGANON generated timber volume yields were reduced by BLM district-specific factors derived from historical timber sale cruise and scale data.

Soil Compaction

Districts with available data as to the extent and degree of soil compaction applied a yield reduction factor to DBORGANON yields. The deductions were applied to the Medford and Salem Districts and the Klamath Falls Resource Area.

Snag Retention

The yield impact of retaining varying amount of green trees for the creation of future snags was done by leaving extra retention trees or applying a percent volume reduction to meet the minimum snag requirements at the time of harvest. Retention requirements varied by alternative and by land use allocation.

Coarse Woody Debris Retention

The yield impact of retaining varying amounts for future down woody debris on timber yield was modeled as a percent volume reduction at the time of harvest. Retention requirements were varied by alternative and land use allocation.

Stocking Irregularity

For any level of stocking, a portion of a stand may consist of openings which do not contribute to stand volume at any point in time, i.e., a stand may contain non-stocked openings of a size sufficient to affect timber yield. These openings may be thought of in terms of less-than-perfect stocking or in terms of variation in tree location and fall into two categories; permanently incapable of growing commercial tree species, and those temporarily unoccupied by desirable trees.

Portions of stands may contain permanent areas of non-productive rock or other areas incapable of growing commercial tree species. This condition is partially accounted for by reductions in the timber base through the Timber Productivity Capability Classification.

Temporarily non-stocked areas occur due to variation in reforestation success from a variety of non-permanent factors, such as vegetative competition or logging slash.

The ORGANON model accounts for stocking variation by assuming that the degree of local competition experienced by a tree is reflected in its crown size. Trees growing next to openings have longer crowns and poor growth reflected as stem taper which reduces the volume of a tree next to the opening, compared to a similar size tree with shorter crown in an area with more uniform tree distribution. As long as the crown characteristics of sample trees are measured, then any long-term spatial variation within the stand will be modeled appropriately (Forsight 2006).

Since existing CVS data used for existing stands and the development of future stands modeling groups contain the necessary crown measurement, no external adjustment for stocking irregularity was applied to DBORGANON yields.

Green tree retention has two effects from a stand growth and yield standpoint. First, otherwise harvestable volume is foregone for commodity use at the time of harvest. Methodology for determining this allowance was described previously for each alternative. Second, retention trees compete for growing space with the newly regenerated trees.

The first effect of retained trees on foregone harvest volume is modeled with the OPTIONS model as a stand constraint. A proportion of the stand equating to the amount of basal area per acre of the uncut stand retained is set aside and is simulated to continue to grow on the existing guide curve until the next regeneration harvest. At that time a new set of retention trees would be set aside to grow for the subsequent harvest cycle. The proportions ranged from approximately 10% to 20% for the No Action Alternative and from 18% to 37% for Alternative 3 depending on land use allocation or vegetation zone.

The second effect was modeled using DBORGANON for the No Action Alternative and by using a fixed percentage yield reduction for Alternative 3.

The No Action Alternative future modeling group tree lists included the required number of retained trees as overstory. The retained trees slowed the growth of the new understory in roughly proportional to the amount of retained overstory trees. The volume of the retention trees was not included in DBORGANON estimates of potential timber yield, but included for evaluating overall stand characteristics and structural stages.

Alternative 3 partial harvest yields from future stands were reduced by 5% percent to account for edge effect, i.e., the effects of the aggregated retention blocks of overstory trees competing with the new tree regeneration. The factor used is an average reduction observed from modeling work in British Columbia (Di Lucca et al. 2004).

Disease

Two types of reductions were used to simulate the effects of endemic levels of insect and disease on timber yields. The first method was through the DBORGANON model using a growth modifiers approach for areas on the Salem District with moderate to severe levels of Swiss needle cast disease. The second method used a percentage reduction in yield approach applied in OPTIONS data-prep program to the guide curves for all districts to account for other insect and disease effects.

Swiss Needle Cast Disease

Portions of the Salem District are located in an area with a moderate to high occurrence of Swiss needle cast disease. This disease infects Douglas-fir trees only and reduces growth rates. It does not affect the growth of other tree species. A growth modifier approach similar to that used for modeling the growth of genetically improved trees was employed in DBORGANON to reflect the estimated growth reductions for Douglas-fir in the Swiss needle cast zone. Three Swiss needle cast (SNC) zones were developed for BLM land consistent with Oregon Department of Forestry (ODF) criteria, a severe, moderate, and a no impact zone.

The BLM calculated mean foliage retention values for the severe and moderate zone using plot data from ODF Swiss need cast surveys. The foliage retention values were used to calculate growth loss in height and basal area by severity zone using ODF methodology (Oregon Department of Forestry 2005). The growth loss modifiers were applied in DBORGANON to existing and future stand modeling groups in order to simulate more realistic stand dynamics. New Swiss needle cast factors were calculated based on information that became available after the growth simulations for the draft EIS were completed. The new factors are a product of ongoing work to develop a Swiss needle cast disease module for the ORGANON model. The difference in factors was considered substantial enough that new growth simulations for the PRMP were done. Revised genetic tree improvement factors were also incorporated in the simulations.

As stands are regeneration harvested in the Swiss needle cast zones, an average mix of tree species will be used for reforestation that is different than the current stand composition. Future tree lists reflecting tree lists with a minority of Douglas- fir were generated using the process described above for the future stands modeling groups. Tree lists with a single average species composition for both zones containing 28% Douglas-fir was used. Examination of the simulation results for the moderate and severe Swiss needle cast zones showed no substantial difference in predicted timber yields (<1%) so a single yield function was used.

Other Insects and Disease

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

Additional Overstory Mortality Factor

The ORGANON model underestimates tree mortality from causes other than inter-tree competition, such as insects, disease, windthrow and stem breakage, (Tappeiner et al. 1997). This type of mortality is often irregular, or episodic in nature, and it is inherently difficult to predict the exact time period in which it will occur (Franklin et al 1987). The ORGANON mortality equations predict that the risk of dying is very low for trees over 20 inches in diameter or with crown ratios over 70% (Hann and Wang 1990). For mature stands, mortality from inter-tree competition becomes less significant as stands age and mortality from other factors becomes more substantial.

To account for mortality from these other factors, an irregular mortality adjustment of 1.4% per DBORGANON growth cycle (five years) was determined from a review of ecological literature and Continuous Forest Inventory data (Lewis and Pierle 1991).

The 1.4% factor was applied to existing and future stand modeling groups through a function in the DBORGANON model. The factor applied only to trees greater than 20" diameter breast height in stands aged 100 years-old and older, to simulate mortality of larger trees from causes other than inter-tree competition.

In addition, partial cutting has been reported to significantly increase wind damage, especially during the first few years after treatment. Amount and extent are dependent on individual site factors, landscape conditions, and severity of the storm event (Strathers et al 1994). Average mortality for retained trees in partial cut Douglas-fir stand during the first five years post harvest from non- suppression factors averages about 1-2% (Williamson and Price 1973; McDonald 1976; Jull 2001). To account for this type of mortality, the same 1.4% factor was applied to stands which represented regeneration harvests with dispersed green tree retention. Model limitations allowed the use of only one additional mortality factor in a simulation. Therefore, the additional mortality factor was applied at stand age of 20 years-old, corresponding to the end of the first growth cycle in DBORGANON to trees greater than 20" diameter breast height.

Application of the additional 1.4% mortality rate during growth simulations produced modeling results which more closely matched patterns of stand development supported by empirical data and ecological theory than simulations done without the factor (Lewis and Pierle 1991).

A review of the green-tree retention mortality rate assumptions used in the Draft EIS was completed due to the availability of new published information. Three previously unexamined publications were reviewed (Buermeyer et al. 2002; Busby et al. 2006; Maguire et al. 2006) for applicability. Based on the review, sensitivity analysis was done to determine if new growth simulations were warranted for the Final EIS. The results of the analysis indicated that new growth simulations using revised mortality assumptions were not necessary since the results were not expected to substantially affect predicted yields or structural class changes in those alternatives that reserved live overstory trees for stand structural values.

OPTIONS Modeling

OPTIONS Model

Background

The OPTIONS model version V (OPTIONS or the model) is a spatially explicit, rules-based, land management simulation model. OPTIONS, developed by D.R. systems inc. (DRSI), has been in use for more than 20 years and is regularly updated and refined to reflect current knowledge, issues in land management and modeling techniques. The model has been used to develop land management strategies and operationally feasible plans on more than 500 million acres throughout North America, South America, the South Pacific and Asia. Most of these projects involved complex, multi-resource objectives and environmental regulations.

In the western United States, OPTIONS has been used for a wide range of industrial and government analyses, including land trades, evaluation of lands for sale or purchase and the development of sustainable, multi-resource management plans. The model was used in Plum Creek Timber Company's 1997 Cascades Habitat Conservation Plan for central Washington State. The Habitat Conservation Plan was the first major, multi-species habitat conservation plan developed in the United States. The OPTIONS model was also used in the Washington State Department of Natural Resources 2004 Sustainable Forest Management Harvest Calculations. The Sustainable Forest Management Harvest Calculations applied an alternatives based approach toward developing a long-term, sustainable, multi-resource forest management plan on approximately 2.1 million acres of Washington State Trust Lands. The model was also recently used to complete Pacific Lumber Company's Long-term Sustainable Yield Calculations on approximately 217,000 acres of redwood forest land in northern California. The project set new standards for sustainable yield calculations and planning in California.

Currently the model is also being used by the University of Georgia to analyze the impacts of proposed regulations and policies on long-term timber supply, by the California Department of Forestry in a pilot project investigating new approaches to the sustainable yield calculations, as well as numerous operational analyses in Washington, Alaska and British Columbia, Canada. DR Systems' expertise in partnership with BLM staff was used in applying the OPTIONS model to analyze alternative management strategies for the Western Oregon Plan Revision.

This analysis provided the basis for comparing alternatives in terms of the forest conditions / wildlife habitats created over time as well as determining the sustainable harvest levels for the Western Oregon BLM districts.

OPTIONS Model Overview

The OPTIONS model simulates the growth and management of individual land management units within a BLM Sustained Yield Unit (SYU). Land management units are created in a GIS process that combines multiple layers of resource information and objectives into a single resultant layer. Examples of these resource layers would include Forest Operations Inventory units, administrative boundaries, riparian management areas, Late-Successional Management Areas, Visual Resource Management areas, (See *Figure R-17*).

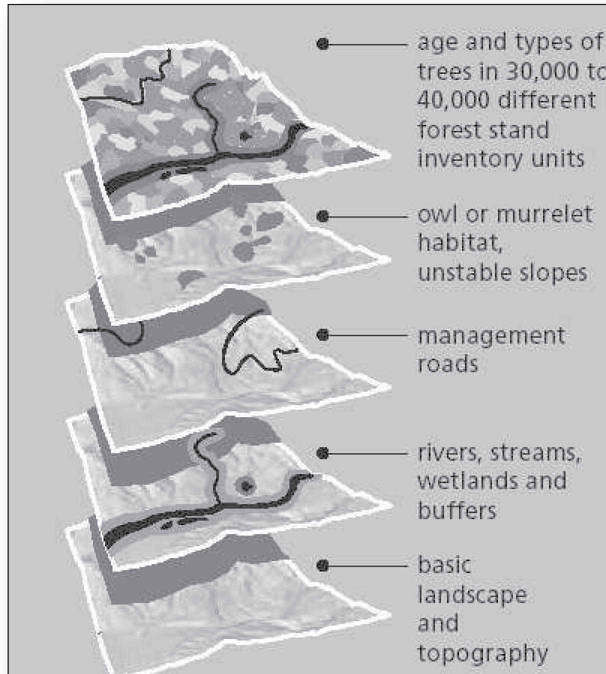
The model utilizes the resultant file to dynamically maintain all of the spatial identity across all contributing layers enabling the model to apply spatially explicit growth projections and management rules to individual resultant units (polygons), or groups of polygons throughout the Sustained Yield Unit.

The planning horizon of a simulation can extend as far as 400 years. Inventory information for each resultant unit is used to initialize the model and for each subsequent year in the planning horizon growth projections forecast future conditions for each polygon. However, these growth projections are sensitive to management activities and rules.

Management activities, such as silvicultural treatments (for example site preparation, fertilization or pre-commercial thinning) and harvesting activities (for example commercial thinnings, selection harvest or regeneration harvest) are distinguished from management objectives such as the exclusion of harvesting activities within riparian management areas. Activities are applied to polygons individually, while objectives may be applied to individual polygons, portions of a polygon, or collectively to a group of polygons.

Importantly, all objectives are implemented before any management activity can be applied, so harvest activities are simulated only after all environmental and habitat requirements have been satisfied.

Figure R-17. Graphic Example Of How A Resultant Layer Is Created From Multiple Resource Layers In GIS



Growth Projections

Throughout the planning horizon individual polygons are grown according to their individual forest inventory characteristics and growth trends established from a set of generalized growth projections. For this project, the growth projections were generated with the DBORGANON growth and yield model. These projections are imported into OPTIONS and used to forecast the nominal growth trend of each polygon. Within the model these growth projections are further refined to accommodate the unique characteristics of each polygon, including any unique management objectives, environmental conditions or inventory information. Growth projection attributes are tracked and reported including: stand height, diameter, basal area, density, and volume.

Incorporating Existing Inventory Information into the Simulation

Spatially explicit forest inventory information reflects current forest conditions. Depicting current conditions accurately is important in forecasting how alternative management strategies impact future forest conditions.

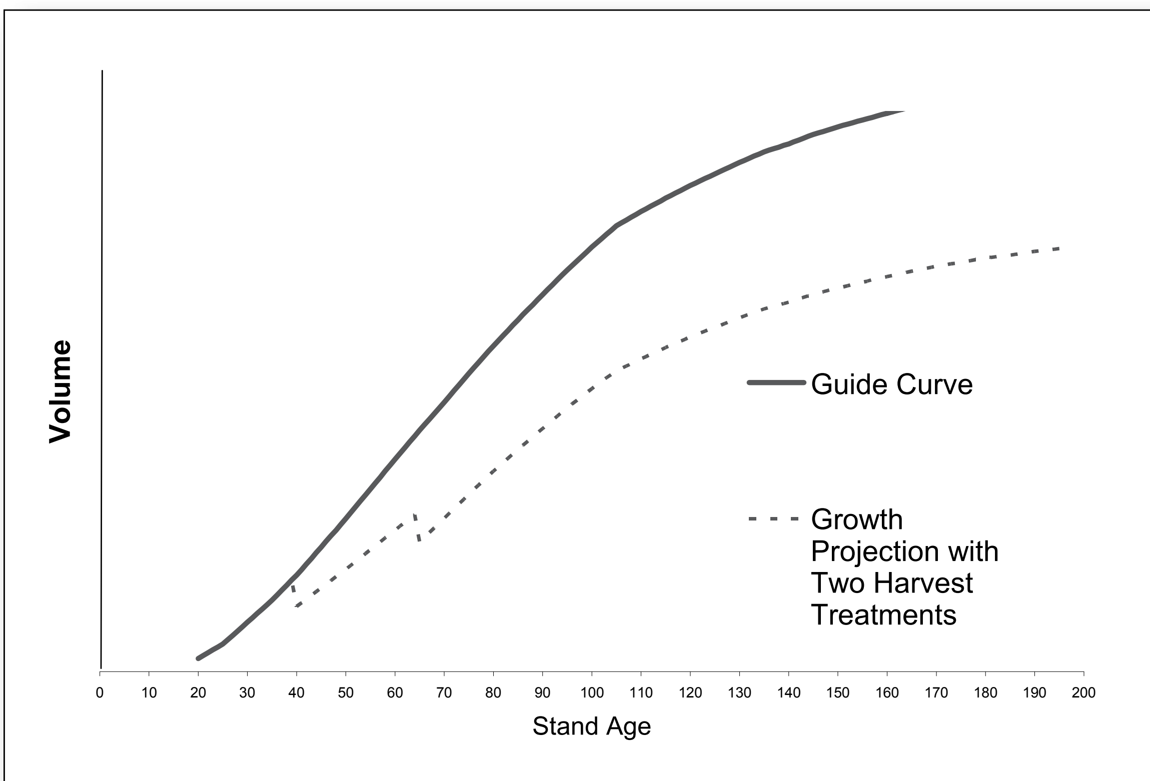
Where available, OPTIONS incorporates existing forest inventory information into the simulation analysis. Spatially explicit forest inventory information improves the analysis, but can create challenges because resource inventory classification systems often do not coincide directly with modeled growth projections. Although the generalized growth projections are accurate across a broad set of polygons, they do not capture variations of current inventory conditions at the individual polygon level. Thus, projecting the future growth of individual polygons requires an integration of existing inventory information with the generalized growth model projection. This integration is accomplished by utilizing algorithms to normalize future growth from the individual polygon's current inventory condition towards the long-term growth model projection. The rate of normalization is scaled according to the proximity of the inventory value to the model prediction. The process, referred to as the "trend to normality" captures, with spatial integrity, current conditions while accounting for the future growth within the polygon.

Treatment Adjustments and Responses

Growth projections are sensitive to management activities such as silvicultural treatments. Management activities are applied to individual polygons only when a set of eligibility criteria are met. Polygons that do not meet these criteria are not treated and their growth projection is uninterrupted. Stands that meet the eligibility criteria, as well as all other management objectives, are treated and their growth projection is adjusted. This adjustment is specific to stand age, species, site productivity level, as well as treatment type and intensity. All of these treatment and adjustment variables are defined in the model based on experience gained from the growth and yield modeling, professional judgment, research, and management objectives.

Figure R-18 provides an example of a volume growth projection and the adjustments applied for two stand thinning treatments. Growth projection for a polygon without treatment following the guide curve and the adjustments for two stand treatments at ages 40 and 60.

Figure R-18. Example Of A Volume Growth Projection Curve And Adjustments For Thinning Treatments



Management Activities and Rules

Management Activities

Forest management often requires intervention activities such as silvicultural treatments or harvesting activities. Silviculture treatments such as planting, pre-commercial thinning, pruning, fertilization, commercial thinning and selection harvest are explicitly defined, that is; their timing, intensity, duration and biological response are all defined in the model based on experience gained from the growth and yield modeling, professional judgment, and research.

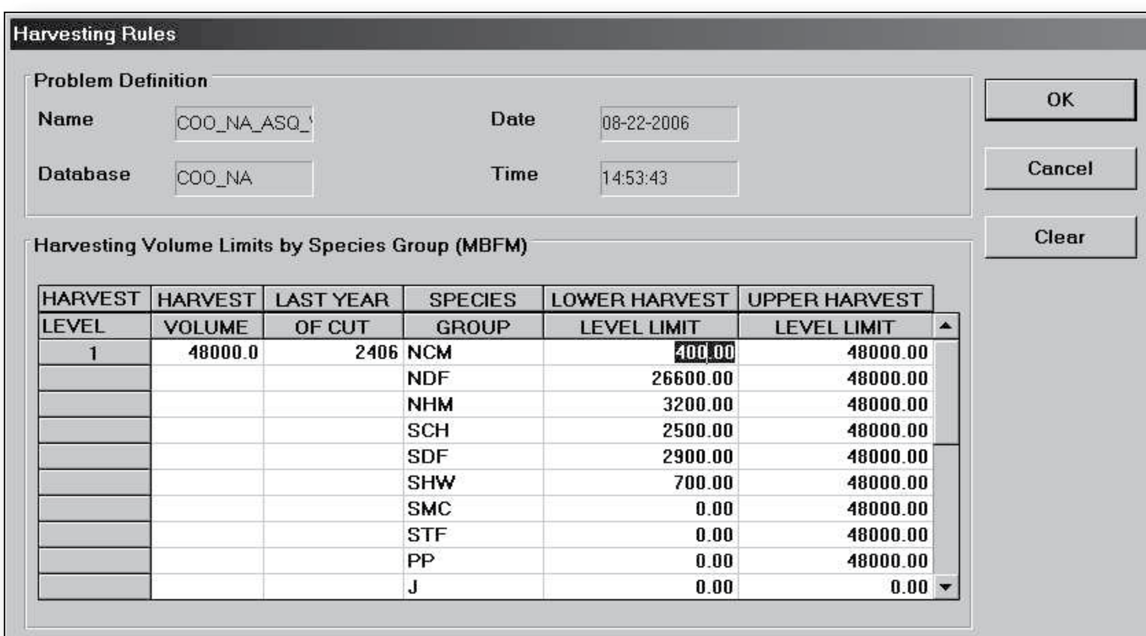
Additionally, treatments are subject to stand (polygon) level and landscape level eligibility criteria. An example of a stand level eligibility rule would be a minimum age or basal area threshold. A landscape level eligibility criteria would be an upper limit on the commercial thinning volume, within a Sustain Yield Unit. Silviculture treatments were not applied unless all eligibility criteria were met.

Harvesting activities are also subject to stand level and landscape level rules. An example of a polygon level harvest rule would be a minimum harvest age or a minimum residual volume per acre. There can be a number of landscape level harvest rules that control the maximum and minimum harvest levels by species type, species and wood-type priorities, polygon age and treatment type and landscape management objectives.

Figure R-19 provides an example set of landscape level harvest rules requesting minimum and maximum board foot volume level by species group.

Numerous management activities and silvicultural treatments can be developed and applied in various combinations, each combination defines a unique management regime. Polygons within a Sustained Yield Unit are assigned to a single, starting management regime. On completion of the management regime, or because of a specific harvest treatment, the polygon may return to the same management regime or continue under a new management regime.

Figure R-19. Landscape Level Harvest Rules Example


Harvesting Rules

Problem Definition

Name COO_NA_ASQ_ Date 08-22-2006

Database COO_NA Time 14:53:43

OK

Cancel

Clear

Harvesting Volume Limits by Species Group (MBFM)

HARVEST LEVEL	HARVEST VOLUME	LAST YEAR OF CUT	SPECIES GROUP	LOWER HARVEST LEVEL LIMIT	UPPER HARVEST LEVEL LIMIT
1	48000.0	2406	NCM	400.00	48000.00
			NDF	26600.00	48000.00
			NHM	3200.00	48000.00
			SCH	2500.00	48000.00
			SDF	2900.00	48000.00
			SHW	700.00	48000.00
			SMC	0.00	48000.00
			STF	0.00	48000.00
			PP	0.00	48000.00
			J	0.00	0.00

Land and Resource Management Rules

In OPTIONS, resource management objectives can be applied as targets or constraints.

Targets and constraints can be applied to individual polygons or collectively to a group of polygons. Targets and constraints are applied for each year in the planning horizon, so all management objectives are maintained for every year within the planning horizon.

Targets are used to control conditions at the landscape level. For example, a target may be used to ensure that at any point in time 15% of the forested BLM-administered lands within a fifth field watershed will be in stands 80 years and older before regeneration harvest may occur. The model is flexible about which particular polygons are reserved to satisfy the target criteria. If current stand conditions do not achieve the target criterion the model will evaluate and recruit polygons that will contribute toward meeting the criterion soonest. Recruited polygons are deferred from harvest ensuring that the target criterion is met as soon as possible. Each year within the planning horizon, the model checks that sufficient polygons are available and deferred to meet the target criteria. The model only defers enough polygons to meet the modeling targets, thus allowing non-deferred polygons to contribute toward meeting other management objectives.

Constraints set explicit limitations on the amount, or kind, of activities permitted for an individual polygon, portion of a polygon or across a group of polygons, for a defined period. The defined period can extend through the entire planning horizon, or it can be defined for a shorter timeframe. For example, constraints can be used to exclude regeneration harvest activities from a riparian area throughout the entire planning horizon, while allowing commercial thinning activities until the stand reaches an age of 80, after which no further treatments are permitted.

GIS-Based Modeling Rules

The attributes associated with the GIS spatial data are used in OPTIONS to identify areas where modeling rules are applied to simulate the management action and land use allocations for the alternatives. This section will describe, by topic area, the modeling rules and GIS data as they were applied to simulate the alternatives with the OPTIONS model.

1) **Sustained Yield Units (SYU)**

   The BLM lands are subdivided into Sustained Yield Units for the purpose of defining the area in which the allowable sale quantity will be based. The Sustained Yield Units are based on the BLM-administered lands within the District boundaries for Salem, Eugene, Roseburg, Coos Bay, and Medford Districts. The western portion of the Klamath Falls Resource Area within the Lakeview District is also a SYU. The eastern portion of the Klamath Falls Resource Area does not contain any O&C lands and a sustained yield unit is not designated. The Forest Operations Inventory (FOI) District attribute data was used as the basis for the Sustained Yield Units in the OPTIONS modeling. The Land Use Allocation data segregated the Klamath Falls Resource into the Klamath SYU and the eastside management lands. An estimate of the sustainable harvest level was done for the eastside management lands under the No Action Alternative modeling assumptions. Allocations and management direction did not vary across alternatives for the eastside management lands and so they were not modeled in the action alternatives.

2) **Non Forest**

   Non-forest areas in the OPTIONS model remain static in the projections and do not carry vegetation attributes. Non forest information was derived from multiple sources of GIS data to form the non forest class in the OPTIONS modeling.

   Transportation data buffered by 22.5 feet to simulate the road network.

Timber Productivity Capability Classification non forest classes.

Forest Operations Inventory Existing Stand Condition non forest class.

In Alternatives 2 and 3 – open water class from the streams data.

3) Timber Productivity Capability Classification (TPCC)

The TPCC inventory is described in detail in the Inventory Data section of this appendix. Common to all alternatives, the non suitable woodlands and the suitable woodland categories of low site and non commercial species had no harvest modeled and were not included in the ASQ.

In the No Action Alternative, the reforestation suitable woodlands had no harvest modeled and were not included in the ASQ. In the Action Alternatives, these lands had harvest modeled and did contribute to the ASQ.

4) Recreation Sites

In all Alternatives, the existing recreation sites had no harvest modeled and were not included in the ASQ. In the Action Alternatives the proposed recreation sites had no harvest modeled and were not included in the ASQ. In the No Action Alternative the proposed recreation sites lands had harvest modeled and did contribute to the ASQ.

5) Wild and Scenic Rivers

In all alternatives, the existing Wild and Scenic Rivers had no harvest modeled and were not included in the ASQ. In the Action Alternatives, the eligible Wild and Scenic Rivers had no harvest modeled and were not included in the ASQ. In the No Action Alternative, the eligible Wild and Scenic Rivers had harvest modeled and did contribute to the ASQ. In the No Action Alternative, the existing recreation segments had harvest modeled and did contribute to the ASQ. (Note: not all recreation segments were able to be identified and put in the harvest land base).

6) Visual Resource Management (VRM)

In all alternatives, the VRM class one had no harvest modeled and was not included in the ASQ. Under Alternative 2 and the PRMP, on the PD or acquired lands, no regeneration harvest was applied on VRM class two (Note: The VRM class one GIS data was only used in the No Action Alternative and Alternative 2. In the other action alternatives, the combination of the Wild and Scenic River and Congressionally Reserved covered this allocation.)

7) Areas of Critical Environmental Concern (ACEC)

In the No Action Alternative, all of the existing ACECs had no harvest modeled and were not included in the ASQ. The proposed ACECs had harvest modeled and did contribute to the ASQ. In the action alternatives, all of the existing and proposed ACECs which passed through the O&C filter had no harvest modeled and were not included in the ASQ. Those ACECs that did not pass through the O&C filter had harvest modeled and did contribute to the ASQ.

O&C Filter - Used the following evaluation to determine how the each ACEC was modeled.

a) All ACECs that were Research Natural Areas (RNAs) had no harvest modeled and were not included in the ASQ.

b) For each of the action alternatives, the districts reviewed the existing and proposed ACECs and designated them as:
   - Whole ACEC does not conflict with the timber management objectives (On PD lands or on non commercial forest lands). These areas had no harvest modeled and were not included in the ASQ.

- A portion of the ACEC is in conflict with timber management but the portion of the ACEC outside of the O&C lands would remain as a valid ACEC. These portions of the ACECs that were not on O&C or CBWR lands had no harvest modeled and were not included in the ASQ.
- The entire ACEC conflicts with timber management objectives and is not carried forward under the alternative. These areas had harvest modeled and did contribute to the ASQ.

8) **Marbled Murrelet Sites**

Existing occupied marbled murrelet sites.

- No Action Alternative, Alternative 1, and PRMP, these areas had no harvest modeled and were not included in the ASQ.
- In Alternative 2, they became part of the Late-Successional Management Area which had thinning harvest modeled but this volume does not contribute to the ASQ.
- Alternative 3 had no harvest modeled until the landscape targets were met. In the modeling, one decade after the landscape target was met, these areas became available for harvest and they contributed to the ASQ. See the Assessment Area description for further information on the landscape targets and release dates.

The No Action Alternative Occupied Marbled Murrelet Site (OMMS) data was used to simulate the existing sites.

Projected future marbled murrelet sites.

The Draft EIS alternatives had a management action to limit harvest around marbled murrelet sites as they are identified. To simulate this in the modeling, the stands that are 120 years and older that are within four townships from the coast were used as a surrogate.

The No Action Alternative and Alternative 1, for Coos Bay only, had no harvest modeled and were not included in the ASQ. The LSR / LSMA in Salem and Eugene encompassed the majority of the area within 4 townships of the coast so no simulation was needed.

Alternative 2 had no projection for future sites.

Alternative 3 had no harvest modeled until the landscape targets were met. In the modeling, one decade after the landscape target was met, these areas became available for harvest and they contributed to the ASQ. See the Assessment Area description for further information on the landscape targets and release dates.

For the PRMP, marbled murrelet survey station data was used to determine the probability of finding a murrelet site when a survey occurred in stands that were likely habitat. A combination of District, Resource Area, and distance from the coast were used to subdivide the Marbled Murrelet Range into zones to develop these probabilities based on district Biologist professional judgment. Age breaks for each zone (generally 110 years) were used as a threshold for likely marbled murrelet habitat. The land outside of the large block Late Successional Management Areas within each zone and above the age threshold were identified as the population of potential sites. A random selection of stands from this population was done based on the probability for that zone. The center point of these stand was used to place a ½ mile buffer to select all stands meeting the likely habitat age criteria plus all stand within 30 years of that age threshold (for recruitment within 25 years). The selected stands within the half mile radius were used to simulate the future sites for the Marbled Murrelet in the OPTIONS modeling. These areas were modeled as no harvest.

9) **Northern Spotted Owl**

The No Action Alternative had 100 acres known owl activity centers identified which had no harvest modeled and were not included in the ASQ.

The No Action Alternative had Reserve Pair Areas identified in the Salem District.

- The suitable and next best reserved areas had no harvest modeled and were not included in the ASQ.
- The dispersal, next best, and non-habitat received thinning only with no regeneration harvest. These lands had thinning harvest modeled but this volume did not contribute to the ASQ.

Alternatives 1, 2, and the PRMP have no provisions for site management in the modeling.

Alternative 3 had 250-acre activity centers identified which had no harvest modeled until the landscape targets were met. In the modeling, one decade after the landscape target was met, these areas became available for harvest and they contributed to the ASQ. See the Assessment Area description for further information on the landscape targets and release dates.

10) Special Status Species

For the No Action Alternative, survey and manage species sites had no harvest modeled and were not included in the ASQ. Although the survey and manage mitigation was subsequently removed from the No Action Alternative, the modeling had already been completed.

In Alternative 1, 2, and 3 special status species which were on Public Domain or Acquired lands had no harvest modeled and were not included in the ASQ.

For the PRMP, all existing identified sites on all BLM lands were modeled as no harvest and were not included in the ASQ.

11) Species Management Areas

In all alternatives, species management areas were identified for bald eagle and golden eagles sites. These areas had no harvest modeled and were not included in the ASQ.

12) Riparian

GIS Modeling

The riparian reserves / riparian management areas vary across the alternatives based upon the management action outlined in *Chapter 2*. The GIS modeling was employed to estimate the extent of riparian areas so that management action could be simulated in the OPTIONS modeling.
The GIS modeling, depending on the alternative, had many factors to consider in estimating the riparian area; presence/absence of fish, potential tree height adjusted specifically for each area, perennial versus intermittent streams, wetlands, lakes, ponds, and the potential to deliver large wood to streams. (See *Table R-12*) The description below is general in nature. The GIS metadata contains the technical details of the GIS riparian modeling.

<u>No Action Alternative, Alternative 1, and PRMP.</u> The GIS modeling varied the application of the site potential tree height based on district computed values usually by fifth-field watershed. To determine the GIS buffering widths, the potential tree heights were adjusted for the average stream side adjacent slope as determined by GIS analysis for each 5th field watershed. Attributes from the hydrography data were used to determine the presence and absence of fish, if a stream was intermittent or perennial, and the identification of ponds, wetlands and lakes. The GIS data for the OPTIONS modeling identified those areas in the riparian reserves as a Y/N classification.

<u>Alternative 2</u>. Three riparian management area zones were identified with GIS buffering of the hydrography data. All fish-bearing streams 0-25 feet (buf25). All non-fish-bearing intermittent 0-25 feet (shrub). Perennial and fish-bearing 25-100 feet (buf100). The GIS modeling was done to identify the areas likely to deliver large wood to streams which were identified in addition to the GIS buffering of the hydrography data (WDFLOW).

Alternative 3. Four riparian management areas zones were identified with GIS buffering of the hydrography data. 0-25 feet on all streams. Within the Coquille Tribal Management Area for all perennial streams and all intermittent streams with fish 25-50 feet. Within the Coquille Tribal Management Area for all fish bearing streams 50-100 feet. Outside the Coquille Tribal Management Area for all perennial streams and all intermittent streams with fish 25-100 feet.

Alternative 2 and 3 riparian GIS analysis identified open water that was not recognized in the No Action Alternative and Alternative 1 data. The open water was added to the other classes of non forest and not included in the modeled riparian area in Alternatives 2 and 3.

OPTIONS Modeling Rules

In the OPTIONS modeling, any harvest coming from the riparian areas does not contribute to the ASQ since the management action / modeling rules preclude continuous management. The shrub riparian area in Alternative 2 does contribute to the ASQ, because these harvest practices can continue over time. Harvest levels are determined for these lands along for the duration which harvest can occur given the modeling rules.

Operability limitations were modeled by limiting thinning activities within each riparian polygon to a maximum of 50% of the polygon area. Additionally, riparian stand that were commercially thinned were then deferred from subsequent thinning treatments for 60 years. This deferral was applied to the entire polygon.

Table R-12. Riparian Modeling Rules By Alternative

Alternative	GIS Data	Riparian Modeling Rules
No Action	Y – Yes inside riparian reserve	• No regeneration harvest • Commercial thinning modeled up to age 80. In Salem Adaptive Management Areas up to age 110 • 50% operability by polygon
Alternative 1 & PRMP	Y – Yes, inside riparian Management area	• No regeneration harvest • Commercial thinning modeled up to age 80. • 50% operability by polygon and 0-60’ no harvest (PRMP)
Alternative 2	0 to 25 feet	• No harvesting activities modeled
	25 to 100 feet	• No harvest in stands 80 years and older. • No regeneration harvest modeled • Commercial thinning modeled up to age 80 • 50% operability by polygon
	Shrub	• Regeneration harvest modeled with 10-15 conifer green tree retention. (Contributes to ASQ.)
	Wood Debris Flow Area	• No harvest activities modeled.
Alternative 3	0 to 25 feet	• No harvesting activities modeled
	25 to 100 feet	• No harvest in stands 80 years and older • No regeneration harvest modeled • Commercial thinning modeled to age 80 • 50% operability by polygon
	Coquille Management Area 25 to 50 feet	• No harvest in stands 80 years and older. • No regeneration harvest modeled. • Commercial thinning modeled to age 80 • 50% operability by polygon
	Coquille Management Area 50 to 100 feet	• No regeneration harvest modeled • 50% operability by polygon

13) Congressionally Reserved

Congressionally reserved areas had no harvest modeled and were not included in the ASQ for any alternative. The Land Use Allocation GIS layer and Wild and Scenic Rivers GIS layer were used to define these areas.

14) Late-Successional Reserves (LSR)

The Late-Successional Reserves had only thinning harvests modeled in those stands less than 80 years of age for the No Action Alternative. This volume estimate is not included in the ASQ since the harvest would diminish over time as the stands eligible for thinning matured. The OPTIONS modeling projected the duration and volume levels for this harvest as it stepped down over time. The Land Use Allocation GIS theme was used to define this allocation. The other Northwest Forest Plan LSR components, Occupied Marbled Murrelet Sites and Know Owl Activity Centers, were modeled independently of the large block reserves. Also see the Adaptive Management Area Reserve section.

15) Late-Successional Management Areas (LSMA)

Late-Successional Management Areas were defined for Alternatives 1, 2, and the PRMP.

Alternative 1 LSMAs were based on the No Action Alternative Late-Successional Reserves. Commercial thinning treatments within LSMA were consistent with the No Action LSR thinning treatments. Thinning was modeled in stands less than 80 years of age.

Alternative 2 LSMAs were developed by BLM utilizing rules for size and spacing of large blocks which was based on current science for the Northern Spotted Owl and discussions from the draft Northern Spotted Owl recovery team. The initial GIS mapping of these large blocks was revised in the OPTIONS data preparation program to designate whole BLM parcels/sections based on a majority rule. In addition the existing Occupied Marbled Murrelet Sites were added to the LSMA. Commercial thinning treatments within LSMA were consistent with the No Action LSR thinning treatments. Thinning was modeled in stands less than 80 years of age.

For the PRMP, the Late-Successional Management Areas were developed from three components. Northern Spotted Owl Managed Owl Conservation Areas from the proposed recovery plan

- Currently Occupied Marbled Murrelet Sites (Occupied Marbled Murrelet Site – OMMS GIS Data)
- A subset of existing Marbled Murrelet Critical Habitat.
    - — A MAMU zone that is 35 miles from the coast and extends inland 50 miles in Medford.
    - — All stands 80 years and older (as currently mapped) within MAMU zone are part of the LSMA.

Note: All stands less than 80 years old (as currently mapped) in the MAMU zone are in the Timber Management Area and not include in the LSMA.

No harvest was simulated for the LSMAs associated with the occupied Marbled Murrelet Sites. Since the other components of the LSMA were related to critical habitat designations it was intended to have no thinning of stands 70 years and older. Although the model did not enforce this cap, this was inconsequential because it resulted in a minor increase in the overall thinning.

Harvest projections for the LSMAs are not included in the ASQ estimates. With the absence of regeneration harvest, timber production from commercial thinning would diminish over time as the stands mature and become ineligible for thinning.

16) Adaptive Management Area and Late Successional Reserves

Under the No Action Alternative, there are Adaptive Management Area designations that overlap the Late-Successional Reserves in the Salem and Medford Districts. The Medford area was modeled the same as the Late-Successional Reserves, with thinning harvests limited to those stands less than 80 years of age. For the Salem area, the thinning harvest was modeled up to age 110. Harvest projections for the areas are not included in the ASQ estimates. With the absence of regeneration harvest, timber production from commercial thinning would diminish over time as the stands mature and become ineligible for thinning. The OPTIONS modeling projected the duration and volume levels for this harvest as it stepped down over time. The Land Use Allocation GIS theme was used to define this allocation.

17) Adaptive Management Areas (AMAs)

Adaptive Management Areas applied to the No Action Alternative. These are the portions of the AMA that exist outside Late-Successional Reserves.

The AMAs in the Eugene and Roseburg Districts were modeled the same as General Forest Management Areas (GFMA).

The Medford AMA was modeled the same as Southern General Forest Management Areas (S_ GFMA).

The modeled harvest from these areas was included in the ASQ.

The Salem AMA was modeled under thinning only, up through age 110, with no regeneration harvest. Since this harvest level would diminish over time the modeled volume was not included in the Allowable Sale Quantity.

Modeling reductions to the harvest land base for administratively withdrawn and riparian reserves within the AMAs was the same as within the surrounding matrix lands. The Land Use Allocation GIS layer was used to define this allocation.

18) Connectivity Diversity Blocks

The connectivity diversity block allocations applied only to the No Action alternative. OPTIONS modeling rules were established so regeneration harvest would not occur until at least 25% of the forest area in the blocks was in stands 80 years or older. For each block a maximum of 1/150th of the forested area could be at age zero (regenerated) to simulate the area control requirement. The modeling blocks were based on all of the connectivity diversity lands within a township and Sustained Yield Unit. The Land Use Allocation GIS layer was used to define this allocation on a gross basis. The net acreage modeled for harvest is the area remains after all other reductions to the harvest land base have been made. The modeled harvest from these areas was included in the ASQ.

19) General Forest Management Areas (GFMA)

The GFMA allocation applied only to the No Action Alternative. The Southern GFMA in the Medford District and the Klamath Falls SYU has older minimum harvest ages and higher green tree retention than the GFMA allocations in the other SYUs. The Land Use Allocation GIS layer was used to define this allocation on a gross basis. The net acreage modeled for harvest is the area remains after all other reductions to the harvest land base. The modeled harvest from these areas was included in the ASQ.

20) Timber Management Area (TMA)

The TMA allocation applied to Alternatives 1, 2 and the PRMP. On a gross basis, these are the lands outside of the Late-Successional Management Area, Riparian Management Area, Congressionally Reserved, and the Cascade-Siskiyou National Monument. The net acreage modeled for harvest is the area which remains after all other reductions to the harvest land base. The modeled harvest from these areas was included in the ASQ.

21) General Landscape Area (GLA)

The GLA allocation applied to Alternative 3. On a gross basis these are the lands outside of the Riparian Management Area, Congressionally Reserved, and the Monument. The net acreage modeled for harvest is the area which remains after all other reductions to the harvest land. The modeled harvest from these areas was included in the ASQ.

22) District Defined Reserves

Under the No Action Alternative, there are district-defined reserves that were established in the 1995 RMP. These lands are defined in the Land Use Allocation GIS layer. No harvest was modeled for these areas and they were not included in the ASQ.

23) Miscellaneous District No Harvest Areas

Under all alternatives, individual OI units were earmarked by the districts to be excluded from the harvest land base for modeling. These included communications sites, seed orchards, and some omissions in the TPCC data for Klamath Falls. No harvest was modeled for these areas and they were not included in the ASQ.

24) Wilderness Characteristics

Under the action alternatives, wilderness characteristics areas were identified in GIS. Only those lands which fell on Public Domain were considered in the modeling. For those areas no harvest was modeled and they were not included in the ASQ.

25) Medford Granitic Soils

For the No Action Alternative, the areas identified in GIS for the Medford District as granitic soils in the Northern General Forest management Areas were modeled under the southern General Forest Management Areas prescriptions.

26) Medford Frost Areas

For the No Action Alternative, the areas identified in GIS for the Medford district as frost areas called for developing unique prescriptions to establish shelterwood prescriptions to retain trees for 30 years. The area was 8,000 acres in size. Due to the small size and complexity of modeling this no specific modeling was done for this area. For the PRMP, a shelterwood prescription was applied to the Medford frost areas.

27) Medford Deferred Watersheds

The Medford District 1995 RMP identified a set of monitoring watersheds which were deferred from harvest for one decade.

- In the No Action Alternative, these areas had no harvest modeled for 1 decade. After that, these areas would have harvest modeled according to the underlying land use allocation and contribute to the ASQ. One watershed was included that was not intended to be deferred and another was omitted. Overall, the modeling was 500 acres short on modeling this deferral.
- In Alternative 1, these watersheds were modeled as completely deferred with no harvest activities simulated. These lands did not contribute to the ASQ. The GIS data was corrected from the No Action dataset.

28) 15% Standard and Guideline (15% S&G)

The 15% S&G was modeled in the No Action Alternative. The OPTIONS model did not conduct any regeneration harvest until 15% of the forest area with in each fifth field (with in the SYU) was in stands 80 years or older. This constraint was enforced annually, prohibiting watersheds from going below the threshold. Thinning treatments were modeled irrespective of the 15% S&G status. Harvest in these areas does or does not contribute to the ASQ depending on the underlying land use allocation.

29) Swiss Needle Cast Area

The Salem District identified where the current extent of the Swiss needle cast infection exists. The OPTIONS model used a unique set of species groups to reflect the reduced yields of existing stands or the future growth and yields of disease resistant species mixes in the existing infection area.

30) Alt 3 Assessment Areas – Landscape Targets

A review of the age which the OPTIONS projection achieved Northern Spotted Owl habitat (category 4) was conducted for each province / SYU. From this review, 90 year or 140 year thresholds were established for each province / SYU for use as the landscape targets. (See *Table R-13*) Assessment areas were established based on the combination of province / SYU which were outside of the Uneven-aged Management Area in Medford and Klamath Falls and the Coquille Tribal management area. In OPTIONS, regeneration harvest was not modeled until 50% of the forest area in each assessment area was above the landscape target age. Partial harvest and commercial thinning were modeled for the entire projection period independent of the landscape targets and assessment areas. Marbled Murrelet Sites and Northern Spotted owl sites were modeled as no harvest until one decade after the landscape targets were met. At that time those lands were available for harvest.

Table R-13. Landscape Areas, Habitat Threshold Ages, and Assessment Area Names (Alternative 3)

	Cascades	Coast	Klamath	Total (acres)
Coos Bay		269,634	51,533	321,166
Threshold Age		90 Years	90 Years	
Assessment Area		CB Coast / Coquille	CB Klamath	
Eugene	151,974	160,286		312,261
Threshold Age	90 Years	90 Years		
Assessment Area	Eug Cascades	Eug Coast		
K-Falls	51,306			51,306
Threshold Age	n/a			
Assessment Area	Uneven Age			
Medford	229,873		636,819	866,692
Threshold Age	140 Years & n/a		140 Years & n/a	
Assessment Area	Med Cascades & Uneven Age		Med Klamath & Uneven Age	
Roseburg	152,313	129,039	142,236	423,588
Threshold Age	90 Years	90 Years	140 Years	
Assessment Area	Ros Cacades	Ros Coast	Ros Klamath	
Salem	170,027	232,157		402,184
Threshold Age	90 Years	90 Years		
Assessment Area	Sal Cascades	Sal Coast		

31) Coquille Tribal Management Area

The Coquille Tribal Management Area was modeled in Alternatives 2 and 3. No northern spotted owl site harvest constraints were applied in this area under both alternatives. Under Alternative 3, the landscape targets were not applied which limited regeneration harvest. See Riparian section for Alternative 3 modeling for the riparian area. The TMA/ GLA lands were modeled under the No Action GFMA prescription.

32) PRMP Deferred Timber Management Area

The Northern Spotted Owl Recovery Plan Recovery Action 32 - "*Maintain substantially all of the older and more structurally complex multi-layered conifer forests on Federal lands outside of MOCAs.*" BLM staff met with the Interagency Support Team supporting the recovery team to gain an understanding of how this could be defined. The BLM staff and the Interagency Support Team agreed that the structurally complex forest classification approximates the types of conditions they were describing. The BLM does not have an in place stand level classification of structurally complex forest. A comparison was done with the BLM stand age data with the modeled structurally complex classification. Stands with ages of 160 years and older reasonably approximates the stands mapped currently as structurally complex (80% of structurally complex stands are 160 years and older; 85% of the stands 160 years and older are structurally complex) Stands currently mapped as 160 years and older were mapped as the Deferred Timber Management Area land use allocation. These lands were deferred from harvest for 15 years in the modeling.

Recovery action 32 states – "*Land managers have made significant investments of time and resources in planning projects that may have been developed prior to the approval of this Recovery Plan, thus some forests meeting the described conditions might be harvested*". The planned timber sale areas for the 2009 and 2010 were not included in the Deferred Timber Management Area allocation. The modeling occurred before this adjustment was made so these lands were simulated as a 15 year deferral in determining the harvest levels.

GIS Data – Modeling Harvest and Contribution to ASQ

Table R-14 provides a summary of how each category of GIS data was modeled and which categories contribute to the Allowable Sale Quantity.

Table R-14. GIS Modeling Data Layers

GIS Modeling Data Layers	No Action	Alternative 1	Alternative 2	Alternative 3	PRMP
Roads	X	X	X	X	X
TPCC Non Forest	X	X	X	X	X
TPCC Non Suitable Woodlands	N	N	N	N	N
TPCC Suitable Woodlands - Low Site and Non Commercial Species	N	N	N	N	N
TPCC Suitable Woodlands - Reforestation	N	Y	Y	Y	Y
Recreation Sites Existing	N	N	N	N	N
Recreation Sites Proposed	Y	N	N	N	N
Wild and Scenic Rivers - Existing	N	N	N	N	N
Wild and Scenic Rivers - Eligible	Y	N	N	N	N
Visual Resource Management Class 1	N	N/A	N On PD Only	N/A	N On PD Only
Visual Resource Management Class 2	N/A	N/A	P On PD Only	N/A	P On PD Only
Areas Of Critical Environmental Concern - Existing	N	N – If Passes O&C Filter	N –If Passes O&C Filter	N – If Passes O&C Filter	N – If Passes O&C Filter
Areas Of Critical Environmental Concern - Proposed	Y	N – If Passes O&C Filter	N – If Passes O&C Filter	N – If Passes O&C Filter	N – If Passes O&C Filter
Occupied Marbled Murrelet Sites	N	N	N	D	N
Simulation Future Marbled Murrelet Sites	N	N	N	D	N
Known Owl Activity Centers	N - 100 Acres	Y	Y	D - 250 Acres	N/A
Reserve Pair Areas (Salem)	N	N/A	N/A	N/A	N/A
Survey and Manage Species	N	N/A	N/A	N/A	N/A N
Special Status Species	N/A	N - For Those On PD Lands	N - For Those On PD Lands	N - For Those On PD Lands	N
Species Management Areas	N	N	N	N	N
Riparian Reserves	P	N/A	N/A	N/A	N/A
Riparian Management Areas	N/A	P	P	P	P
LUA - Congressionally Reserved	N	N	N	N	N
LUA - Late-Successional Reserves	P	N/A	N/A	N/A	N/A
LUA - Late-Successional Management Areas	N/A	P	P	N/A	P
LUA - Adaptive Management Areas	Y/P	N/A	N/A	N/A	N/A
LUA - Adaptive Management Areas/Reserves	P	N/A	N/A	N/A	N/A
LUA - Connectivity Diversity Blocks	Y	N/A	N/A	N/A	N/A
LUA - General Forest Management Areas	Y	N/A	N/A	N/A	N/A
LUA - Southern General Forest Management Areas	Y	N/A	N/A	N/A	N/A
LUA - Timber Management Area	N/A	Y	Y	N/A	Y
LUA - Gen Landscape Area	N/A	N/A	N/A	Y	N/A
LUA - District Defined Reserves	N	N/A	N/A	N/A	N/A
Misc. District No Harvest Areas	N	N	N	N	N
Wilderness Characteristics on PD Lands	Y	N	N	N	N
Medford Deferred Watersheds	D	N	N/A	N/A	N/A
15% Standard & Guide	D	N/A	N/A	N/A	N/A
Deferred Timber Management Area (15 Years)	N/A	N/A	N/A	N/A	D

Y = Harvest is modeled and contributes to ASQ
P = Harvest is modeled but does not contribute to ASQ since the harvest can not be sustained continuously over time.
N = No harvest is modeled.
D = Harvest is deferred for 1 or more decades and contributes to ASQ.
X = Non Forest
N/A = Does not apply to the alternative

Reference Analysis Modeling Rules

1) **Maximum Harvest**

   The Alternative 2 data was used for this analysis. All lands were made available for harvest with the exception of TPCC Non Suitable Woodlands, TPCC Suitable Woodland (low site and non commercial species), Wild and Scenic Rivers, existing recreation sites. 25' buffer on streams (buf_25), Congressionally Reserved lands, and the National Monument. CMAI was used in setting the minimum harvest ages similar to Alternative 2.

2) **No Harvest**

   No harvest was simulated.

Green Tree Retention

No Action Alternative

Green Tree Retention (GTR) was modeled as a stand level constraint in the No Action Alternative. Within each polygon, a retention level was applied at the time of harvest. Retention levels varied by land use allocation as presented in Table R-15.

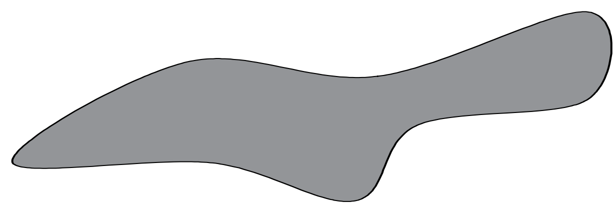
Table R-15. Green Tree Retention Percent By Land Use Allocation For The No Action Analysis

Land Use Allocation	Green Tree Retention Percent
General Forest Management Area (GFMA), North GFMA, Adaptive Management Areas, No Designation	11%
South General Forest Management Area (including Granitic Soils Areas)	24%
Connectivity Diversity Blocks, District Defined Reserves, Congressionally Reserved, National Monument	18%
Late-Successional Reserves, Adaptive Management Area Reserves	Not Applicable
Eastside Management Lands	Not Applicable

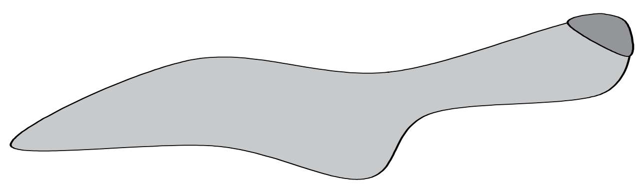
The retained portions of the polygons were modeled as contiguous areas and reserved until a subsequent rotation when the areas were made available for harvest and GTR retention was applied. Thus, in each subsequent harvest a smaller portion of the original retention area was reserved while younger GTR areas were also retained.

Figure R-20 provides a graphic example of modeling 11% green tree retention. In the model the retention areas is not spatially defined with in the polygon but is tracked as a proportion of the area.

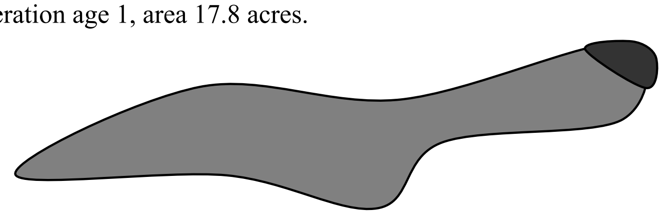
Figure R-20. Green Tree Retention Accounting Within The OPTIONS Model



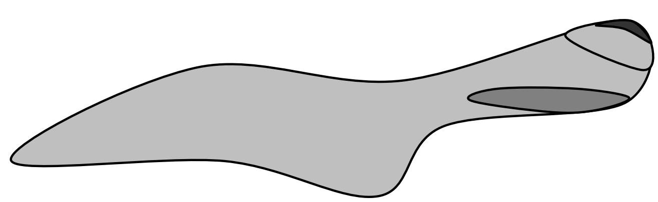
Polygon prior to first harvest. Stand age 100 years. Area 20 acres.



Polygon after first harvest. Retention stand age 101, area 2.2 acres; regeneration age 1, area 17.8 acres.



Polygon prior to second harvest. Retention stand age 181, area 2.2 acres; regeneration age 81, area 17.8 acres.



Polygon after second harvest. Oldest retention stand age 181, area 0.24 acres; younger retention stand age 81, area 1.96 acres; regeneration age 1, area 17.8 acres.

Alternative 1 and PRMP

No green tree retention was applied.

Alternative 2

Management action for two trees per acre green tree retention was not simulated in the modeling since the volume reduction would be minor. Green tree retention for the Coquille Management Area was modeled the same as the No Action alternative General Forest Management Area.

Modeling of the tree retention levels for future snags and coarse woody debris in the Late-Successional Management Areas varied individual SYUs and physiographic provinces. This retention was modeled as a stand level constraint by reserving a percentage of each stand being thinned. (See *Table R-16* below)

Table R-16. Late-Successional Management Areas Tree Retention Percent By Sustained Yield Unit / Retention Zone

Retention Zone	Lakeview	Salem	Eugene	Roseburg	Medford	Coos Bay
Western Hemlock	0%	7%	8%	14%	0%	8%
Douglas-fir	9%	0%	0%	8%	12%	0%
Tan Oak	9%	0%	0%	0%	13%	5%

Alternative 3

Assessment areas were established based on the combination of province / SYU which were outside of the Uneven-aged management area in Medford and Klamath Falls and the Coquille Tribal management area. Age thresholds (90 yr or 140 yr) were established as landscape target for each assessment area. (See GIS Based Modeling Rules – Assessment Areas) Regeneration harvests were not modeled until 50% of the Assessment Area was in ages at or above the landscape target threshold.

After regeneration harvests, green tree retention was modeled in a similar manner as in the No Action and Alternative 2. However, retention levels for Alternative 3 were based on species group. (See *Table R-17* below)

Table R-17. Regeneration Harvest Prcent Volume Tree Retention For Green Tree, Snag, And Coarse Woody Debris Creation By Species Group

Species Group	Green Tree Retention Percent	Green Tree + Future Snag and CWD
Northern Hardwood Mixed	7%	15%
Northern Mixed Conifer	6%	14%
Northern Douglas-fir	6%	14%
Southern Douglas-fir	7%	10%
Southern Mixed Conifer	8%	12%
Sothern Conifer Hardwood	10%	13%
Southern Hardwood	9%	13%
Southern True Fir	8%	11%
Ponderosa Pine	15%	24%

In Alternative 3, intermediate harvests, termed partial harvests, were permitted prior meeting the older forest targets. For intermediate harvests, green tree retention was modeled as a partial harvest, and stand attributes of the retained stems were incorporated into the blended yield curves. The blended yield curves reduced the retained and regenerated components of the harvest unit proportionally, similar to the stand level constraint method described above, however, the retained portions of the polygons are not reported independently. (See *Tables R-18* and *R-19* below)

The Coquille Management Area was modeled the same as the No Action General Forest Management Area.

Table R-18. Stand Treatment Age And Retention Used To Blend Yield Curves For Intermediate Harvests

Zone	1st Intermediate Harvest		2nd Intermediate Harvest		3rd Intermediate Harvest		4th Regeneration Harvest	
	Age	%	Age	%	Age	%	Age	%
Hemlock	120	35	240	35	0	0	360	n/a
Douglas fir	80	19	160	19	0	0	240	n/a
Tanoak	60	35	120	35	180	35	240	n/a

Table R-19. Partial Harvest Retention Plus Supplemental Retention For Snag And Coarse Woody Debris Creation

Zone	1st Intermediate Harvest		2nd Intermediate Harvest		3rd Intermediate Harvest		4th Regeneration Harvest	
	Age	%	Age	%	Age	%	Age	%
Hemlock	120	42	240	42	0	0	360	*
Douglas fir	80	22	160	22	0	0	240	*
Tanoak	60	39	120	39	180	39	240	*

* GTR levels by Species Group

Scribner Volume

For OPTIONS modeling, Scribner volumes were generated as a part of the guide curve modeling with the ORGANON Shell. The equations for these volumes are based 16-foot BLM volume rules.

Volume Adjustments

Guide Curve Adjustments to volume were made for Defect and Breakage (D&B), Green Tree Retention (GTR), Snags, Coarse Woody Debris (CWD), Insect and Disease, and Soil Compaction.

With the exception of GTR, all adjustments to the Guide Curves were compiled outside the OPTIONS model as percent basal area reductions. Estimates for D&B, Insect and Disease, and Soil Compaction were supplied by the districts or based on values derived for the most recent RMP. The guidelines for Snags and Coarse Woody Debris (CWD) varied by alternative. These adjustments were made to the Guide Curves with the OPTIONS data preparation program and applied within the OPTIONS modeling as volume reductions. Adjustments were compiled and applied by ORGANON variant, Species Group, stand type (managed, unmanaged, or future) and harvest type where appropriate. For Alternative 3, these adjustments were further stratified by Vegetation Zone; Western Hemlock, Douglas-fir and Tanoak to account for differences in Snag and Coarse Woody Debris requirements. (See *Figure R-21*)

Figure R-21. An Example Of Adjustments Utilized For A Single Alternative And District

Alternative 3 Yield Adjustments - Factors Varying by Management Status and Retention Zone																
District:	Roseburg							GTR Green Tree Retention %BA Adj for Regen Harvest Only			Snag Creation/Retention %BA Adj for Partial & Regen Harvest			CWD %BA Adj for Partial & Regen Harvest		
Alternativ	Alt 3															
ESC/Modeling Grou	MG11&15=Unmanaged															
Land Use Allocation:	GLA															
Regen Harvest Age	Soil Compaction	Insect & Disease	Cruise Gross to Net [D&B]	GTR Edge Effect	Sum of Adjustments	Final Adjustment Factor Managed & Future	Final Adjustment Factor Unmanaged (w/o Soil I&D)	WH Retention Zone GTR %BA	DF Retention Zone GTR %BA	TO Retention Zone GTR %BA	WH Retention Zone Snag %BA	DF Retention Zone Snag %BA	TO Retention Zone Snag %BA	WH Retention Zone CWD %BA	DF Retention Zone CWD %BA	TO Retention Zone CWD %BA
30	0.00	0.005	0.050	0.050	0.105	0.895	0.900	0	0	0	0	0	0	0	0	0
40	0.00	0.007	0.050	0.050	0.107	0.893	0.900	0	0	0	0	0	0	0	0	0
50	0.00	0.008	0.050	0.050	0.108	0.892	0.900	0	0	0	0	0	0	0	0	0
60	0.00	0.010	0.050	0.050	0.110	0.890	0.900	0	0	0	0	0	0	0	0	0
70	0.00	0.011	0.050	0.050	0.111	0.889	0.900	0	0	0	0	0	0	0	0	0
80	0.00	0.012	0.050	0.050	0.112	0.888	0.900	0	0	0	0	0	0	0	0	0
90	0.00	0.014	0.050	0.050	0.114	0.886	0.900	0	0	0	0	0	0	0	0	0
100	0.00	0.015	0.060	0.050	0.125	0.875	0.890	0	0	0	0	0	0	0	0	0
110	0.00	0.016	0.070	0.050	0.136	0.864	0.880	0	0	0	0	0	0	0	0	0
120	0.00	0.018	0.080	0.050	0.148	0.852	0.870	0	0	0	0	0	0	0	0	0
130	0.00	0.019	0.090	0.050	0.159	0.841	0.860	0	0	0	0	0	0	0	0	0
140	0.00	0.020	0.090	0.050	0.160	0.840	0.860	0	0	0	0	0	0	0	0	0
150	0.00	0.022	0.090	0.050	0.162	0.838	0.860	0	0	0	0	0	0	0	0	0
160	0.00	0.023	0.100	0.050	0.173	0.827	0.850	0	0	0	0	0	0	0	0	0
170	0.00	0.024	0.110	0.050	0.184	0.816	0.840	0	0	0	0	0	0	0	0	0
180	0.00	0.026	0.120	0.050	0.196	0.804	0.830	0	0	0	0	0	0	0	0	0
190	0.00	0.027	0.130	0.050	0.207	0.793	0.820	0	0	0	0	0	0	0	0	0
200	0.00	0.028	0.200	0.050	0.278	0.722	0.750	0	0	0	0	0	0	0	0	0
210	0.00	0.028	0.200	0.050	0.278	0.722	0.750	0	0	0	0	0	0	0	0	0
220	0.00	0.028	0.200	0.050	0.278	0.722	0.750	0	0	0	0	0	0	0	0	0
230	0.00	0.028	0.200	0.050	0.278	0.722	0.750	0	0	0	0	0	0	0	0	0
240+	0.00	0.028	0.200	0.050	0.278	0.722	0.750	0	0.083	0.074	0	0.012	0.018	0	0.028	0.035
360+	0.00	0.028	0.200	0.050	0.278	0.722	0.750	0.065	0.083	0.074	0.030	0.012	0.018	0.043	0.028	0.035

Exceptions to these were limited to the modeling of GTR for Regeneration harvests in the No Action Alternative and Alternative 3 and the Partial harvests in Alternative 3. These reductions were taken at time of harvest within the OPTIONS model in the form of reduced harvest unit acreage.

Minimum Harvest Age

The OPTIONS model uses a minimum harvest age to control the lower limit where regeneration harvest could occur.

In the No Action Alternative, the minimum harvest ages were set by direction in the existing plans. For all districts, except Medford, the minimum regeneration harvest age was set to 60 years. For the Medford District, the minimums were 100 years in the North General Forest Management Areas and 120 years in the South General Forest Management Areas.

For Alternatives 1, 2, and the PRMP, minimum harvest ages were based on Culmination of Mean Annual Increment (CMAI) for regeneration harvests.

Culmination of Mean Annual Increment (CMAI) results can vary widely depending on the unit of measurement used, the utilization standards and whether net or gross growth is considered. It has been a commonly accepted forestry theorem that even- aged stands should be harvested at CMAI in order to maximize biological yields.

Current Annual Increment (CAI) is defined as the annual increment of wood grown for a particular stand, or in this case a group of inventory plots representing similar growing conditions. Mean Annual Increment (MAI) for a particular stand or set of plots is the total increment of wood at a given stand age divided by that stand age. CMAI is the point when the CAI, sometimes termed Periodic Annual Increment (PAI) and the MAI are equal. Culmination occurs when the maximum MAI is reached. From the ORGANON Guide

Curve runs, Total Stem Cubic Volume (TSCV) was used for CMAI determination. This approximates a biological decision rule for the point of harvest. For this evaluation, the CMAI threshold was assumed to be the first age (5-year ORGANON modeling cycle) at which the difference between PAI and MAI was zero or negative. The gross volume CMAI statistics generated from ORGANON were adjusted to approximate net volume CMAI and allow the OPTIONS modeling greater flexibility in harvest scheduling.

In Alternatives 1 and 2, the OPTIONS minimum harvest age was set at the 90% level of CMAI to give the model a reasonable level to vary from the estimated values. (See *Table R-20*)

For Alternative 3, minimum both partial harvest and regeneration harvest minimum harvest ages were established in the management action. (See *Table R-21*)

Table R-20. Forest Maturity Criteria: Proposed Minimum Harvest Ages At 90% CMAI By Species Group And Site (Productivity) Class

Species Group	Productivity Classes				
	SP5 (yrs)	SP4 (yrs)	SP3 (yrs)	SP2 (yrs)	SP1 (yrs)
NCM	110	105	95	95	85
NDF	110	95	85	85	75
NHM	95	95	85	80	80
SCH	155	120	110	110	110
SDF	140	120	110	105	100
SHW	155	120	110	110	110
SMC	155	120	110	110	110
STF	145	140	120	120	120
PP	140	115	115	115	115
SSCH	155	120	110	110	110
SSDF	140	120	110	105	100
SSHW	155	120	110	110	110
SSMC	155	120	110	110	110
SSTF	145	140	120	120	120
SPP	140	115	115	115	115
CNCM	130	110	95	90	85
CNDF	130	110	95	90	85
CNHM	130	110	95	90	85

Table R-21. Minimum Stand Treatment Ages For Partial And Regeneration Harvests (Alternative 3)

Zone	1st Partial Harvest	2nd Partial Harvest	3rd Partial Harvest	Regeneration Harvest
	Stand Age (yrs)	Stand Age (yrs)	Stand Age (yrs)	Stand Age (yrs)
Hemlock	120	240	0	360
Douglas fir	80	160	0	240
Tanoak	60	120	180	240

Modeling Thinnings

Commercial thinning modeling criteria were derived from two sources.

1. Simulation rules for management action for an alternative.

Example - Modeling "caps' were used to limit commercial thinning in Late- Successional Reserves to stands less than 80 years to simulate the plan requirement to only apply treatments that would promote the development of late-successional forest.

2. Growth and yield team's results for the ORGANON modeling of existing and future stands.

ORGANON modeling determined the timing, extent and number of treatments which were specific to modeling groups. The lower and upper treatment ages, treatment intensity and the number of treatments along with modeling criteria, targets and guidelines are documented under the Forest Growth and Yield Modeling section.

The Treatment Response approach allowed the OPTIONS model to adjust for the total growth in the thinned stand by modifying the growth rate (slope) of the Guide Curve for the untreated stand. The growth rate was adjusted such that the ORGANON modeled growth response of the treated stand, i.e. the increase in volume growth at the end of the treatment response period, was approximated within the OPTIONS modeling for that particular stand type and a specific thinning treatment. For use in the OPTIONS model, the commercial thinning treatment results, for each modeled combination of Species Group(s), Productivity Class(es) and thinning entry number (1st, 2nd, 3rd…) were subsequently analyzed to determine a "Treatment Response". Treatment Response Period was defined as 30 years or the number of years between modeled thinning entries, whichever was less.

Within the OPTIONS model, the thinning availability window was set in all alternatives to 5 years prior and 15 years after the ORGANON modeled treatment age for a specific stand type. If, within the OPTIONS model, a particular vegetation polygon was not thinned during a treatment window, the opportunity for the model to apply that specific commercial thinning treatment was foregone. If that particular stand was modeled for subsequent thinning treatments at older ages, it became available for treatment evaluation like any other stand regardless of whether the previous treatment was applied.

Before the OPTIONS model could apply a commercial thinning treatment to a particular stand, the current stand attributes were reviewed to ensure that the prescribed removal would meet the minimum per acre harvest targets. The minimum targets were – Salem Roseburg, Coos Bay – 8,000 board feet per acre, Eugene – 6,000 board feet per acre, Medford 4,000 board feet per acre, and Klamath Falls 2,000 board feet per acre. If the residual stand criteria could not be met, the stand would be left to grow and be re-evaluated in subsequent years as long as it remained within the treatment window or until the treatment was applied. Since all the existing stands were assigned an imputed stand attributes, not the average guide curve values, some lower-stocked stands which could not meet the minimum post-harvest criteria could be left to grow. Depending on the stand, the priority for commercial thinning in a particular alternative and the harvest related criteria described above, stands might or might not receive treatment.

Shelterwood Modeling

Shelterwood treatment areas were identified and mapped for the Medford District in areas with frost problems or granitic soils. Within these areas, all stands classified as Ponderosa pine Species Group were excluded from modeling under the Shelterwood Management Regime and modeled along with like stands according to the rules of the underlying general LUA.

Shelterwood regeneration harvest levels used in OPTIONS modeling were computed using the basal area difference between the existing stand pre- and the post-shelterwood treatment basal area levels. It was assumed that the ORGANON cycle 3 (15-year) residual stand basal area statistics approximated that of the post-shelterwood treatment stand.

Shelterwood treatments were modeled to occur approximately 30 years prior to 90% CMAI for Productivity Class 5 Species Groups and approximately 20 years for Productivity Classes 1- 4.

Shelterwood stands, for modeling purposes were stratified into separate age-based grouping: Young, Mature, Old and Very Old stands. (See *Table R-22*) These are identified with Species Group prefixes of S, M, O and V respectively (e.g. SSDF represents Young Southern Douglas-fir, MSDF for Mature, OSDF for Old and VSDF for Very Old). The partition of stands into these various modeling groups was based on initial ten-year age class and varies by Species Group – Site Productivity combinations.

Table R-22. Initial Age Criteria For Shelterwood

Shelterwood Species Group Age Criteria									
Species Group	Site Productivity Class	Maximum Group Age by Shelterwood Modeling Species Groups							
		Young		Mature		Old		Very Old	
PP	SP1	115	SSPP	200	MPP	285	OPP	370	VPP
PP	SP2	115	SSPP	200	MPP	285	OPP	370	VPP
PP	SP3	115	SSPP	200	MPP	285	OPP	370	VPP
PP	SP4	115	SSPP	200	MPP	285	OPP	370	VPP
PP	SP5	140	SSPP	220	MPP	300	OPP	380	VPP
SCH	SP1	110	SSCH	195	MSCH	285	OSCH	370	VSCH
SCH	SP2	110	SSCH	195	MSCH	285	OSCH	370	VSCH
SCH	SP3	110	SSCH	195	MSCH	285	OSCH	370	VSCH
SCH	SP4	120	SSCH	205	MSCH	285	OSCH	370	VSCH
SCH	SP5	155	SSCH	230	MSCH	305	OSCH	380	VSCH
SDF	SP1	100	SSDF	190	MSDF	280	OSDF	370	VSDF
SDF	SP2	105	SSDF	195	MSDF	280	OSDF	370	VSDF
SDF	SP3	110	SSDF	195	MSDF	285	OSDF	370	VSDF
SDF	SP4	120	SSDF	205	MSDF	285	OSDF	370	VSDF
SDF	SP5	140	SSDF	220	MSDF	300	OSDF	380	VSDF
SHW	SP1	110	SSHW	195	MSHW	285	OSHW	370	VSHW
SHW	SP2	110	SSHW	195	MSHW	285	OSHW	370	VSHW
SHW	SP3	110	SSHW	195	MSHW	285	OSHW	370	VSHW
SHW	SP4	120	SSHW	205	MSHW	285	OSHW	370	VSHW
SHW	SP5	155	SSHW	230	MSHW	305	OSHW	380	VSHW
SMC	SP1	110	SSMC	195	MSMC	285	OSMC	370	VSMC
SMC	SP2	110	SSMC	195	MSMC	285	OSMC	370	VSMC
SMC	SP3	110	SSMC	195	MSMC	285	OSMC	370	VSMC
SMC	SP4	120	SSMC	205	MSMC	285	OSMC	370	VSMC
SMC	SP5	155	SSMC	230	MSMC	305	OSMC	380	VSMC
STF	SP1	120	SSTF	205	MSTF	285	OSTF	370	VSTF
STF	SP2	120	SSTF	205	MSTF	285	OSTF	370	VSTF
STF	SP3	120	SSTF	205	MSTF	285	OSTF	370	VSTF
STF	SP4	140	SSTF	215	MSTF	295	OSTF	370	VSTF
STF	SP5	145	SSTF	225	MSTF	300	OSTF	380	VSTF

Uneven-Age Management Modeling

To facilitate OPTIONS modeling, stands in the Uneven Age Management Area were stratified into three separate Management Regimes; Young, Old and Future. (See *Table R-23*)

Uneven-age modeling was applied to the Uneven-Age Management Area land use allocation in the Medford District and to most of Klamath Falls Resource Area of the Lakeview District.

The sequence of 5 treatments was similar in all three OPTIONS Management Regimes and across all combinations of Species Group and Site Productivity classes. Harvest entries were modeled at 20, 30 or 50-year intervals, depending on Species Group, productivity level and stand type. The initial entry, at whatever age, might be best termed a Preparatory or Fuels Hazard Reduction treatment. The ORGANON modeling for this harvest entry focuses on thinning from below, concentrating on removal of smaller diameter trees. The second and third treatments are more traditional proportional commercial thinnings, removing trees across the range of diameters. The fourth treatment entry was, with a few exceptions, a non-commercial thinning entry for reducing the number of smaller, younger trees and potential fuel ladders. The fifth and final entry in this modeling sequence is another thinning entry which the OPTIONS model identifies as a Selection Harvest. After the Selection Harvest entry, both the Young and Old modeling groups shift to the Future stand Management Regime and follow another similar treatment sequence for the remainder of the modeling cycle.

Table R-23. Old Versus Young Age Class Thresholds By Site Productivity Level

Species Group	Old Versus Young Age Class Threshold by Site Productivity Level				
	SP5	SP4	SP3	SP2	SP1
	Age	Age	Age	Age	Age
SCH	200	130	130	130	n/a
SDF	200	200	200	130	130
SHW	200	130	130	n/a	n/a
SMC	200	130	130	130	130
STF	130	130	130	130	130
SPP	70	70	70	70	70

Harvest Priorities

Within the OPTIONS model the source of harvest volume could be prioritized by three categories of "Wood Type" defined and held constant across all alternatives.

- Older Forest – Regeneration harvest stands 200 years and older.
- Second Growth – Regeneration harvest of stands less than 200 years.
- Thinning – All thinning, intermediate, or partial harvests.

Within the model, Wood Types are assigned priorities 1 through 3, with 1 being the highest and 3 the lowest priority for harvest.

Within each Wood Type a lower and an upper harvest request limit can be designated.

An overall harvest volume is established in the Model as a maximum harvest level for any one year. The model will then attempt to satisfy the first priority Wood Type lower harvest request. Then do the same with the other two Wood Type priorities. After the lower harvest limits have been, to the extent possible, implemented across all three Wood Types, the model goes through the Wood Types by priority to satisfy any upper limit of harvest requests. If the upper harvest limit can not be satisfied in the first wood type priority then it proceeds to the next wood type priority until it attains the over all harvest level requested.

These lower and upper limits for each wood type can be modified for specific time periods of the projection.

These harvest priority controls can be used to control the rate of harvest in a particular Wood Type as well as balancing the levels of harvest across wood types.

Establishing Harvest Levels

The OPTIONS modeling projections occurred in increments of one year. Thus, all management objectives were maintained, and requested harvest levels met, in each year of the planning horizon. The planning horizon for all analyses was 100 years, although the final ASQ harvest level for each alternative was tested at 400 years to ensure its long-term sustainability. The sustainability analyses were subject to the same criteria as the 100 year analyses.

Harvest volume projections were based on the lands available for harvest, under the assumptions of the alternative within each sustained yield unit. Those lands which contribute to the ASQ can be managed over an extended period of time to provide a sustainable non declining level of harvest. Harvest from reserves (Late-Successional Reserves / Late Successional Management Areas and or Riparian Reserves / Riparian Management Areas) would diminish as stands grow past the conditions suitable for thinning and would not produce a sustainable harvest over time.

The sustainable harvest level from the land base supporting the ASQ was modeled separately from that harvest which can be derived from the reserves. Segregating the landbase and modeling of harvest volume in this manner isolated the interaction of these two types of allocations.

For ASQ lands, a non-declining even flow (NDEF) strategy was applied. Based on this approach a single maximum harvest level was modeled for the entire planning horizon and tested within a defined level of precision (increments of 1 million board feet, 0.1 for Klamath Falls). The exception to this approach was in the modeling of Alternative 3 where a future increase in the ASQ harvest levels were determined after landscape targets were achieved for an entire Sustained Yield Unit.

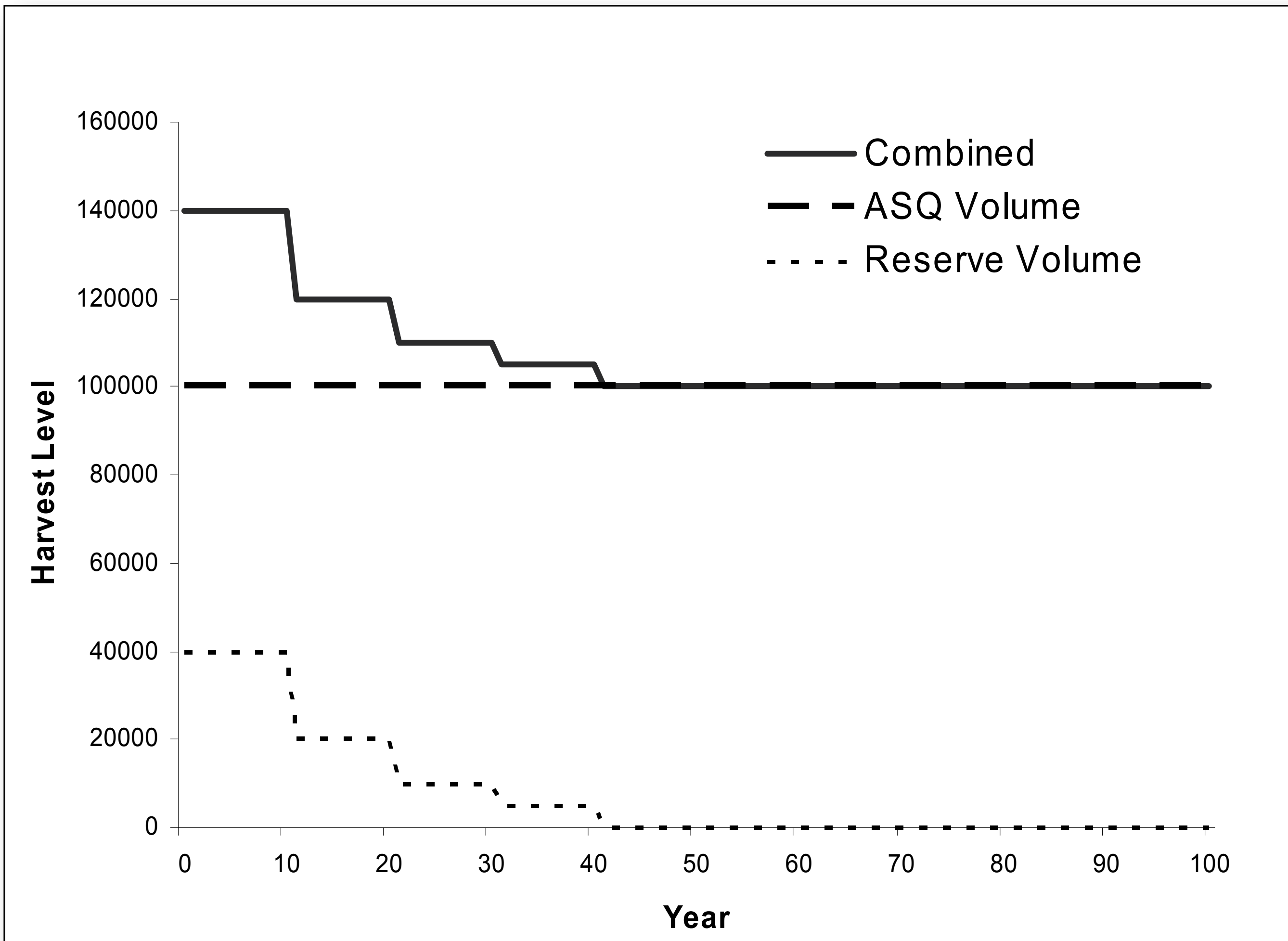
Generally, reserve lands permit limited management activities and thus have a limited period of availability. The NDEF strategy was not an appropriate method of modeling these areas so an uneven flow strategy was applied. Reserve lands only provided timber within the short-term (within the first 80 to 100 years, depending on the alternative), so a stair- stepped method was used to characterize and report partial harvest volume. With this approach a maximum harvest volume for each 10-year period was determined.

A combined ASQ and reserve land OPTIONS run was performed for the production of the Ten-Year Scenario, Northern Spotted Owl Habitat Projections, Structural Stage Projections and other post processing reporting. A maximum harvest level of the larger combined harvest landbase was not modeled. The total harvest volume modeled was the simple sum of the ASQ and reserve harvest volumes, although the reserve harvest volume amount was first reduced by 20% to approximate operational fall down. A maximum harvest volume level of the larger combined harvest levels landbase was not modeled. The overall thinning harvest level in terms of acres and volume matched the combined request but the proportions coming from inside and outside reserves was not controlled in the combined run. This appeared in Alternative 3 where a very small amount of riparian thinning (2 MMBF out of 473 MMBF total) was requested in the combined run but none if occurred in the riparian areas.

The sustainable harvest level for the PRMP was initially determined to be 523 MMBF. When the stands in the deferred timber management area became available for harvest, there was a high proportion of the volume coming from regeneration harvest of these stands and the thinning levels elsewhere were lower. The sustainable harvest level of 502 MMBF was established to maintain a balanced level of regeneration harvest and thinning over time.

Figure 22 is an example of non-declining ASQ harvest volume, stair-stepped reserve harvest volume and combined harvest volumes.

Figure R-22. Reserve, ASQ, And Total Volume



Creating Blended Yield Curves for Alternative 3

Alternative 3 included rules that excluded regeneration harvests until older forest retention target thresholds were achieved. Additionally, within each landscape unit intermediate harvests with high levels of green tree retention were permitted prior to achieve the landscape target levels of older forests. (See *Table R-24)*

In the other alternatives, yield curves were developed by the growth and yield team with the Organon model. However, the high retention levels of the intermediate harvests in Alternative 3 presented a modeling challenge for Organon. Investigation by the growth and yield specialists revealed that in the ORGANON model, it would be difficult to develop an appropriate set of tree data to represent the multi-storied character of the intermediate harvests. As an alternative, a simple mathematical approach was considered a suitable technique for developing the blended guide curves for the multi-storied stand conditions resulting from intermediate harvests. It was recognized that this approach did not account for the treatment, competition, or edge effects of the intermediate harvest. The blending process was applied to the Organon stand summary table for the OPTIONS analysis, and for the Organon detailed stand tables for use with the Northern Spotted Owl habitat index and structural stage classification.

This mathematical approach involved combining (or blending) the yield curve of the untreated portion of the stand with the yield curve of the treated portion of the stand. The blending technique apportioned basal area, volume and density based on the retention level of the intermediate harvest. Stand height and diameter were not blended. These attributes were based wholly on the yield curves for the treated portion of the stand.

Table R-25 provides an example of the pairing between the untreated overstory yield curve and the treated understory yield curve that resulted in a blended yield curve. The values represent the Current Vegetation Survey name prefix. A curve naming convention was established to identify the resulting blended yield curve based on the zone and treatment age. For example, the generation of the 1st intermediate harvest at age 120 for the Hemlock Zone would result in the blended curves shown in *Table R-25.*

For example, if the intermediate harvest retained 40% of the original stand, the blended curve would include

Table R-24. Stand Treatment Age And Percent Retention Used To Blend Yield Curves For Intermediate Harvests

Zone	1st Intermediate Harvest		2nd Intermediate Harvest		3rd Intermediate Harvest		4th Intermediate Harvest	
	Age	%	Age	%	Age	%	Age	%
Hemlock	120	35	240	35	0	0	0	0
Douglas-fir	80	19	160	19	240	19	0	0
Tanoak	60	35	120	35	180	35	240	35

Table R-25. Initial, Regeneration, And Resulting Blended Yield Curves

Overstory Curve	Understory Curve	Blended Curve
MG1_1_NCM_NONE	NDF_NO_OS_1_PCT260	ALT3_H120_MG1_1_NDF
MG1_2_NCM_NONE	NDF_NO_OS_2_PCT260	ALT3_H120_MG1_2_NDF
MG1_3_NCM_NONE	NDF_NO_OS_3_PCT260	ALT3_H120_MG1_3_NDF
MG1_4_NCM_NONE	NDF_NO_OS_4_PCT260	ALT3_H120_MG1_4_NDF
MG1_5_NCM_NONE	NDF_NO_OS_5_PCT260	ALT3_H120_MG1_5_NDF

40% of the stems from the original and 60% of the regenerated stand curve. The curves assigned to existing stands differed from curves assigned to recently regenerated areas to reflect current and/or future regenerations standards. In the model, the treated stand retains the age of the overstory which represents the initial age of the blended curve. Figure R-23 compares a stand's initial yield curve, the regeneration yield curve, the blended curve, and how a stand progresses from its initial curve to the blended curve. In the example shown in *Figure 23*, a stand receives an intermediate harvest at age 80. At the time of treatment, the stand supports a volume of approximately 70,000 board feet/ acre. Immediately after treatment, the stand retains its age of 80, and has a residual volume of approximately 15,000 board feet/acre, or approximately 22% of the original stand volume. After treatment, the stand is assigned to the blended yield curve and grows at the blended rate.

Within the various landscape units, multiple intermediate harvests were permitted, and for each possible intermediate harvest an additional blended yield curve was required. Blended curves were applied after intermediate harvest treatments. Where the blended curve of the first intermediate harvest was created from the initial curve combined with a regeneration curve, each successive treatment combined the previously blended curve with a regeneration curve. Once the landscape targets were achieved, stands were regeneration harvested and then assigned to an unblended regeneration curve. The blended curves extended to a stand age of 400 years. In OPTIONS, stands older than this were assigned the attributes of the 400 year old stand.

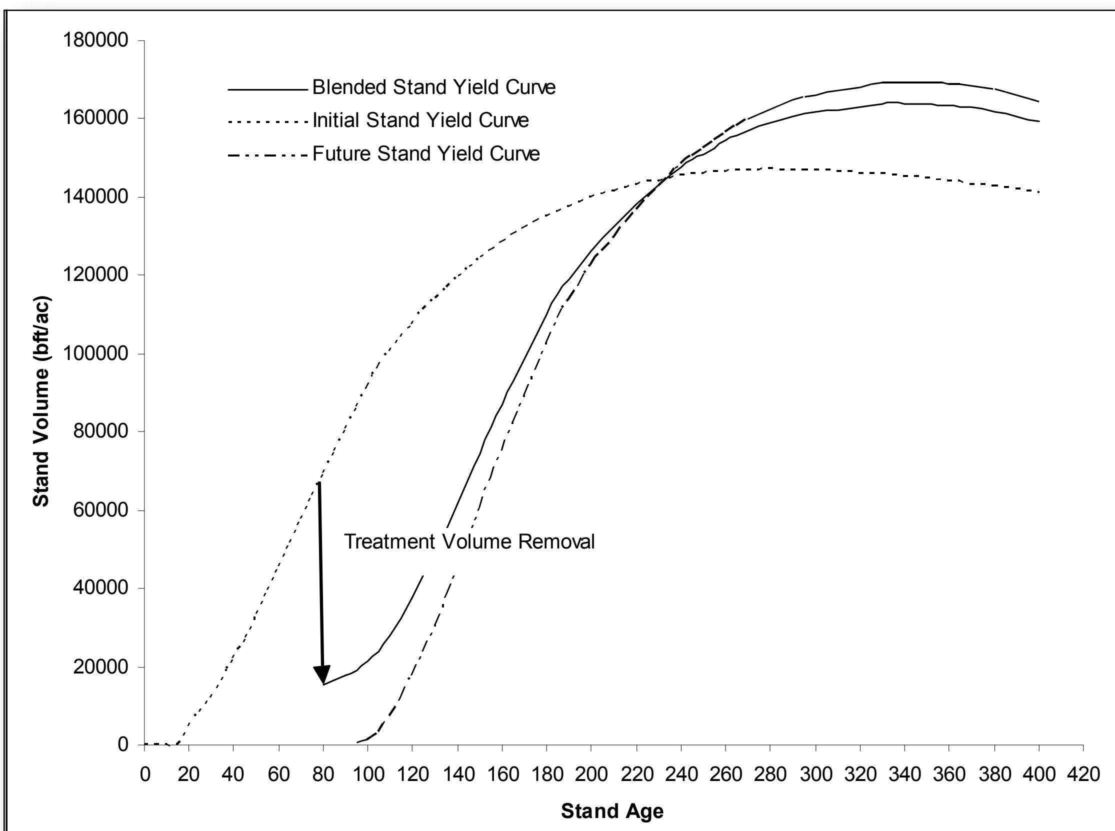


Figure R-23. A Comparison Of An Initial Yield Curve, The Regenerated (Future) Yield Curve And The Blended Curve

Alternative 3 Blended Curve Procedures

Create a blended curve for a stand within the Douglas-fir Zone (DF) with an intermediate harvest at age 80 years. This is the first intermediate harvest age and the green tree retention level is 19%.

Stand Summary Blending

1. Initialize the new blended yield curve with the stand characteristic from the overstory yield curve beginning at the blending age and continuing to the end of the projection horizon.

2. Incorporate the stand characteristics from the understory yield curve, matching the blended stand age with the initial understory age. In this example, the overstory stand characteristics at age 80 are matched with the stand characteristics of the understory at age 0.

3. Calculate the blended stand characteristics through the simple mathematical approach of summing the retention percent of the overstory stand and the remaining percent of the understory stand. In this example, 19% of the overstory stand is combined with 81% of the understory stand. This approach is applied to basal area, trees per acre and volume. Quadratic Mean Diameter (QMD) and height are re-set to the understory levels. Relative density (RD) is recalculated based on blended values for QMD and basal area.

Stand Table Blending

1. Initialize the new blended stand table with the overstory stand table values for each species and diameter beginning at the blended stand age and continuing to the end of the projection horizon.
2. Incorporate the stand table values from the understory stand table by species and diameter, matching the blended stand age with the initial understory age. In the case where there is no matching understory species and diameter, incorporate these additional stand table values into to the blended stand table.
3. Calculate the blended stand table values through the simple mathematical approach of summing the retention percent of the overstory stand with the remaining percent of the understory stand. This approach is applied to basal area, live trees per acre, dead trees per acre and board foot volume and cubic foot volume. Height is re-set to the understory value.

   In the case where there are only overstory stand values, the retention percent of the overstory stand values are used. In our example, 19% of the overstory stand values would be used.

OPTIONS Products

Introduction

The projection of forest conditions with OPTIONS is based on the model tracking the change over time for five basic attributes:

- Density – trees per acre
- Volume – board feet per acre
- Diameter
- Basal Area
- Height

The growth and yield curves coming from the ORGANON modeling can also be used as a source for forest attribute information since each OPTIONS polygon has a relationship with a growth curve.

Additional modeling was performed to create look up tables for the presence and absence of dead wood which could be related back to the OPTIONS projections.

Considering each alternative has between 400,000-600,000 polygons, each with 5 attributes, projected in annual increments for 200-400 years the potential data array from OPTIONS alone is considerable. Drawing data relationships from ORGANON or other models to derive forest attributes related to the OPTIONS projections increase that potential data to draw upon. Many of the outputs for the modeling required custom programming to extract and formulate the products for the ID team analysis.

Although OPTIONS performs projections in annual increments, only key projection reporting periods (0, 10, 20, 30, 40, 50, and 100 years) were established for the ID team analysis.

The following products from the OPTIONS modeling are described in this section.

- ASQ / NON ASQ Volume
- Ten-Year Scenario
- Projections
  - — Structural Stages Projection
  - — Northern Spotted Owl Habitat Projection.
  - — Age Projection
  - — Carbon Projection
  - — Large Wood Projections
  - — OPTIONS Projections – Technical Papers
- Economic Analysis Data
- Time Slice Report
- State of the Forest
- Net Down Report
- Attribute Data for GIS

ASQ / NON ASQ Volume

Harvest volumes are a direct output from the OPTIONS model. Volumes from OPTIONS for the plan revisions are based upon scribner16 foot short log volumes. Harvest volumes are based on the capabilities of the forest lands in each individual Sustained Yield Unit given the management action and allocations of the alternative. All volumes are rounded down to the nearest whole million board feet.

- **ASQ Volume** - ASQ is synonymous with the O&C Act term Annual Productive Capacity. For each alternative, the non declining even flow volume that can be sustained from the harvest land base is the basis for, determining the Allowable Sale Quantity. Under Alternative 3 a two tiered volume was reported to account for the increased harvest level that can be attained after the landscape targets are met (regeneration harvest begins) and the owl and murrelet sites are released, resulting in an increase in the size of the harvest land base
- **Non ASQ** – Thinning harvest is simulated for the Riparian Reserves / Riparian Management Areas and for the Late-Successional Reserves / Late Successional Management Areas as they apply to the alternatives. The management actions for these allocations do not permit regeneration harvest and there are modeling age caps on the thinning treatments, thus a sustainable source of harvest cannot be expected from these lands. The OPTIONS modeling determined the amount of harvest volume that could be produced from these lands and stepped down harvest levels as the stands aged and their thinning treatment windows closed.

The ASQ and Non ASQ volumes were recorded by SYU for each alternative and reference analyses. The duration of the Non ASQ volume and the long term increase in ASQ for Alternative 3 was summarized as well.

No ASQ was calculated with the OPTIONS model or declared for the East-side Forest Management Areas in Klamath Falls since there are no O&C lands in that area.

Ten-Year Scenario

The Ten-Year Scenario selects polygon records that were harvested in the first ten years of the OPTIONS projections. For each polygon, the acreage and volume harvested is reported by harvest type; regeneration, commercial thinning or selection. The OPTIONS Ten-Year Scenario report also identified a random 1/3 sample of BLM sections that were harvested in the first decade and identified all harvest units within those sections.

The OPTIONS output of the polygons harvested by harvest type with acreages and volume were brought back to GIS to make map products with these attributes. The Districts evaluated the harvest units in the sample sections to identify the logging system, and road construction needs.

The Ten-Year Scenario reports were produced for the No Action and all action alternatives. A database was created with the first decade polygons harvested, with acreage and volume by harvest type at the SYU and District level. This data was linked to the vegetation polygons to make GIS coverages and map products.

See the Timber Appendix for further description of the methodology of the Ten-Year scenario.

Projections

Post processing of the OPTIONS data created a classification of every OPTIONS vegetation polygon record at year 0, 10, 20, 30, 40, 50, and 100 years for the structural stage classification, Northern Spotted Owl habitat classification and age class distributions. Databases were created for the No Action, action alternatives, and reference analysis. This data was linked to the vegetation polygons in GIS for further spatial analysis.

1) Structural Stage Projections

The following structural stage classifications were used in the modeling:

1) Stand Establishment

1a.) Without Structural Legacies

1b.) With Structural Legacies

2) Young

2a.) Young High Density

2a1.) Without Structural Legacies

2a2.) With Structural Legacies

2b.) Young Low Density

2b1.) Without Structural Legacies

2b2.) With Structural Legacies

3) Mature

3a.) Single Canopy

3b.) Multiple Canopy

4) Structurally Complex

4a.) Existing Structurally Complex

4a1.) Existing Old Forest

4a2.) Existing Very Old Forest

4b.) Developed Structurally Complex

2) Northern Spotted Owl Habitat Projections

Three classes of habitat were determined based on diameter class, canopy cover, presence/ absence of snags (10 snags per hectare greater than 25 centimeters), presence / absence of down woody debris (greater than 2% ground cover).

The classification used in the Draft EIS was revised for the Final EIS as follows:

- Exception for size 11-20, canopy cover 60-100 for the Salem District only.
- Dispersal habitat that was in mature multi canopy or structurally complex structural stages were re-classified as suitable (tracked as code 2-ss).

Table R-26. Northern Spotted Owl Habitat Projections

Diameter Class (Inches)	Canopy Cover (%)	Snag Presence (p) / Absence (a)	Down Woody Debris Presence (p) / Absence (a)	Habitat Code Value[a]
[a]Habitat Code values: 1 - non-habitat, 2 - dispersal, 4 - suitable and dispersal (Finalized 10/18/2006)				
11-20	0-40	a	a	1
11-20	0-40	p	a	1
11-20	0-40	a	p	1
11-20	0-40	p	p	1
0-11	0-100	n/a	n/a	1
20-30	0-40	a	a	1
20-30	0-40	p	a	1
20-30	0-40	a	a	1
20-30	0-40	p	a	1
20-30	0-40	a	p	1
20-30	0-40	p	p	1
20-30	0-40	a	p	1
20-30	0-40	p	p	1
30-100	0-40	a	a	1
30-100	0-40	p	a	1
30-100	0-40	a	a	1

Diameter Class (Inches)	Canopy Cover (%)	Snag Presence (p) / Absence (a)	Down Woody Debris Presence (p) / Absence (a)	Habitat Code Value[a]
[a]Habitat Code values: 1 - non-habitat, 2 - dispersal, 4 - suitable and dispersal (Finalized 10/18/2006)				
30-100	0-40	p	a	1
30-100	0-40	a	p	1
30-100	0-40	p	p	1
30-100	0-40	a	p	1
30-100	0-40	p	p	1
11-20	40-60	a	a	2
11-20	40-60	p	a	2
11-20	40-60	a	p	2
11-20	60-100	a	a	2
11-20	60-100	p	a	2
20-30	40-60	a	a	2
20-30	40-60	p	a	2
20-30	40-60	a	a	2
20-30	40-60	a	p	2
20-30	60-100	a	a	2
20-30	60-100	a	a	2
30-100	40-60	a	a	2
30-100	40-60	p	a	2
30-100	40-60	a	a	2
30-100	40-60	p	a	2
30-100	60-100	a	a	2
30-100	60-100	a	a	2
11-20	40-60	p	p	2
11-20	60-100	a	p	4/2 Salem
11-20	60-100	p	p	4/2 Salem
20-30	40-60	p	a	2
20-30	40-60	p	p	2
20-30	40-60	a	p	2
20-30	60-100	p	a	4
20-30	60-100	p	a	4
20-30	60-100	a	p	4
20-30	60-100	p	p	4
30-100	40-60	a	p	2
30-100	40-60	p	p	2
30-100	60-100	p	a	4
30-100	60-100	a	p	4
20-30	40-60	p	p	4
20-30	60-100	a	p	4
20-30	60-100	p	p	4
30-100	40-60	a	p	4
30-100	40-60	p	p	4
30-100	60-100	p	a	4
30-100	60-100	p	p	4
30-100	60-100	a	p	4
30-100	60-100	p	p	4

3) Age Class Projections

Starting age classes derived from the Forest Operations Inventory (see inventory data section of this appendix) increment forward on an annual basis with the OPTIONS projections until regeneration harvest treatments reset the age. The stand ages under Alternative 3 should be treated as broad age groups since the yield curves and the progression of stands over time reflect multi storied stand conditions in which a single age does not well represent a multi storied stand.

4) Carbon Projections

The carbon sequestration projection forecasts the total-unit standing inventory volume of carbon within each forest stand at the reporting point (report date years 0, 10, 20, 30, 40, 50, 100)). This carbon volume (metric tonnes) is based on individual forest stand volume which reflects the management activities (treatments) scheduled in the OPTIONS model and the volume projections (ASQ and non-ASQ) derived from the ORGANON model. A series of factors are then applied to convert the stand volumes (per acre) to total carbon volume for each forest stand

See Appendix C, (Carbon Storage Modeling) for further details on the carbon projection.

5) Large Wood Projections

The Large Wood projection provides statistics for each forest stand on the number of stems, density, height and diameter of the live and standing dead trees by 10 inch diameter class for conifer and hardwood at each reporting point (0, 10, 20, 30, 40, 50, 100 years). The reports account for management activities and stand growth and mortality.

See Appendix J, (Fish) for further details on the large wood projections.

6) OPTIONS Projections (Technical Papers Spotted Owl Habitat / Structural Stage, Carbon, Large Wood)

Northern Spotted Owl (NSO) Habitat and Structural Stage Classification

ORGANON Stand Tables for NSO Habitat and Structural Stage Classification Data

The NSO dispersal habitat and structural stage classifications are based on a number of stand averages and stand table statistics. Stand height is an example of stand average information, the number of stems greater than a threshold diameter, or the number of snags of a particular decay class, are examples of stand table information. The OPTIONS model utilized and reports stand average data but did not provide the detailed stand table information required in the dispersal habitat and structural stage classifications. To project habitat and structural stage conditions throughout the planning horizon, ORGANON stand tables were required.

In the modeling environment, each WOPR unit may receive a number of possible treatment combinations throughout the planning horizon. The number of possible treatments varies by management regime (a series of treatments), species group, site productivity and alternative. The actual sequence of treatments a WOPR unit receives is a dynamic modeling process, dependent upon stand and landscape level targets and rules; it cannot be forecast outside of the OPTIONS model. However, it is possible to describe all possible combinations of treatments, and from this all inclusive set, select the actual scenario of treatments as reported by OPTIONS. Thus, an ORGANON stand table was created for each possible unique combination of treatment, species group and site productivity, for each management regime and for each alternative. A crosswalk table was defined to provide a reference between the treatment combinations and the corresponding stand table.

Modeling Process

There are a number of stand attributes to be considered in the habitat and structural stage classification for an individual WOPR unit, at a particular point in time. The ORGANON treatment stand tables were pre-processed, and then further analyzed to calculate specific habitat and structural stage statistics. These statistics, referred to as 'index values', are reference values in a look-up table; the Index Table. The index values for every modeling group, stand group, site index and treatment are stored in the Index Table.

One of the key steps in the pre-processing of the stand tables for northern spotted owl habitat classification was to generate index values for snags and down woody debris. The CWDM model was used to generate this information based on input from the stand table dead trees. Together, the stand tables and snag and downed woody debris information provided the detailed information necessary to complete the habitat. Information from the CWDM is also reported within the Index Table.

The OPTIONS model records for each WOPR unit and for all years in the planning horizon, all silvicultural and harvest treatments performed. Also recorded are details of the treatments such as: the area treated, the type of treatment, the volume removed, as well as stand attribute information after treatment. Based on this information it is possible to compile a complete history of activities for each WOPR unit for the entire planning horizon.

Based on the information from the WOPR unit activity history provided by OPTIONS, the appropriate stand table reference is identified in the crosswalk table. This stand table reference is used to locate the index values in the Index table that will be evaluated to define the NSO dispersal habitat and structural stage classification.

Methodology

The following methodology was applied to generate the NSO Habitat and Structural Stage Index Report.

Source Information

<u>NSO Dispersal Habitat Classification</u>

An NSO Dispersal Habitat definition table was used to define the stand conditions required to meet dispersal habitat. These included:

- Diameter Range– average stand diameter from summary table
- Canopy Closure – based on relative density as follows:
  Canopy Closure = -12.298 + 2.375(RD) – 0.014(RD)^2
- Snag presence: 10 snags/acre greater than 10"
- Down woody debris presence: 2% ground cover. The percent ground cover was approximated using a conversion factor and volume by retention plant zones
  (Volume (cu ft/ac)/X var = % cover) (see *Table R-27*)

Table R-27. Plant Zone and Down Woody Debris Volume

Retention Plant Zone	DWD Volume (ft3/ac)
Ponderosa Pine/Douglas Fir	362.648
Southwest Oregon conifer	465.179
Westside conifer	62.771

Note: TanOak and DF = SW Oregon, and W. hemlock = West side conifer
Note: Species Group of P. Pine for the p.pine/d.fir in SW Oregon

- Canopy (single/multi-story): A diameter diversity index (DDI) of 60 was used to determine the distinction between single and multi-story canopy, with single-story canopy having a DDI greater than 60 and multi-story canopy having a DDI less than or equal to 60.

Structural Stage Classification

Structural Stage Classification definitions were provided based on the following stand characteristics:

- Age: stand age from summary table
- Height: average stand height from summary table
- TPA: number of trees per acre by diameter from the stand table
- Relative Density: average stand relative density from the summary table
- Legacy Presence: the presence of legacy as an initial condition (based on MicroStorms structure stage classification) as well as the future creation of legacy based on alternative harvest prescriptions.
- CVgt(10): from summary table coefficient of variation of tree diameters greater than 10" dbh.

All Possible Treatment Yield Curve Crosswalk Table

This table (ACT2CVS_XWALK) identifies which treatment yield curve to use for the required stand characteristics and index values to determine the NSO Dispersal Habitat and Structural Stage Classifications. The treatment yield curve is identified based on the current alternative, management regime, species, site productivity class, and treatment age. Below is an example of the crosswalk table.

Index Value Lookup Table

This table, (INDX_LKUP) is an alternative-based lookup table containing projected stand characteristics and index values for each treatment yield curve. Some of the index values available include:

- Stand characteristics: age, basal area, TPA, QMD, height, volume, crown ratio, canopy closure, relative density, SDI, CV, DDI,
- TPA by 10" diameter classes: # of trees in 0" to 9", 10" to 19", 20" to 29", 30" to 39", greater than or equal to 40"
- Snags by 10" diameter classes: # of snag in 0" to 10", 11" to 20", 21" to 30", 31" to 40", greater than 40"
- Snag TPA: # of snags greater than 10" dbh
- CWD by 10" diameter classes: sum of volume in 0" to 10", 11" to 20", 21" to 30", 31" to 40", greater than 40"
- CWD vpa: sum of volume greater than 10"
- Calculated canopy closure: canopy closure calculated based on relative density
- Overstory stand characteristics: available for Alternative 3 blended curves, based on the untreated yield curve (basal area, tpa, qmd, height, volume relative density, tpa by 10" diameter class, CV, DDI)
- Understory stand characteristics: available for Alliterative 3 blended curves, based on the treated yield curve (basal area, tpa, qmd, height, volume relative density, tpa by 10" diameter class, CV, DDI)

OPTIONS Run Files

To post-process an OPTIONS run, the following OPTIONS run files are required:

- OPTIONS data files (.DBF, .DBS, .SPG, .SIC)
- OPTIONS run files (.DEF, .DEV, .RUN, .I, .II., .V)

Procedure

For each Alternative:

1. Using ORGANON, generate the possible treatment stand tables based on the Alternative's management regime definitions. Create the Crosswalk Table to identify which stand table to reference for a particular treatment combination.

2. Based on the Crosswalk Table, pre-process each treatment stand table to generate the index values that will be used to define the habitat and structural stage classifications. This includes projecting snag and CWD using stand table attributes. Create the Index Table to identify which index values to use for a particular treatment stand table.

3. Initialize a Habitat Report Table by listing for each WOPR unit the OPTIONS inventory values for forest type (forest, non-forest, road), initial management regime, species group, site productivity class and area.

For each forested WOPR unit in the Habitat Report Table:

4. Set initial conditions:
    - Initial Structural Stage and legacy (based on OPTIONS inventory structural stage)
    - Plant Series/Retention Zone (based on OPTIONS inventory)
    - NSO Variance: based on plant series, species group and habitat definition
    - Alternative 2 GTR (green tree retention) flag for MOCA and SHRUB areas

5. Based on the OPTIONS run results, build the WOPR unit Activity History Table including harvest activities and state of the forest years in chronological order. Also record the stand management regime, species group, site productivity and age at which these actives occur. This history table represents the changes in stand characteristics over time.

For each Activity in the Activity History:

6. Determine the current thinning treatment combination, partial harvest condition and legacy based on the type of activity completed.

    For Regeneration Harvest: reset thinning treatment combination, reset partial harvest conditions, re-evaluate legacy:
    - No Action Alternative (modeled tree retention), legacy is present (WL)
    - Alternative 1 (no modeled tree retention), then legacy is not present (WOL)
    - Alternative 2 (no modeled tree retention), then legacy is not present (WOL).
    - Alternative 2, MOCA and SHRUB area (modeled tree retention), then legacy is present (WL)
    - Alternative 3 (modeled tree retention), legacy is present (WL)
    - PRMP, area with GTR the legacy is present (Snag retention in LSMA –WL) otherwise legacy is not present (WOL)

    For Selection Harvest: reset thinning treatment combination, set partial harvest condition, re-evaluate legacy:
    - No Action Alternative, Alternative 1 and Alternative 2 there is no modeled selection harvest
    - Alternative 3 and PRMP has modeled selection harvest, so legacy is present (WL)

For Commercial Thinning: set thinning treatment combination based on thinning age and thinning sequence, no change to partial harvest condition or legacy.

7. Set activity stand table reference from Crosswalk Table based on the treatment combination.

8. Retrieve stand characteristics and index values from Index Table based on stand table reference.

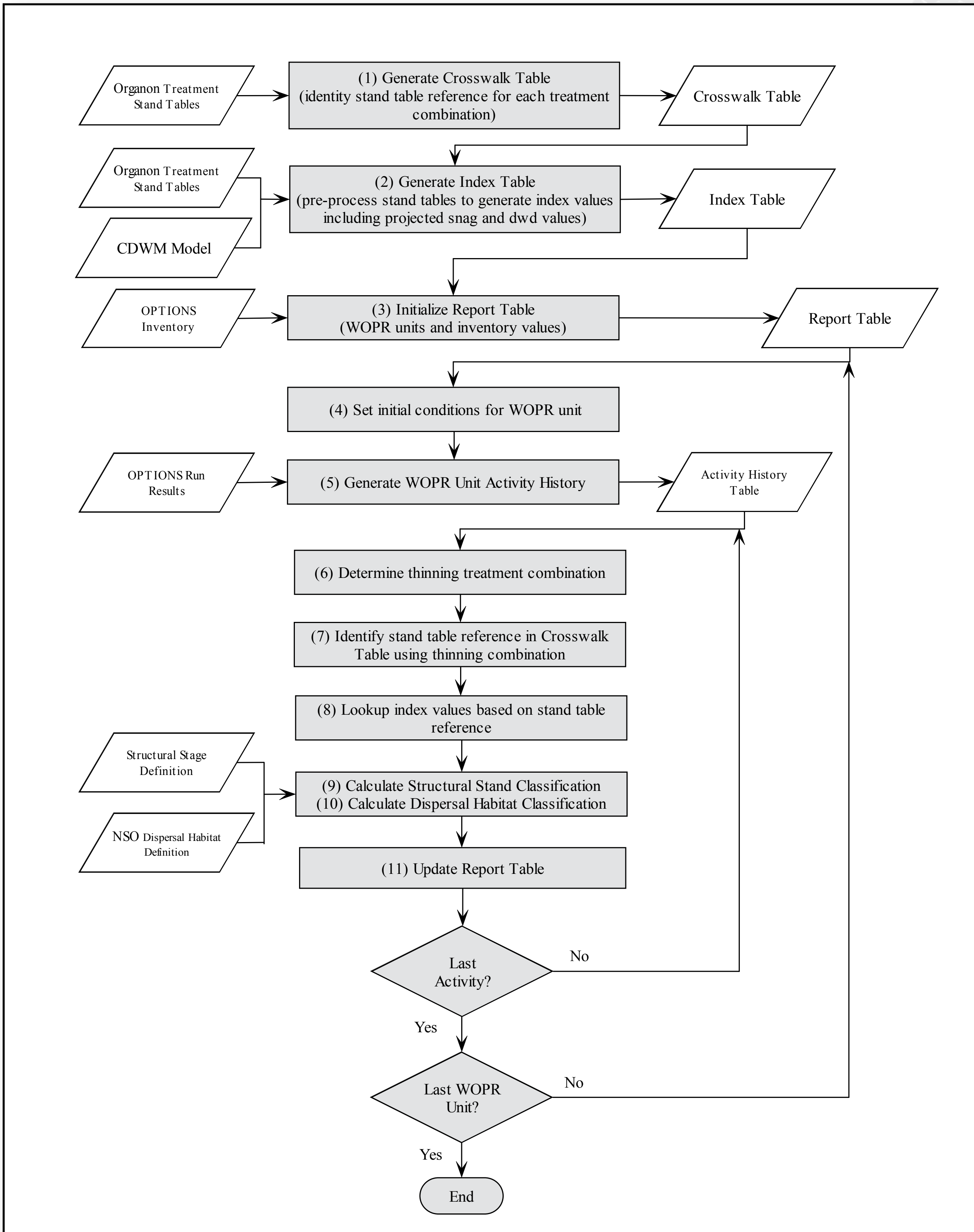
9. Calculate Structure Stage Classification based on index values and structural stage definition.
    - For Alternative 3 with partial harvest conditions, if height is <50' Structural Stage is based on understory values. Otherwise Structural Stage is based on stand values.
    - For Alternative 3 with partial harvest conditions, if Structural Stage is calculated as Mature-Single-Story, then canopy is reset to multi-story.

10. Calculate NSO Dispersal Habitat Classification based on index values and dispersal habitat definition.
    - For Alternative 3 with partial harvest conditions, canopy is set to multi- story. Otherwise, canopy is set based on DDI values.
    - The NSO Classification is then re-evaluated for Dispersal Classifications (class 2) that are within Mature Multiple Canopy or are Structurally Complex. These are re-classified as Dispersal with Structural Stage (class 2-SS)

11. Update Report Table with Structural Stage and NSO Dispersal Habitat Classification values for reporting years

See *Figure R-24* for a data flow diagram of this procedure.

Figure R-24. Data Flow Diagram For Owl Habitat And Structural Stage Classification



Carbon Sequestration Projection

The carbon sequestration projection forecasts the total-unit standing inventory volume of carbon within each WOPR unit at the reporting point (report date). This carbon volume (metric tonnes) is based on individual WOPR unit stand volume which reflects the management activities (treatments) scheduled in the OPTIONS model and the volume projections (ASQ and non-ASQ) derived from the ORGANON model. A series of factors are then applied to convert the stand volumes (per acre) to total carbon volume for each WOPR unit.

Modeling Process Overview

The calculation of total carbon volume requires information about the stand volume per acre, including both ASQ and non-ASQ species. However, because OPTIONS utilizes and reports stand information for ASQ species only, it was necessary to adopt a method to determine the total (ASQ and non-ASQ) stand volume for each WOPR unit at each reporting point.

In the OPTIONS model, each WOPR unit is uniquely managed based on the hierarchy of management assumptions and objectives. The application of these assumptions and objectives create a dynamic modeling process that affects the sequence and timing of stand level treatments, this sequence cannot be forecast outside of the OPTIONS model. However, based on the OPTIONS modeling framework it was possible to define the entire range of possible treatment combination based on modeling group, site index and treatment timing and intensity, which were then modeled in ORGANON to create stand tables with total stand volume (ASQ and non-ASQ species).

For modeling convenience this large set of ORGANON volume data was consolidated into a single Index Table that contained the volume information to represent every combination of modeling group, species group, site index and treatment timing and intensity. This volume information was expressed as the total board foot volume per acre unit. The per acre stand inventory volume was determined for each WOPR unit by reviewing the sequence of OPTIONS treatment details and then referring to the corresponding ORGANON volume data from the Index Table.

Board foot volumes were then converted to cubic foot volumes and then to dry wood weight by applying species sensitive conversion factors. An expansion factor was then applied to the dry wood weight to account for non-merchantable biomass including roots and branches. The dry wood weight was further converted to carbon volume and then multiplied by the WOPR unit area to derive a total carbon volume within the WOPR unit.

Methodology

The following methodology was applied to generate the Carbon Credit Report.

<u>Source Information</u>

Carbon Factor Lookup Table:

> A Carbon Factor Lookup table was provided that defines the board foot to cubic foot conversion factor by species. Also included in this table are various prices for carbon by cubic ton.

All Possible Treatment Yield Curve Crosswalk Table (ACT2CVS_XWALK):

> This table identifies which treatment yield curve to use for the required stand characteristics to calculate available carbon. The treatment yield curve is identified based on the current alternative, management regime, species, site productivity class, and treatment age.

Index Value Lookup Table (INDX_LKUP):

This table is an alternative-based lookup table containing projected stand characteristics and index values for each treatment yield curve. Some of the index values available include:

- Stand characteristics: age, basal area, TPA, QMD, height, total volume, crown ratio, canopy closure, relative density, SDI, CV, DDI,
- TPA by 10" diameter classes: # of trees in 0" to 9", 10" to 19", 20" to 29", 30" to 39", greater than or equal to 40"
- Snags by 10" diameter classes: # of snag in 0" to 10", 11" to 20", 21" to 30", 31" to 40", greater than 40"
- Snag TPA: # of snags greater than 10" dbh
- CWD by 10" diameter classes: sum of volume in 0" to 10", 11" to 20", 21" to 30", 31" to 40", greater than 40"
- CWD vpa: sum of volume greater than 10"
- Calculated canopy closure: canopy closure calculated based on relative density
- Overstory stand characteristics: available for Alternative 3 blended curves, based on the untreated yield curve (basal area, tpa, qmd, height, volume relative density, tpa by 10" diameter class, CV, DDI)
- Understory stand characteristics: available for Alliterative 3 blended curves, based on the treated yield curve (basal area, tpa, qmd, height, volume relative density, tpa by 10" diameter class, CV, DDI)

<u>OPTIONS Run Files</u>

To post-process an OPTIONS run, the following OPTIONS run files are required:
— OPTIONS data files (.DBF, .DBS, .SPG, .SIC)
— OPTIONS run files (.DEF, .DEV, .RUN, .I, .II., .V)

Procedure

<u>For each Alternative:</u>

1. Using Organon, generate the possible treatment stand tables based on the management direction for each Alternative. Create the Crosswalk Table to identify which stand table to reference for a particular treatment combination.
2. Based on the Crosswalk Table, pre-process each treatment stand table to generate the index values that will be used to define the habitat and structural stage classifications. This includes projecting snag and CWD using stand table attributes. Create the Index Table to identify which index values to use for a particular treatment stand table.
3. Initialize a Carbon Report Table by listing for each WOPR unit the OPTIONS inventory values for forest type (forest, non-forest, road), initial management regime, species group, site productivity class and area.

<u>For each forested WOPR unit in the Carbon Report Table:</u>

4. Set initial conditions:
   — Initial Structural Stage and legacy (based on OPTIONS inventory structural stage)
   — Plant Series/Retention Zone (based on OPTIONS inventory)
   — NSO Variance: based on plant series, species group and habitat definition
   — Alternative 2 GTR (green tree retention) flag for MOCA and SHRUB areas
5. Based on the OPTIONS run results, build the WOPR unit Activity History Table including harvest activities and state of the forest years in chronological order. Also record the stand management regime, species group, site productivity and age at which these actives occur. This history table represents the changes in stand characteristics over time.

<u>For each Activity in the Activity History:</u>

6. Determine the current thinning treatment combination, partial harvest condition and legacy based on the type of activity completed.

For Regeneration Harvest: reset thinning treatment combination, reset partial harvest conditions, re-evaluate legacy:

- No Action Alternative (modeled tree retention), legacy is present (WL)
- Alternative 1 (no modeled tree retention), then legacy is not present (WOL)
- Alternative 2 (no modeled tree retention), then legacy is not present (WOL).
- Alternative 2 – MOCA and SHRUB area (modeled tree retention), then legacy is present (WL)
- Alternative 3 (modeled tree retention), legacy is present (WL)
- PRMP area with GTR the legacy is present (Snag retention in LSMA –WL) otherwise legacy is not present (WOL)

For Selection Harvest: reset thinning treatment combination, set partial harvest condition, re-evaluate legacy:

- No Action Alternative, Alternative 1 and Alternative 2 there is no modeled selection harvest
- Alternative 3 and PRMP has modeled selection harvest, so legacy is present (WL)

For Commercial Thinning: set thinning treatment combination based on thinning age and thinning sequence, no change to partial harvest condition or legacy.

7. Set activity stand table reference from Crosswalk Table based on the treatment combination.
8. Retrieve stand characteristics and index values from Index Table based on stand table reference.
9. Calculate the total number of metric tons of carbon dioxide OPTIONS reports volume in board foot per acre. Convert this volume to merchantable cubic feet per acre. For this report, we used a factor of 6.00.

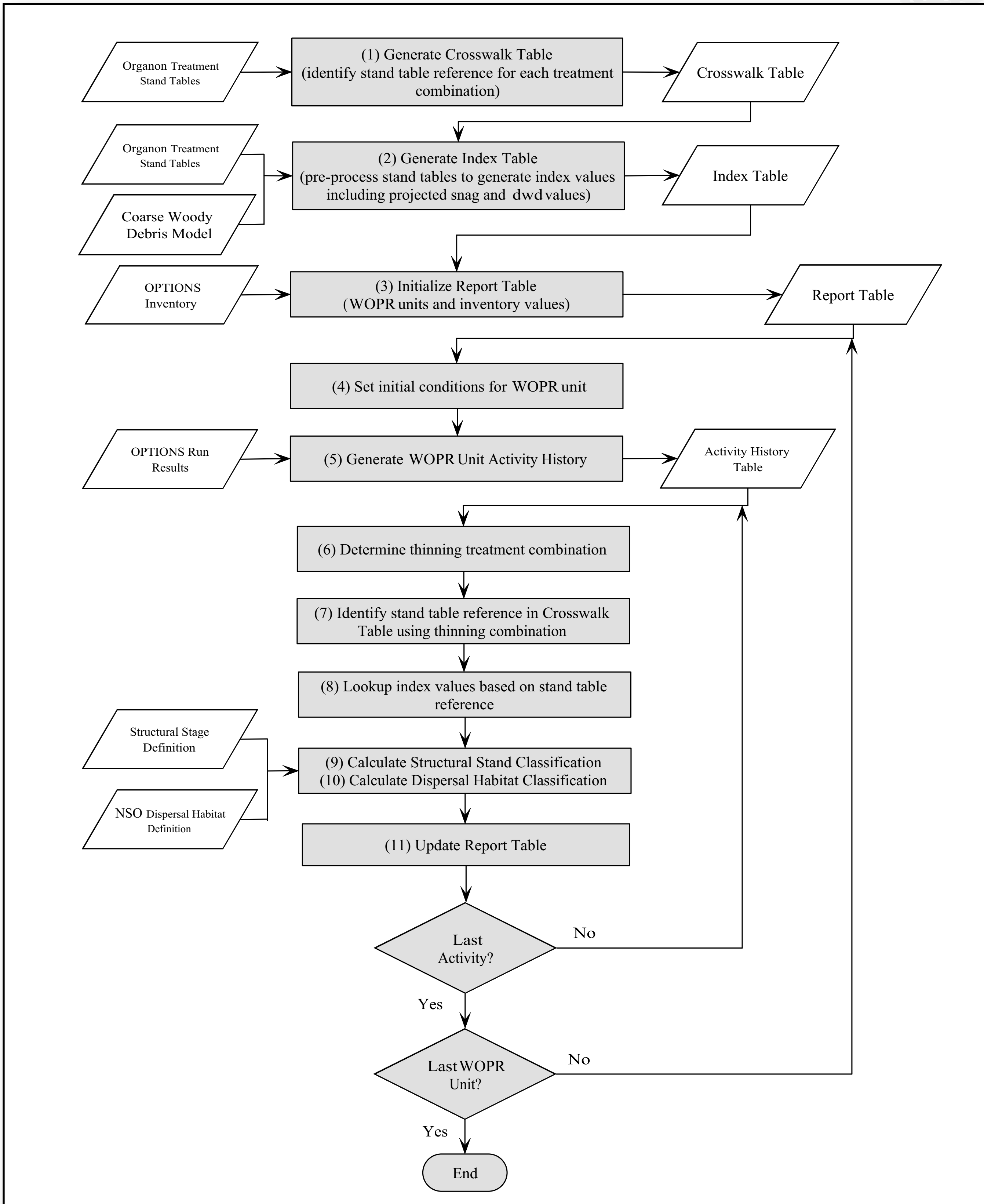
   MERCH_CUFT = BDFT volume /6.00

   A. Initialize the conversion factor (LBS_CUFT) for calculating the number of pounds of dry weight of a cubic foot of wood based on the species group. This conversion factor is located in the CARBON FACTOR Lookup table.
   B. Calculate the number of pounds of dry weight (MERCH_LBS) per acre using the corresponding species conversion factor.
      MERCH_LBS = MERCH_CUFT * LBS_CUFT
   C. Calculate the total dry biomass in trees (TOT_LBS) per acre. The expansion factor is set to 1.85 for all units, meaning that total tree biomass (including tops and roots) is 1.85 times merchantable dry weight.
      TOT_LBS = MERCH_LBS * 1.85
   D. Calculate the number of pounds of carbon (LBS_C) per acre.
      LBS_C = TOT_LBS * 0.50
   E. Calculate the number of metric tons of carbon (TONS_C) per acre.
      TONS_C = LBS_C / 2200.0
   F. Calculate the number of metric tons of carbon dioxide (TONS_C02E) per acre.
      TONS_CO2E = TONS_C * 3.667
   G. Calculate the total number of metric tons of carbon dioxide
      TOT_CO2E = TONS_C02E * unit area.

10. Update Report Table with carbon values for reporting years.

See *Figure R-25* for a data flow diagram of this procedure.

Figure R-25. Data Flow Diagram For Carbon Projection



Large Wood Projection

The Large Wood projection provides statistics for each forest stand (WPR_ID) on the number of stems, density, height and diameter of the live and standing dead trees by 10 inch diameter class for conifer and hardwood at each reporting point (report date). The reports account for management activities and stand growth and mortality.

Modeling Process

The Large Wood Report requires stand table information on live and dead trees by species type. The abundance of live and dead trees is sensitive to management activities. Detailed information about these activities is provided by WOPR unit from the OPTIONS model. However, since OPTIONS utilizes and reports stand average information, it was necessary to adopt a method to determine the stand table information for each WOPR unit at each reporting period.

In the OPTIONS model, each WOPR unit is uniquely managed based on the hierarchy of management assumptions and objectives. The application of these assumptions and objectives create a dynamic modeling process that affects the sequence and timing of stand level treatments, this sequence cannot be forecast outside of the OPTIONS model. However, based on the OPTIONS modeling framework it was possible to define the entire range of possible treatment combination based on modeling group, site index and treatment timing and intensity, which were modeled in ORGANON to create to create individual stand tables

For modeling convenience, this large set of ORGANON stand tables was consolidated into a single Index Table for every combination of modeling group, species group, site index and treatment timing and intensity. In creating the Large Wood Report this detailed stand table information for each WOPR unit was determined by reviewing the sequence of OPTIONS treatment details and then referring to the corresponding ORGANON data in the Index Table.

Methodology

The following methodology was applied to generate the Large Wood Analysis Report.

<u>Source Information:</u>

All Possible Treatment Yield Curve Crosswalk Table (ACT2CVS_XWALK)

> This table identifies which treatment yield curve to use to obtain the required stand characteristics and index values for the large wood analysis report. The treatment yield curve is identified based on the current alternative, management regime, species, site productivity class, and treatment age.

Index Value Lookup Table (INDX_LKUP)

> This table is an Alternative based lookup table containing projected stand characteristics and index values for each treatment yield curve. Some of the index values available include:

- — Stand characteristics: age, basal area, TPA, QMD, height, volume, crown ratio, canopy closure, relative density, SDI, CV, DDI,
- — TPA by 10” diameter classes for live and dead trees by Conifer and hardwood: # of trees in 0” to 9”, 10” to 19”, 20” to 29”, 30” to 39”, greater than or equal to 40”
- — Average height by 10” diameter classes for live and dead trees by Conifer and hardwood: weighed height by TPA in 0” to 10”, 11” to 20”, 21” to 30”, 31” to 40”, greater than 40”
- — Average diameter by 10” diameter classes for live and dead tree by conifer and hardwood: weighted diameter by TPA in 0” to 10”, 11” to 20”, 21” to 30”, 31” to 40”, greater than 40”

OPTIONS Run Files

To post-process an OPTIONS run, the following OPTIONS run files are required:

— OPTIONS data files (.DBF, .DBS, .SPG, .SIC)
— OPTIONS run files (.DEF, .DEV, .RUN, .I, .II., .V)

Procedure

For each Alternative:

1. Using Organon, generate the possible treatment stand tables based on the management direction for each alternative. Create the Crosswalk Table to identify which stand table to reference for a particular treatment combination.
2. Based on the Crosswalk Table, pre-process each treatment stand table to generate the index values that will be used to in the large wood analysis. Create the Index Table to identify which index values to use for a particular treatment stand table.
3. Initialize a Large Wood Report Table by listing for each WOPR unit the OPTIONS inventory values for forest type (forest, non-forest, road), initial management regime, species group, site productivity class and area.

For each forested WOPR unit in the Large Wood Report Table:

4. Set initial conditions:
   — Initial Structural Stage and legacy (based on OPTIONS inventory structural stage)
   — Plant Series/Retention Zone (based on OPTIONS inventory)
   — NSO Variance: based on plant series, species group and habitat definition
   — Alternative 2 GTR (green tree retention) flag for MOCA and SHRUB areas
5. Based on the OPTIONS run results, build the WOPR unit Activity History Table including harvest activities and state of the forest years in chronological order. Also record the stand management regime, species group, site productivity and age at which these actives occur. This history table represents the changes in stand characteristics over time.

For each Activity in the Activity History:

6. Determine the current thinning treatment combination, partial harvest condition and legacy based on the type of activity completed.

   For Regen Harvest: reset thinning treatment combination, reset partial harvest conditions, re-evaluate legacy:
   - No Action Alternative (modeled tree retention), legacy is present (WL)
   - Alternative 1 (no modeled tree retention), then legacy is not present (WOL)
   - Alternative 2 (no modeled tree retention), then legacy is not present (WOL).
   - Alternative 2 – MOCA and SHRUB area (modeled tree retention), then legacy is present (WL)
   - Alternative 3 (modeled tree retention), legacy is present (WL)
   - PRMP area with GTR the legacy is present (Snag retention in LSMA –WL) otherwise legacy is not present (WOL)

   For Selection Harvest: reset thinning treatment combination, set partial harvest condition, re-evaluate legacy:

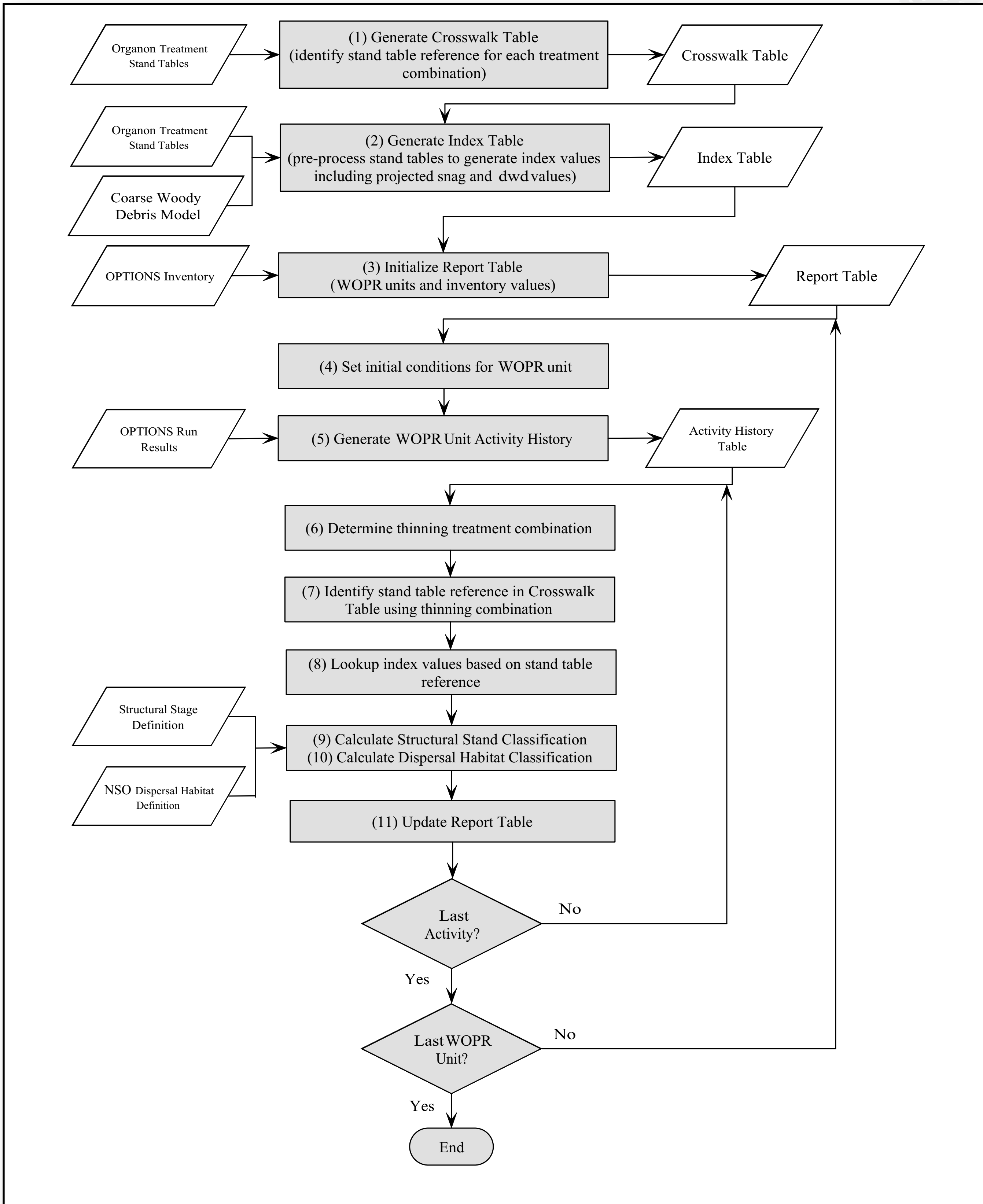
   - No Action Alternative, Alternative 1 and Alternative 2 there is no modeled selection harvest
   - Alternative 3 and PRMP has modeled selection harvest, so legacy is present (WL)

For Commercial Thinning: set thinning treatment combination based on thinning age and thinning sequence, no change to partial harvest condition or legacy.

7. Set activity stand table reference from Crosswalk Table based on the treatment combination.
8. Retrieve stand characteristics and index values from Index Table based on stand table reference.
9. Calculate Structure Stage Classification based on index values and structural stage definition.
   - For Alternative 3 with partial harvest conditions, if height is <50' Structural Stage is based on understory values. Otherwise Structural Stage is based on stand values.
   - For Alternative 3 with partial harvest conditions, if Structural Stage is calculated as Mature-Single-Story, then canopy is reset to multi-story.
10. Update Report Table with Structural Stage and stand table values such as TPA, average HT and DBH for live and dead trees by conifer and hardwood in 10" diameter classes for each reporting year

See *Figure R-26* for a data flow diagram of this procedure.

Figure R-26. Data Flow Diagram For Large Wood Projection



Economic Analysis Data

Two inputs were provided for post processing of the OPTIONS data for the calculation of timber harvest value.

- Costs necessary for harvesting were computed using an historical basis of timber sales from FY 1996 thru FY 2006 (part). Costs were brought to 2005 dollars and expressed in $/MBF. Thinning and partial harvest for Alternative 3 were separated from regeneration harvests and costs averaged by harvest method for each district. See Appendix E, Timber, for additional information.
- The weighted pond value was calculated for each district for each structural stage and harvest method. This weighted pond value included both a weighting for the level of expected species from each district and additionally weighted for grades expected from each structural stage. See Appendix E, Timber, for additional information

OPTIONS post processing produced a report by each SYU with the attributes listed below. This data is in excel spreadsheet by sustained yield unit for the No Action alternative, Action alternatives, and reference analyses.

- Projection year – Annual for first ten years.
- Harvest Land Base – distinguish ASQ from non ASQ volume sources.
- County, Name, Resource Area
- Harvest Type
- Volume in MBF 16' scribner for the action
- Weighted pond value of timber for action X (totvol)
- Average stump to truck cost - falling, yarding and loading, $/MBF X totvol Average road construction, improvement and renovation cost/MBF X totvol Average hauling cost to mill, $/MBF X totvol
- Average road maintenance and road use fees X totvol
- Average misc. cost, includes slash disposal, special requirements, etc X tot vol
- Sum (stump, roads, transport, maintain, misc.)
- Revenue-(tot cost), estimate of value of action, (Stumpage in MBF X tot vol)

Time Slice Report

For 10-year increments, spanning 200 years, this report summarizes the acres and volume harvested for the combination of data elements listed below.

- Sustained Yield Unit
- County
- Resource Area
- Harvest Land Base – Distinguish ASQ from Non ASQ volume
- Harvest type
- Ten-Year age class at time of treatment
- Treatment area
- Harvest volume

This report was generated for the No Action and Action Alternatives. The data is compiled in Access databases.

State of the Forest

The state of the forest contains the attributes tracked in OPTIONS for each vegetation polygon record at the time of the projections periods – year 0, 10, 20, 30, 40, 50, and 100. These attributes include

- Management regime
- Species group
- Volume
- Trees per acre
- Height Basal Area
- Harvest Land Base
- Age Class
- Sustained Yield Unit.

This report was generated for the No Action and action alternatives. The data is compiled in Access databases.

Attribute Data for GIS

A GIS input file was created for each alternative. This spatial analysis dissected the vegetation polygons by all of the GIS layers which formed an allocation, modeling rule, or reporting unit needed for the OPTIONS modeling. The OPTIONS data prep program utilized this GIS file to further classify and format the data for OPTIONS modeling. Harvest Land Base coding is an example for this reclassification of the data. The data from the OPTIONS data preparation program is returned to GIS so selected attributes can then be linked and used for subsequent spatial analysis. This provides a common data set used in both the OPTIONS analysis and the resulting GIS spatial analysis. Access databases with the data going to the OPTIONS model and data returned to GIS were generated for the No Action and action alternatives.

Vegetation Modeling Team Members

OPTIONS Team

Kristine Allen	OPTIONS Programming / Modeling Director of Operations D. R. Systems Inc.
Chris Cadwell	Forester / Vegetation Modeling Coordinator WOPR Core Team BLM Oregon State Office.
Joe Graham	Inventory Forester / Senior Modeling Specialist WOPR Core Team BLM Oregon State Office.
Mark Perdue	OPTIONS Modeling Manager of Consulting Services D. R. Systems Inc.
Don Reimer	OPTIONS Modeling CEO, D. R. Systems Inc.

Growth and Yield Team

Craig Kintop	Forester (Silviculturist) / Growth & Yield Modeling Coordinator BLM Roseburg District Office
Michael Oxford	Forester (Inventory Specialist) BLM Coos Bay District Office
Robert Pierle	Forester (Inventory Specialist) BLM Medford District Office
Steve Brownfield	Forester (Inventory Specialist) BLM Salem District Office
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Alan Bergstrom	Forester BLM Medford District Office
Douglas Stewart	Forester BLM Medford District Office
Mark Stephen	Forester BLM Eugene District Office
Frank Hoeper	Forester BLM Medford District Office
Mark Hanus	Biometrician ORGANON Shell Developer / ORGANON Advisor FORSight Resources, Vancouver WA.
William Johnson	Forester (Silviculturist) BLM Lakeview District Office
Gregory Reddell	Forester (Inventory Specialist) BLM Lakeview District Office

CVS / Statistical Team

Carol Apple	Mathematical Statistician FS PNW Region Regional Office
Jim Alegria	Biometrician BLM Oregon State Office GIS Team
Duane Dippon	GIS Lead WOPR Core Team BLM Oregon State Office
Thomas Jackson	GIS Specialists Eugene District Office
Arthur Miller	GIS Specialist BLM Oregon State Office

Appendix S Wood River Wetland and West Eugene Wetlands Management Plans

This appendix includes two documents: (1) the record of decision and resource management plan for the Upper Klamath River and Wood River Wetland, which is in the Klamath Falls Resource Area of the Lakeview BLM District; and (2) a summary of the wetlands plan for the West Eugene Wetlands, a portion of which are in the Eugene BLM District.

In this appendix:

Wood River Wetland Plan 736

Summary of the West Eugene Wetlands Plan 758

Wood River Wetland Plan

The following pages contain a consolidated document (including the record of decision and resource management plan) of the Upper Klamath Basin and Wood River Wetland. The document is tiered to and references the Klamath Falls Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS), which is available from:

BLM Klamath Falls Resource Area Office
2795 Anderson Ave., Bldg. #25
Klamath Falls, OR 97603

The Klamath Falls Proposed Resource Management Plan was approved by the Oregon/Washington State Director in November 1995. The Record of Decision approves the BLM decisions for managing 3,220 acres in Klamath County, Oregon.

The Record of Decision conforms with 40 CFR 1505.2, which requires a concise document linking the manager's decision to the analysis presented in the Upper Klamath Basin and Wood River Wetland Final Environmental Impact Statement (FEIS), dated July 1995.

Record of Decision for the Upper Klamath Basin and Wood River Wetland Resource Management Plan

Prepared by the Bureau of Land Management
Klamath Falls Resource Area
Lakeview District, Oregon
February 1996

Introduction

In this Record of Decision we adopt and approve for immediate implementation the following Upper Klamath Basin and Wood River Wetland Resource Management Plan, based on the combination of this office's March 1994 draft environmental impact statement and the July 1995 final environmental impact statement. The resource management plan addresses resource management on approximately 3,220 acres of federal land administered by the Bureau of Land Management (BLM) located within Klamath County, Oregon.

The approved resource management plan responds to the need for a healthy aquatic ecosystem associated with the Upper Klamath Basin that will contribute toward improved water quality and support stable populations of native species, particularly those associated with wetland and riparian communities. It also responds to the need for monitoring the results of implementing the plan and the use of adaptive management based on those monitoring results.

Alternatives Considered

Four alternatives for management of the BLM-administered lands and resources on the Wood River property were analyzed in the final environmental impact statement. A brief description of each alternative analyzed in the final environmental impact statement follows below.

Alternative A (No Action). This alternative would emphasize a continuation of the management direction in place at the time of the BLM's purchase of the Wood River property. The management objective would be to maintain irrigated pastureland for livestock grazing.

Alternative B. This alternative would emphasize restoring the property to a functioning wetland with diverse and healthy plant communities. This would be accomplished by restoring historic stream channel meanders on the property. Few water control structures, minimal hydrologic control, long-term low maintenance, and no livestock grazing are features of this alternative.

Alternative C. This alternative would emphasize the restoration of a functioning wetland through the use of highly engineered techniques, complex designs, and/or numerous research pilot projects to meet the long-term goal of improving water quality entering Agency Lake from the property. Research would be emphasized in this alternative. Vegetation management could be done through the use of water level and flow manipulations, livestock grazing, prescribed fire, mechanical and chemical treatments. Recreation use would be maximized, with an emphasis on outdoor education and interpretation.

Alternative D (Proposed Action). This alternative would restore the property to its previous function as a wetland community. Emphasis would be given to long-term improvement in the quality of water entering

Agency Lake from the property. In addition, improving and increasing the wetland and riparian habitat for federally listed fish and other wildlife species would be emphasized. Vegetation management could be accomplished through the use of water level and flow fluctuations, livestock grazing, fire, chemical and mechanical treatments. A combination of new structures to improve hydrologic control, and utilization of natural processes would be emphasized in this alternative. Adaptive management, the process of changing land management as a result of monitoring or research, would be used. Recreation resources would be managed for low to moderate use levels, with non-motorized access being featured.

Rationale for Decision

The Congressionally directed purposes for managing the Bureau of Land Management-administered lands include both conserving the ecosystems upon which plant and wildlife species depend, and at the same time providing raw materials and other resources that are needed to sustain the health and economic well-being of the people of this country. The Proposed Resource Management Plan alternative best meets these criteria.

We have reviewed the alternatives discussed in the Proposed Resource Management Plan/Final Environmental Impact Statement and their predicted environmental, economic, and social consequences, and the risks and safeguards inherent in them. The Proposed Resource Management Plan alternative in the Proposed Resource Management Plan/Final Environmental Impact Statement is the best alternative for providing a sustainable level of human use of the aquatic/wetland resource while still meeting the need to restore and maintain the wetland ecosystem. We therefore select the Proposed Management Plan alternative as the management direction that best responds to the purpose and need for the proposed action as expressed in the Proposed Resource Management Plan/Final Environmental Impact Statement.

We base our conclusion on a number of factors. Management under Alternative A (No Action), would provide the least amount of water quality, water retention, and endangered species habitat improvements. Management under Alternative B would provide the least amount of hydrologic control, and the lowest long-term maintenance costs. It would likely provide the least improvement in water quality of the action alternatives, the fewest acres of emergent marsh habitat, and the most water retention capability. Management under Alternative C would provide the most hydrologic control, the most potential for improved water quality, the greatest construction and long-term maintenance costs. It would provide greater capability for water storage than Alternative A, but less than Alternative B. Management under Alternative D (the Proposed Resource Management Plan) would provide more hydrologic control and potential water quality improvements than Alternatives A and B, but less than C. This alternative would provide more potential water retention than alternatives A and C but less than B. This alternative would require more initial and long term maintenance costs than alternatives A and B, but less than C. Alternatives B, C, and D (the Proposed Resource Management Plan) would all have beneficial effects on Lost River and Shortnose sucker habitat. The Proposed Resource Management Plan alternative has the greatest potential to provide improved habitat for these species. The Proposed Resource Management Plan alternative would have a beneficial impact on more Special Status Animal Species than any other alternative. See Proposed Resource Management Plan/Final Environmental Impact Statement.

All alternatives follow current BLM policies, initiatives, and emphasis on restoration and maintenance of wetland resource conditions, including riparian and aquatic conditions, that perpetuate fully functioning ecosystems while still providing for societal needs. The primary goals of water quality improvement, increased water retention and improved habitat for the Lost River and Shortnose suckers were used to develop all action alternatives. Alternatives A (No Action), and B would make achieving these objectives more difficult. Alternatives C and D (the Proposed Resource Management Plan) make it easier to accomplish.

The No Action alternative is based on the previous use of this property for irrigated pasture land that existed prior to acquisition. In addition, it does not emphasize the primary goals stated for the management of this property.

The impacts to many species, and groups of species, of fish, wildlife, and plants are complex and difficult to summarize in this Record of Decision. They are described in detail in the Proposed Resource Management Plant Final Environmental Impact Statement. Based upon the Proposed Resource Management Plan/ Final Environmental Impact Statement and all of the information in the record, we have determined that Proposed Resource Management Plan alternative will continue to meet the needs of species influenced by federal land management activities. We find it meets the requirements of the Endangered Species Act for the conservation of listed species. Moreover, it meets the requirements of acts that protect elements of the environment, and requirements for coordinated planning and consultation.

Environmental Preferability of the Alternatives

Environmental preferability is judged using the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ has stated that "The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Generally this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." (Council on Environmental Quality, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations [40 CFR 1500-1598], Federal Register Vol. 46, No. 55, 18026-18038, March 23,1981:Question 6a.)

NEPA's Section 101 establishes the following goals:

- Fulfills the responsibility of this generation as trustee of the environment for succeeding generations (NEPA 101[b][l]),
- Assures for all Americans productive and aesthetically and culturally pleasing surroundings (NEPA 101[b][2]),
- Attains the widest range of beneficial uses of the environment without degradation or other undesirable and unintended consequences (NEPA 101[b][3]),
- Preserves important natural aspects of our national heritage and maintains an environment which supports diversity and variety of individual choice (NEPA 101[b][4]),
- Achieves a balance between population and resource use, which permits high standards of living and a wide sharing of life 's amenities (NEPA 101[b][5]) , and
- Enhances the quality of renewable resources and approach the maximum attainable recycling of depletable resources (NEPA 101[b][6]) .

The Proposed Resource Management Plan alternative allows for the hydrologic control necessary to restore the property to a fully functioning wetland ecosystem. Hydrologic control will also allow for recovery of the site from subsidence at an accelerated rate.

Recovery from subsidence is necessary before a wetland driven by natural processes and requiring little maintenance is possible. This alternative would also allow more acres of woody riparian habitat and flood plain to be restored along the Wood River. Because of this, the Proposed Resource Management Plan alternative affords the most potential for improved habitat conditions for the Lost River and Shortnose suckers. Based on these factors, we conclude that the Proposed Resource Management Plan alternative is the "environmentally preferable alternative."

Implementation

Decisions in this plan will be implemented over a period of years. The rate of implementation is tied to the BLM's budgeting process. General priorities for overall management will be developed through long-term budgeting processes and in consultation with other agencies, tribes, and government units. Those priorities will be reviewed annually to help develop work plan commitments for the coming years. Although the Resource Management Plan implementing actions are described by individual resources, most activities will be consolidated and considered in an interdisciplinary, multi-resource process.

Valid Existing Rights

This plan will not repeal valid existing rights on public lands. Valid existing rights are those rights or claims to rights that take precedence over the actions contained in this plan. Valid existing rights may be held by other federal, state or local government agencies or by private individuals or companies. Valid existing rights may pertain to reserved mineral rights mining claims; mineral or energy leases; and easements or rights-of-way; reciprocal rights-of-way and water rights.

Administrative Actions

Various types of administrative actions will require special attention beyond the scope of this plan. Administrative actions are the day-to-day transactions required to serve the public and to provide optimum use of the resources. These actions are in conformance with the plan. They include, but are not limited to; permits or sales for traditional or special forest products; competitive and commercial recreation activities; lands and realty actions, including issuance of grants, leases, and permits and resolution of trespass; facility maintenance; law enforcement and hazardous material removal or mitigation; enforcement and monitoring of permit stipulations; cadastral surveys to determine legal land or mineral estate ownership; and engineering support to assist in mapping, designing, and implementing projects. These and other administrative actions will be conducted at the resource area, district or state level, sometimes in partnership with other landowner or agencies or entities. The degree to which these actions are carried out will depend upon BLM policies, available personnel, funding levels, and further environmental analysis and decision making, as appropriate.

Mitigation and Monitoring

All protective measures and other management direction identified in the plan will be taken to avoid or mitigate adverse impacts. These measures will be taken throughout implementation. All practical means to avoid or reduce environmental harm will be adopted, monitored, and evaluated, as appropriate.

Monitoring will be conducted, as identified in the approved plan. Monitoring and evaluations will be utilized to ensure that decisions and priorities conveyed by the plan are being implemented, that progress toward identified resource objectives is occurring, that mitigating measures and other management direction are effective in avoiding or reducing adverse environmental impacts, and that the plan is maintained and consistent with the ongoing development of BLM state office, regional, and national guidance.

Public Involvement

Scoping of the Upper Klamath Basin and Wood River Wetland Resource Management Plan/Environmental Impact Statement began in January 1993, with a public meeting and the formation of the Wood River Wetland Team. Anyone who participated in the development of the plan was considered a team member. Active public involvement has been stressed throughout the plan development process. Public involvement has included information mailers, public meetings, field trips, distribution of planning documents, document review, comment periods, informal contacts, and group presentations to share information. The Wood River Wetland Team had 18 meetings open to the public between January 1993 and May 1995. The team reviewed all portions of the draft and final Resource Management Plan /EIS, and provided comments that were considered throughout the development of these documents. The Bureau of Land Management has been careful to inform this group that all management decisions for this property will be made by the Bureau. The team will continue to meet and provide comments on project implementation and monitoring.

On March 11, 1994, a Notice of Availability of the Draft Resource Management Plan/Environmental Impact Statement was published in the Federal Register by the BLM, in addition to a Notice of Availability by the Environmental Protection Agency. Newspaper and other media were also notified of the document availability, the length of the comment period, and the dates, times, and locations of public meetings. The Draft Resource Management Plan/Environmental Impact Statement was sent to a list of approximately 250 individuals, organizations, and agencies.

On July 28, 1995, the Environmental Protection Agency published a Notice of Availability in the Federal Register, which initiated the official protest and public comment period for the Upper Klamath Basin Proposed Resource Management Plan/Final Environmental Impact Statement. In addition, on July 18, 1995, a Notice of Availability was also published in the Federal Register by the BLM. Newspaper and other media were also notified of the document availability, the length of the protest period, and the date, time, and location of public meetings. The Proposed Resource Management Plan/Final Environmental Impact Statement or summary were sent to a list of approximately 300 individuals, organizations, and agencies. Approximately 20 people attended meetings. The district manager received no comment letters. There were no objections or recommendations by the Governor on behalf of any state or local government entity. There are no known inconsistencies with officially approved or adopted natural resource related plans, policies, or programs of applicable state or local governments or Indian tribes.

The official period to protest the proposed plan closed on September 18, 1995. No valid protests were received. A few non-substantive changes have been made in the text of the approved plan to reflect typographical corrections, improve clarity, or demonstrate consistency with various regulatory procedures or policies.

Recommendation

With full knowledge of the commitment to resource and ecosystem management represented by the plan, I recommend the adoption of the Upper Klamath Basin and Wood River Wetland Resource Management Plan.

/s/ Edwin J. Singleton	10/25/95
	Date

Edwin J. Singleton
District Manager, Lakeview District, Lakeview, Oregon

State Director Approval

I approve the Upper Klamath Basin and Wood River Wetland Resource Management Plan as recommended.

This document meets the requirements for a Record of Decision as provided in 40 Code of Federal Regulations 1505.2.

/s/ William L. Bradley	11/21/95
	Date

for
Elaine Zielinski
State Director, Oregon/Washington
Bureau of Land Management

Summary of Effects Table – Comparison of Alternatives

Summary of Effects Table - Comparison of Alternatives				
Resource	**Alternative A**	**Alternative B**	**Alternative C**	**RMP (Alt. D)**
Air Quality	No significant long-term effects.	Same as A.	Same as A.	Same as A.
Effects on Water Resources	Water quality would continue to deteriorate from sediment input and nutrient loading.	Modest improvement in water quality	Greatest improvement in water quality.	Slightly less water quality improvement than under C, but more than B.
.				
	Sedimentation and fecal pollution from livestock would continue to degrade water quality	Significant decrease in livestock-related impacts on water quality compared to A	Same as B.	Same as B.
	Insignificant effects (sedimentation) from recreation activities. -	Minor effects from recreation activities.	Greatest effects from recreation activities.	Effects would be greater than B and less than C.
	Increase in water storage would not be realized.	Greatest increase in water storage and net decrease in water use from creation of wetlands is possible.	Moderate increase in water storage and net decrease in water use is possible.	Same as C.
Steam Channel Restoration	Wood River and Sevenmile Creek would remain channeled and sedimentation would continue. Continued dredging would negatively affect channel and riparian function.	Short-term sedimentation and nutrient impacts from stream channel restoration options.	Same as B, except less severe impact because less area would be disturbed.	Same as C.
	Groundwater recharge and flood flow retention would remain the same.	Groundwater recharge and flood flow retention would improve.	Same as B, except to a lesser extent.	Same as B.
Wetland Restoration	Benefits from wetland restoration would not be realized	Short-term nutrient reduction would occur.	Same as B.	Same as B.
.				
	Amount of shallow water wetland habitat would remain constant.	Moderate increase in shallow water wetland habitat (compared to A).	Greatest increase in shallow water wetland habitat.	Moderate increase in shallow water wetland habitat (more than B, less than C).
Effects on Wetland Vegetation	Proportion of wetland and upland vegetation would remain constant. Main property's interior would remain dominated by pasture grasses, annual forbs, and weedy species.	There would be an increase in the abundance and diversity of native wetland species, and a decrease in the levels of introduced and native upland species.	Greatest diversity in wetland vegetation.	Greater diversity in wetland vegetation than under A and B, but less than under C.
Effects on Soils	Soil would continue to subside and leach organics and nutrients into Agency Lake, causing long-term decrease in soil productivity.	Soil productivity would increase compared to A.	Same as B.	Same as B.

Summary of Effects Table - Comparison of Alternatives

Resource	Alternative A	Alternative B	Alternative C	RMP (Alt. D)
	Grazing would continue to cause minor sedimentation and compaction effects.	There would be short-term compaction, displacement, and sedimentation from construction activities.	Same as B, except more severe effects.	Same as B.
Effects on Fish And Wildlife Habitat (Including Special Status Species)	Continued periodic dredging on the Wood River would continue to degrade fish habitat components, such as for spawning.	Restoration of natural stream channels would result in a significant increase in quantity and quality of habitat.	Restoration of natural stream channels would result in a moderate increase in quantity and quality of habitat.	Same as B.
	Habitat diversity would be the lowest under this alternative.	Habitat diversity would be greater than A.	The greatest level of habitat diversity would result.	Level of habitat diversity would be more than B, less than C.
	Meadow communities with short and tall vegetation would continue to dominate the area favoring wildlife species that prefer these types of habitat.	Species that prefer meadow communities, and their predators, would be adversely affected by a decrease in percentage of this type of habitat.	Effects on wildlife species would be moderated due to the variety of habitats.	Same as B.
	Habitat diversity would remain the same as wetland habitat would not be created.	Establishment of deep water marsh habitat would have a positive effect on species that prefer this type of habitat.	Same as B.	Same as B.
	The amount of neotropical migrant bird habitat would remain the same as planting of shrubs and trees on dikes would not occur.	Planting of shrubs and trees On dikes would benefit neotropical migrant birds.	Same as B. A great number and variety of habitat developments are proposed resulting in greater benefits than Alternative B.	The widened riparian Zones/floodplains along with the creation of new levees provide the greatest increase in neotropical migrant bird habitat.
	Increased recreation would have the greatest adverse impact on neotropical birds.	Increased recreation use and motorized vehicle traffic would have some impact to wildlife through disturbance.	The greatest recreation use is anticipated under this alternative, causing the most impact to wildlife through disturbance.	Wildlife disturbances from recreation use would be greater than B, but less than C.
	Habitat diversity would remain the same as prescribed fire would not be used.	Use of prescribed fire could benefit wildlife species by providing more natural ecosystem processes and habitat diversity.	Same as B, except fire would be used more intensely.	Same as B.
Effects on Recreation Resources	Small increase in number of visitors due to public ownership.	More visitors than under A due to the development of facilities and opening the property to vehicle use.	Greatest amount of visitors due to the level of facilities development and improved roads.	Similar to A. Amount and type of facilities provided will be limited.
	Area restricted to non-motorized recreation would benefit those people seeking more primitive opportunities, but would adversely affect those people seeking motorized opportunities. Conflicts between hunters with easements and those without are occurring.	Some motorized access would have a negative effect on those people seeking primitive opportunities, but would benefit those people seeking motorized opportunities.	Motorized vehicle opportunities would be the greatest under this alternative and would benefit those people seeking motorized opportunities. Greatest adverse effect on those seeking primitive opportunities.	Similar to A. Amount of access and effect on users will depend on the results of use levels.
	No speed restrictions would besought for boats, so the least adverse effects on boaters would occur under this alternative.	Creation of meanders in Wood River would affect boaters by decreasing their speed and increasing the length of river to boats. Speed and wake limits could be imposed.	Same as B. Speed and wake limits would not be imposed.	Same as B.
Effects on Visual Resources	Visual resources would remain highly modified, and would not improve.	Greatest level of long-term improvement to visual resources. Moderate levels of short-term adverse effects on visual resources from restoration activities.	Moderate level of long-term improvement to visual resources. Greatest level of short-term adverse effects from restoration activities.	Higher level of long term improvement than C, but less than B. Short-term adverse effects would be less significant than B or C.

Summary of Effects Table - Comparison of Alternatives

Resource	Alternative A	Alternative B	Alternative C	RMP (Alt. D)
Effects on Cultural Resources	Least potential negative effect on cultural resources.	Moderate potential negative effect on cultural resources resulting from proposed projects. Discovery of new sites would enhance knowledge base of regional cultural resources.	Highest potential negative effect on cultural resources resulting from proposed projects. Same as B, but potential for discovery would be greater.	Low potential negative effects resulting from proposed projects. Same as B.
Effects on Livestock Grazing	Continuation of livestock grazing would have a positive effect on revenues to the government and livestock producers. Grazing use at a maximum of 3,600 AUMs per year.	There would be a decrease in revenue to the government and livestock producers from the elimination of livestock grazing.	There would be a decrease in revenues to the government and to livestock producers from using livestock grazing as a vegetation management tool and restricting grazing use to a maximum of 750 AUMs in any year that grazing is allowed.	There would be a decrease In revenues to the government and to livestock producers from using livestock grazing as a vegetation management tool and restricting grazing use to a maximum of 1,500 AUMs in any year that grazing is allowed.
Effects on Socioeconomics	Grazing use would be a maximum of 6,500 AUMs per year. The level of grazing use would generate approximately $94,000 of gross agricultural sales, 1.5 jobs, and $19,250 of personal income.	No livestock grazing would occur on the property consequently there would be no economic contribution from livestock grazing.	The level of grazing use could generate up to approximately $19,000 of gross agricultural sales and $4,000 of personal income.	The level of grazing use could generate up to approximately $38,000 of gross agricultural sales and $8,000 of personal income.
	Recreations contribution to the local economy would be the lowest under this alternative.	Recreations contribution to the local economy would be higher than Alternative A, but lower than Alternative C.	The economic contribution from recreational activities would be the greatest under this alternative.	Recreation's contribution to local economy would be about the same as Alternative B.
		The need for 1 to 2 additional full time employees to manage the property would be created under this alternative. Annual salaries would be approximately $35,000 each. Approximately $750,000 would be spent to accomplish identified stream and wetland restoration activities.	Additional employment and wetland restoration expenditures are the same as Alternative B.	Additional employment and wet land restoration expenditures are the same as Alternative B.

The Resource Management Plan

Introduction

This document contains the basic information needed to implement the Upper Klamath Basin and Wood River Wetland Approved Resource Management Plan. The text included in this Approved Resource Management Plan replaces the text of Alternative D of the Upper Klamath Basin and Wood River Wetland Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS). However, this document should be used in conjunction with that PRMP/FEIS for topics such as a discussion of the Planning Area; Purpose and Need for the Action; Relationship of the RMP to BLM Policies, Programs, and Other Plans; Coordination and Consultation; Use of the Completed Plan; Adaptive Management; Requirement for Further Environmental Analysis; The Budget Link; and Research. The appendices of that PRMP/FEIS have not been reprinted here and also apply to this plan.

There were no changes made between the proposed plan and the approval of this plan as a result of protests since no protests were received. Some minor changes were made as a result of on-going internal review to adjust the language of the plan to fit its approved status.

The appendices contained in the PRMP/FEIS contain detail that was deemed non-essential for the purposes of this document. Based on the lack of changes needed it was felt that a portable approved plan usable by the public while actually on the property would be better than reprinting all of the details. This is particularly true for the appendices covering wetland and stream restoration options and the monitoring plan. Those appendices contain details that will be considered during implementation of this plan. This plan is expected to be implemented over a period of years. Readers should keep both this document and the Proposed Resource Management Plan/Final Environmental Impact Statement for future reference.

The text and maps included with this document are sufficient to give the average reader a good idea of what will happen on the property. For those readers interested in more details, using this document in conjunction with the Upper Klamath Basin and Wood River Wetland Proposed Resource Management Plan/Final Environmental Impact Statement will give a complete picture of what is expected to occur on the property.

Plan Objectives

Restore the Wood River property to its previous function as a wetland community, within unalterable constraints (such as water rights, land ownership patterns, and available funding). Long-term improvement in water quality entering Agency Lake is a goal; however, localized decreases in water quality could occur in the short term. Emphasize improving and increasing wetland and riparian habitats for federally listed fish and other wildlife. Allow labor-intensive, highly engineered wetland restoration methods using complex designs; however, the preference would be to use wetland restoration systems and methods that were designed with less labor-intensive practices using the existing landscape features (such as topography) and natural energies (such as stream flows) of the property. Use vegetation management (including water level and flow fluctuations, livestock grazing, fire, chemical and mechanical manipulation) to develop desired plant communities. Allow pilot studies for research purposes. Use adaptive management, the process of changing land management as a result of monitoring or research. Manage recreation resources for low to moderate use levels.

Water Resources

Objective: Improve the quality and quantity of water entering Agency Lake from this property. Restore the majority of the property to a wetland community dominated by native species to the extent that it would not adversely impact adjacent landowners. Improvement in water quality entering Agency and Klamath Lakes would occur through changes in current management practices and passive filtration. The current drainage/irrigation system could be used or modified to manipulate water levels and/or soil moisture conditions to maintain a wetland in properly functioning condition. The BLM will cooperate in studies to determine the effectiveness of the wetland system(s) in improving water quality and storage. The BLM will comply with all applicable Oregon State water laws and cooperate with the Meadows Drainage District in its operation and use of the Wood River property's irrigation system.

The techniques used for wetland restoration will be a combination of existing and constructed water control structures (berms, ditches, screwgates, and flashboard darns), and the encouragement of natural processes (plant succession, channel meandering). Several likely restoration scenarios are summarized in Table 6 of the Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS, see also Appendix F of the PRMP/FEIS for a more detailed description). Actual wetland restoration methods would not vary significantly from methods described in the PRMP/FEIS. A site specific engineering design will be completed prior to construction. The BLM will coordinate with the Oregon Department of Environmental Quality, US Fish and Wildlife Service, and the Army Corps of Engineers (among others) to obtain any permits necessary prior to constructing stream channel or wetland restoration projects.

Stream Channel Restoration Options

Objective: Provide a wider riparian area and floodplain along Wood River and Sevenmile Creek to allow meandering flow patterns to develop. Encourage vegetation diversity, channel sinuosity, and complexity. This restoration will only occur within BLM- administered lands, will be consistent with Oregon State water laws, and will be designed to not adversely affect water use or rights of other landowners.

Stream channel restoration will be accomplished initially as described in the Summary of Channel and Wetland Restoration Actions Table, *located at the end of this appendix* (see also Table 6 of the PRMP/FEIS). New levees will be constructed 50 to 400 meters toward the interior of the property from the current locations. New channel meanders could be constructed between the new levee and the old levee along the west side of the Wood River. Restoration of meandering flow patterns would then be accomplished by removing portions of the existing levees along the streams. Other portions of the existing levees could be left in place or used to encourage meanders in the existing dredged channels. A wider riparian area and floodplain will be created along these streams. Natural processes would then be relied on to establish overflow channels, backwater areas, and to increase the sinuosity and complexity of the Wood River and Sevenmile Creek. This approach will allow the streams to establish their own courses across the floodplains over time. The long-term goal is to have narrower, deeper, and more sinuous channels within wider riparian areas. Because the Wood River channel has been less altered, and has the greatest potential to respond to restoration activities in the shortest period of time, restoration of the Wood River channel will be a higher priority than Sevenmile Creek. Therefore, restoration activities will be implemented first along the Wood River.

Wetland Restoration

Objective: Restore the majority of the Wood River property to a wetland in properly functioning condition dominated by a native plant community. Vegetation management could occur using several methods, including but not limited to water level fluctuations, livestock grazing, haying, planting and seeding, prescribed fire, and mechanical or chemical methods. Vegetation manipulation will be designed to develop species diversity and to maintain healthy and productive communities of native riparian and wetland vegetation. One or two small-scale, reversible pilot projects could be constructed to provide additional information on effects on water quality, effects on wetland habitat, or for other research purposes; however these projects will only take up a very small portion (less than 5 acres) of the property.

Wetland restoration will be accomplished as described in the Summary of Channel and Wetland Restoration Actions Table, *located at the end of this appendix* (see also Table 6 of the PRMP/FEIS). Option I will be applied to the restoration of the entire property. Internal wetland cells will be designed in such a way that Option 2 could be incorporated on a portion of the south half of the property.

Wetland restoration through the use of a system of 4 to 8 cells, water control structures, and pumps will allow hydrologic control to be maintained on the property. This hydrologic control will allow for greater biological diversity to develop. This system of cells and structures will facilitate a wide array of management options (for example maintaining different water levels in different cells), including periodic aeration of the soil surface. Intermixing of waters from the wetland with those of Agency Lake could still be incorporated using this approach on a portion of the wetland.

Special Status Species Habitat

Objective: Manage for a diversity of habitats for special status species (see Table 3 of the PRMP/FEIS). Maintain a viable population of spotted frogs on the property. Protect habitats of federally listed or proposed threatened or endangered species; to avoid contributing: to the need to list category I and 2 federal candidate, state listed, and Bureau sensitive species.

Management of special status species habitats will also be consistent with the Klamath Falls Resource Area's Approved RMP. If any special status species (federally or state listed as threatened or endangered, federally proposed as threatened or endangered, category I and 2 federal candidate, and Bureau sensitive) are suspected in an area proposed for a management activity, field surveys would focus on those species . If populations of these species are found, then the plants or animals and their habitats will be protected through modification or abandonment of management actions as appropriate to eliminate impacts to federally listed or proposed species and to not contribute to the need to list category I and 2 federal candidate, state listed, or Bureau sensitive species.

If a project could not be altered or abandoned to eliminate a potential effect on a federally listed or proposed threatened or endangered species, then consultation with the U.S. Fish and Wildlife Service would be initiated under section 7 of the Endangered Species Act.

For state listed and state proposed species, the BLM will coordinate with the appropriate state agency to develop policies that would assist the state in achieving its management objectives for those species.

Fish and Wildlife. Management actions for special status fish species will include removal and movement of portions of existing levees and dikes. Encourage natural processes to form a more sinuous channel with greater habitat complexity in the Wood River and in portions of Sevenmile Creek. The placement of natural structures such as logs and boulders will be considered to achieve desired channel conditions and increase the amount of cover for fish.

Plants. Inventories will be conducted if appropriate habitat is identified. Coordinate and cooperate with the Oregon Department of Agriculture regarding management activities with potentially adverse effects on a state listed or proposed plant species.

Fish and Wildlife Habitat

Objective: Improve habitat conditions for suckers and salmonids; improve habitat for raptors and neotropical migratory birds; and optimize waterfowl habitat within the constraints of other resource objectives.

Native tree species will be planted in clumps along major dikes for cover and future nest and perch sites, as well as to mitigate dike erosion. Portions of levees will be planted with native shrubs to provide nesting and roosting areas for neotropical migrant birds. Vegetation management (using water fluctuations, livestock grazing, prescribed fires, mechanical or chemical manipulation, or other methods) could be used to maintain, enhance, or create diverse habitats within the wetland. Riparian habitat along the Wood River and Sevenmile Creek will be restored and maintained by planting riparian vegetation and protection from grazing. River meanders will be encouraged to improve fisheries habitat. Channel morphology and substrate will be studied as they relate to factors limiting fish production, and will be modified as necessary to encourage natural sinuosity and narrow, deep channels.

Nest islands, upland areas, and other structures could be developed to provide wildlife habitat.

Vegetation

Fire Management

Objective: Suppress all wildfires, and reintroduce fire as an ecosystem process by using prescribed burning as a management tool to support the primary goal of wetland restoration.

An initial attack agreement for suppression of wildfires will be established with the Winema National Forest, U.S. Fish and Wildlife Service, and/or the Oregon Department of Forestry. Parameters will be developed under which fire could be introduced as an ecosystem process to achieve resource management objectives. Prescribed burning could be implemented through planned ignition, as determined by wetland restoration methods; by meeting the other objectives of improving water quality and quantity, and restoring wetland habitat for endangered suckers and waterfowl; and to further research objectives. To mitigate air quality problems, all burning will be conducted during unstable atmospheric conditions and with favorable transport winds.

Noxious Weed Management

Objective: Manage noxious weed species to facilitate restoration and maintenance of desirable plant communities and healthy ecosystems; prevent introduction, reproduction, and spread of noxious weeds into and within the property; and manage existing populations of noxious weeds to levels that minimize the negative impacts of noxious weed invasions.

Federal agencies are directed to control noxious weeds on federal lands by the Carlson-Foley Act (Public Law [PL] 90-583) and the Federal Noxious Weed Act of 1974 (PL 93-629). Noxious weed management on the Wood River property will be part of an integrated noxious weed management program as described in the Integrated Weed Control Plan and Environmental Assessment (EA) for the Klamath Falls Resource Area (OR-014-93-09). An appropriate combination of manual, mechanical, chemical, and biological methods, and water level manipulation will be used to control noxious weed species. Seasonal timing will be considered in any control program. Herbicide use will be in accordance with the program design features outlined in the KFRA Integrated Weed Control Plan and EA.

All chemical and some mechanical treatments for noxious weeds will be accomplished through a contract with Klamath County or other appropriate contractors, if populations of these species are identified for control. Appropriate herbicides will be used for treatment of noxious weeds in or adjacent to wetlands. Biological control organisms are supplied and/or distributed by the Oregon Department of Agriculture (ODA) through a memorandum of understanding between the ODA and the BLM's Oregon State Office.

Livestock Grazing

Objective: If and where appropriate, use livestock grazing as a vegetation management tool to support the primary goal of wetland restoration.

Use livestock grazing mainly as a management tool to support the primary goal of wetland restoration. Livestock grazing could be allowed if needed to create or maintain wildlife habitat. No long term grazing lease will be issued. Levels and duration of grazing, as well as maintenance and construction of range improvement projects, will be dependent on the need to meet management objectives. It is expected that the amount of grazing will be significantly less than that allowed under Alternative A of the PRMP/FEIS, and it is possible that no grazing will occur. It is estimated that grazing use will not exceed 1,500 animal unit months in any given year. Any livestock use could be authorized and allowed via a competitive bid contract for the purposes of vegetative management and evaluated on a year by year basis. In lieu of or in addition to livestock grazing, haying of portions of the property will be considered as an alternative if vegetative removal was necessary to meet the wetland restoration goals. The allotment is initially categorized as an "M" or maintain category allotment. The same planning (RMP/EIS) constraints and direction listed under Alternative A of the PRMP/FEIS would also apply to this alternative.

Cultural Resources

Objective: Protect known cultural resources (including both historic and prehistoric resources). A class 1 inventory will be conducted on the property. A class 1 inventory is a comprehensive literature search to determine the existence of cultural remains within the project area. A class 3 survey, which is an intensive survey of the ground to identify and record all cultural resource sites within a specific location, will be completed prior to commencing any surface-disturbing activities. An archaeologist (from the BLM and/or Klamath Tribes) will be on-site during these activities to monitor the site. Testing for artifacts could be done, based on surface or stream bank indicators.

Consultation with the Klamath Tribes will occur during the regular monthly BLM\Klamath Tribes meetings on cultural resources, or at other times, if deemed necessary. This consultation will include updates on existing projects and discussion on new projects anticipated on the Wood River property. Consensus will be sought on all projects.

Recreation

Objectives: Provide opportunities for roaded natural and semi-primitive recreation experiences (opportunities to have a high degree of interaction with the natural environment, to have moderate challenge and risk and to use outdoor skills). Manage the area for low (6 to 10 parties per day) to moderate (10 to 50 parties per day) recreation use levels (moderate near developed sites and roads, and low to moderate in other areas). Manage for day use only.

Recreation use and facilities will be secondary to the overall objective of wetland restoration and water quality improvement. Based on informal recreation use monitoring during calendar year 1994, some trends in recreation use levels have been identified (See Chapter 2, Recreation section of the PRMP/FEIS). The property has been designated closed to off-highway vehicles, except for designated roads and trails and for administrative use. An improved parking area (graveled or paved) at or near the entrance to the Wood River property, sufficient to hold 20 to 25 vehicles (for peak use periods) will be provided. The facilities provided will meet the roaded natural and semi-primitive recreation opportunity objectives.

In addition to use levels, the BLM will consider user convenience, safety, and resource protection when determining what recreation facilities to provide. Such facilities could include, but are not limited to, improved (graveled or paved) parking areas and roads, toilets, interpretive signing, nature trails (canoe, foot, mountain bike, horseback, and/or ski trails), and a boat ramp to access Wood River (see Map 7 of the PRMP/FEIS). The BLM will coordinate construction activities with the Oregon Department of Environmental Quality, U.S. Fish and Wildlife Service, and the Army Corps of Engineers (among others) when designing and constructing recreation facilities.

Maintain current recreation use levels during waterfowl hunting season and allow for greater motorized access and increased use levels during the rest of the year. A likely development scenario includes the previously mentioned improved parking area at or near the entrance to the Wood River property, sufficient to hold 20 to 25 cars. A toilet, 1 to 2 picnic tables, garbage cans, and interpretive signs could also be provided at the parking area.

During the non-hunting season, better access to the property could be permitted. An improved (graveled) parking area (approximately one quarter acre in size) near the Wood River bridge, along with a primitive boat ramp (suitable for launching a small boat or canoe) and toilet could be provided. Nature trails could be provided in the vicinity of the Wood River bridge (including canoe trails, interpretive trails along the dikes and newly constructed trails using construction techniques similar to dikes).
The area is closed to overnight use. No campfires, fireworks, or smoking will be permitted. Off-highway vehicles will be limited to designated, signed roads (this will also include seasonal closures), as determined by use levels and needs.

The location and type of facilities, as well as which roads will be open or closed to motorized vehicles, will be determined as recreation use levels are established and the design and location of stream and wetland restoration projects are defined. Because of the increased recreation management and investment, the area is identified as a special recreation management area, as required in BLM Manual 1623. Hunting, fishing, sightseeing, and wildlife viewing will be supported by providing facilities. Hunting regulations on motorized vehicles, such as motorboats, and fishing use will be monitored and coordinated with the Oregon Department of Fish and Wildlife (ODFW); hunting and fishing policies could be developed and/or adjusted based on results of the monitoring data. Safety zones will be established if needed for user safety and wildlife viewing, and shooting will be prohibited in these zones. Jet boats and air boats will be prohibited in the existing Wood River Marsh and in other wetland areas as they are constructed. Limits on speed and wakes will be coordinated with the Oregon State Marine Board and could be recommended to mitigate environmental degradation. Small motorized boats could be allowed to enter the wetland areas, during times when waterfowl nesting is not occurring. The area will be identified as a Watchable Wildlife site in cooperation with the ODFW.

Visual Resources

Objective: Ensure management actions meet VRM Class II objectives.

The property will be managed to meet Visual Resource Management (VRM) Class II objectives, which is to retain the natural character of the landscape, which is a wetland. Changes in any of the basic elements (form, line, color, texture) caused by a management activity should be low. Contrasts are seen, but must not attract attention of the casual observer. Changes must repeat the basic elements found in the predominant natural features of the characteristic landscape. Projects or management actions will be evaluated using the BLM's contrast rating system to measure the degree of contrast between the proposed activity and the natural features of the landscape, and will meet or exceed VRM Class II objectives (BLM Manual Handbook H-8431-1).

Special Areas

Objective: Manage the property as an area of critical environmental concern (ACEC); and protect and restore the area's relevant and important values, which are cultural, fish and wildlife values, and natural processes and systems.

The Wood River property has been designated an ACEC (through this plan process). The Wood River property was evaluated for designation as an ACEC and found to meet the relevance and importance criteria and evaluation process as described in Appendix G in the PRMP/FEIS. This approved Upper Klamath Basin Resource Management Plan/Record of Decision serves as the management plan for the area.

Mineral and Energy Resources

Objective: Ensure mineral and other activities do not conflict with other management goals, the lands will be withdrawn from (closed to) settlement, sale, location, and entry under the general land laws, including the United States Mining Laws (30 USC Ch. 2 [1988]) , but not the mineral leasing laws, subject to valid existing rights. Energy and mineral leases will be subject to a "no surface occupancy" stipulation. The "no surface occupancy" stipulation could be waived if it was demonstrated that the mineral activity was consistent with other management goals. Mineral or energy activity also would be subject to other federal and state regulations, such as the Clean Water Act, Endangered Species Act, etc.

Soil Resources

Objective: Ensure that undue degradation of soils does not occur. Encourage and/or allow the natural accumulation of peat.

Management activities will be designed and monitored to meet the soils objective. Studies that determine the potential of peat and peaty soils as pollutant and nutrient filters will be encouraged.

Air Resources

Objective: Meet the goals of the Federal Clean Air Act, as amended; the Oregon Implementation Plan; the Oregon Smoke Management Plan; and prevent the deterioration of air quality within the Klamath Falls Special Protection Zone (described in the Oregon Smoke Management Plan).

Monitoring of air quality will be conducted as required by regulation and peer practice. Emissions of fugitive dust and smoke will be limited to operations associated with maintenance and restoration activities.

Roads and Facilities

Objective: Provide adequate roads and facilities (quality and quantity) to support management objectives.

Existing easements with adjacent property owners are recognized and the BLM will follow the terms and conditions of those easements. Roads could be improved (graveled or paved), consistent with overall objectives of this alternative and as determined by use levels and needs. Motorized vehicle use is limited to improved, designated, and signed roads (this could also include seasonal closures; see Map 7 of the PRMP/FEIS and the recreation section for more details). Exceptions to this will be for people with administrative access or existing easements. Dike maintenance (such as rip-rapping, and planting trees and shrubs) will be accomplished to provide safety to vehicle users and to maintain the integrity of the dikes. The bridge over Wood River will be inspected and maintained according to BLM bridge maintenance schedules (BLM Manual 9112.4).

If necessary to be consistent with overall management objectives, existing facilities, including cattle guards, fences, gates, ditches, bunkhouse shack, corral, and livestock handling facilities could be removed and disposed of in accordance with BLM property procedures (BLM Manual 1527.2 and 1533.2). The pumps and pump house will be maintained, and improved if necessary (see Map 7 of the PRMP/FEIS).

Plan Monitoring

The BLM planning regulations (43 CFR 1610.4-9) call for monitoring and evaluating resource management plans at appropriate intervals. The purposes of monitoring and evaluating the Upper Klamath Basin and Wood River Wetland Resource Management Plan/Environmental Impact Statement (RMP/EIS) are to:

- Track progress of RMP implementation and assure that activities are occurring in conformance with the plan (implementation monitoring);
- Determine if activities are producing the expected results and meeting stated objectives (effectiveness monitoring); and
- Determine if activities are causing the effects identified in the EIS (validation).
- Ensure that research results are well documented and shared with the community.

Implementation of the RMP will be monitored to ensure that management actions are being implemented and are meeting their intended purposes. Specific management actions will be compared with RMP objectives to ensure consistency with the intent of the plan.

Monitoring will be conducted as specified in the following sections, and the results will be reported in an Annual Program Summary, along with monitoring results from the RMP for the rest of the Klamath Falls Resource Area. This annual summary will be published starting the second year following initial implementation of the RMP. The Annual Program Summary will serve as a report to the public, track and assess the progress of plan implementation, and state the findings made through monitoring. For the Upper Klamath Basin portion of the program summary, the BLM will determine if:

- management actions are resulting in satisfactory progress toward achieving RMP objectives;
- management actions are consistent with current policy ;
- original assumptions are valid and impacts are within the range predicted, given the reliability of the predictions;
- mitigation and corrective measures are satisfactory and serving their purposes;
- the RMP is still consistent with the plans and policies of state or local government, other federal
- agencies, and the Klamath Tribes;
- new data are available that could result in alteration or amendment of the plan;
- requirements of the National Environmental Policy Act are being met; and
- compliance is being achieved on actions authorized by the BLM.

Monitoring will occur for the following resources:

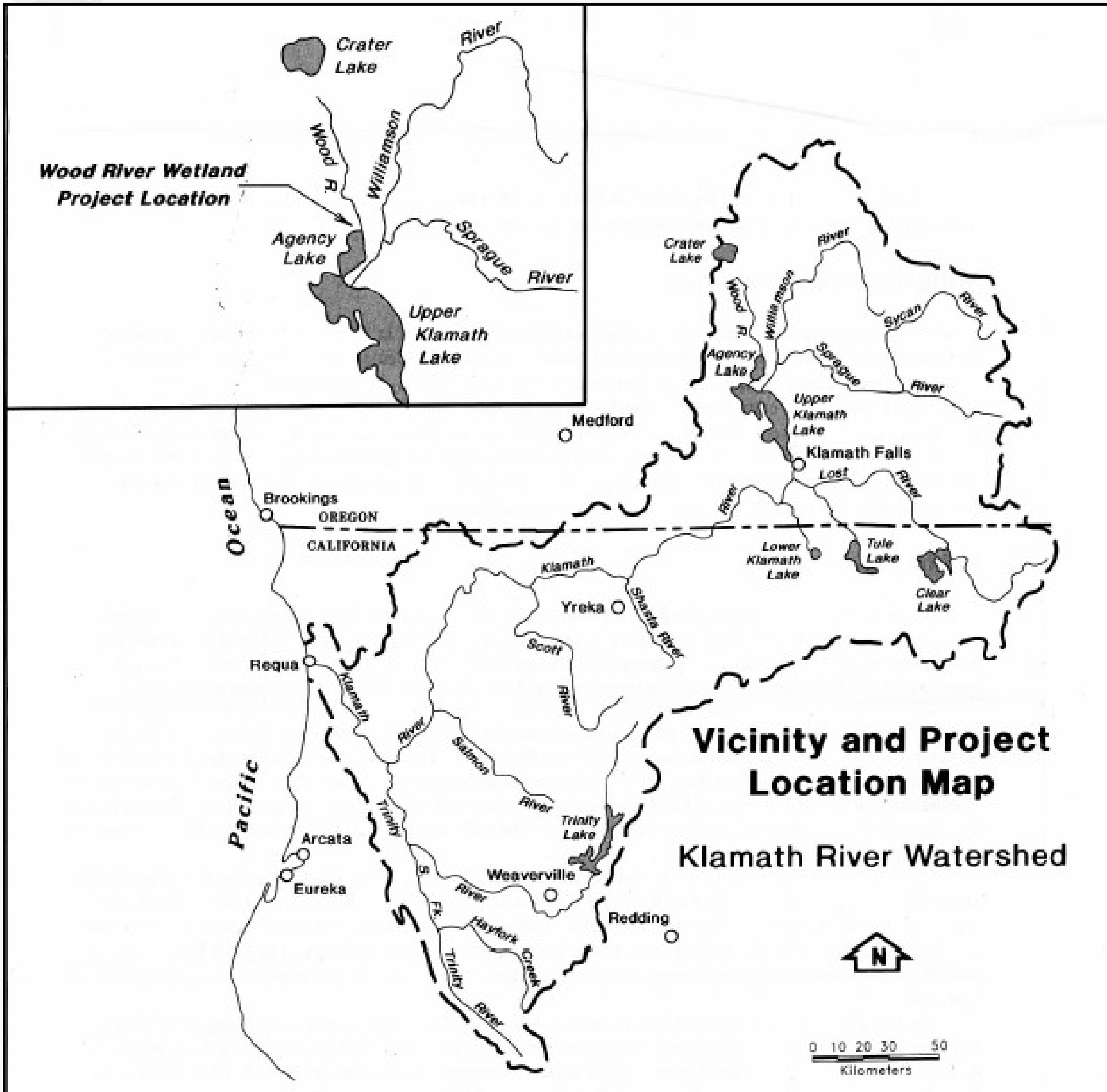
- Air Quality
- Cultural Resources, Including American Indian Values

- Water Resources
- Vegetation
- Riparian Areas
- Wildlife Habitat
- Fish Habitat
- Special Status Species
- Areas of Critical Environmental Concern
- Visual Resources
- Recreation
- Grazing Management

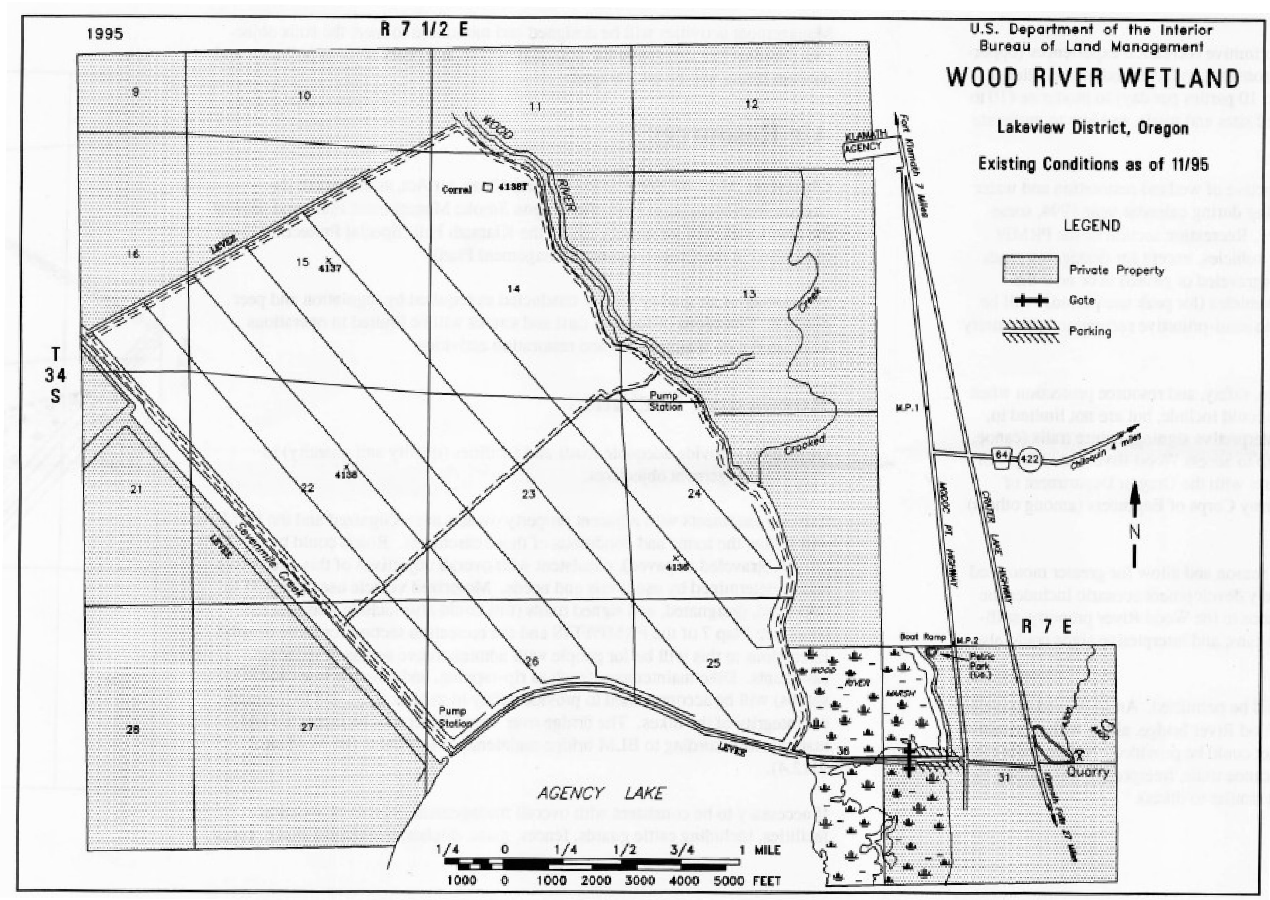
The Upper Klamath Basin and Wood River Wetland Proposed Resource Management Plan/Final Environmental Impact Statement contains the complete details on when and how monitoring will take place.

Summary of Stream Channel and Wetland Restoration Actions Table
Stream Channel Restoration: **Restore meandering flow patterns for the Wood River and Sevenmile Creek by relocating portions of the existing levees along these streams**. Prior to relocating the existing levees, new channel meanders could be constructed along the west bank of the Wood River. New levees would be constructed 50 to 400 meters interior to the existing levees. Portions of the existing levees could be left in place as islands or used to construct point bars. Natural hydrologic processes would then be allowed to establish wider riparian areas, and to enhance channel sinuosity. **Wetland Restoration:** Restore wetland by operating the existing canal and pump system. The wetland would be restored and maintained by manipulating water levels within a system of berms and water control structures. Water levels would be manipulated to manage wetland vegetation within 4 to 8 created cells. This system would be designed so that option 2 could be incorporated at some point in the future. Restore wetland by re-establishing the lake-wetland interface (opening the property's interior to prevailing water levels in Agency Lake). This could be accomplished by installing pipes or culverts through the dike along the north shore of Agency Lake, allowing lake water passage between the lake and the south half of the property. Culverts or other water-control structures could also be installed in the east and west dikes, and in the interior containment dike separating the north and south halves of the property. This would allow for movement of fish, wildlife, and plant species between Agency Lake, Wood River, Sevenmile Creek, and the main property, as well as restoring wetland habitat to the majority of the Wood River parcel.
See Table 6 of the PRMP/FEIS for a comparison of these actions against the other alternatives analyzed in that EIS. See also Appendix F of the PRMP/FEIS for a more complete description of these options.

Map 1. Vicinity And Project Location Map, Klamath River Watershed



Map 2. Existing Conditions As Of 11/95



Map 3. Conceptual View Of Fully Implemented Plan

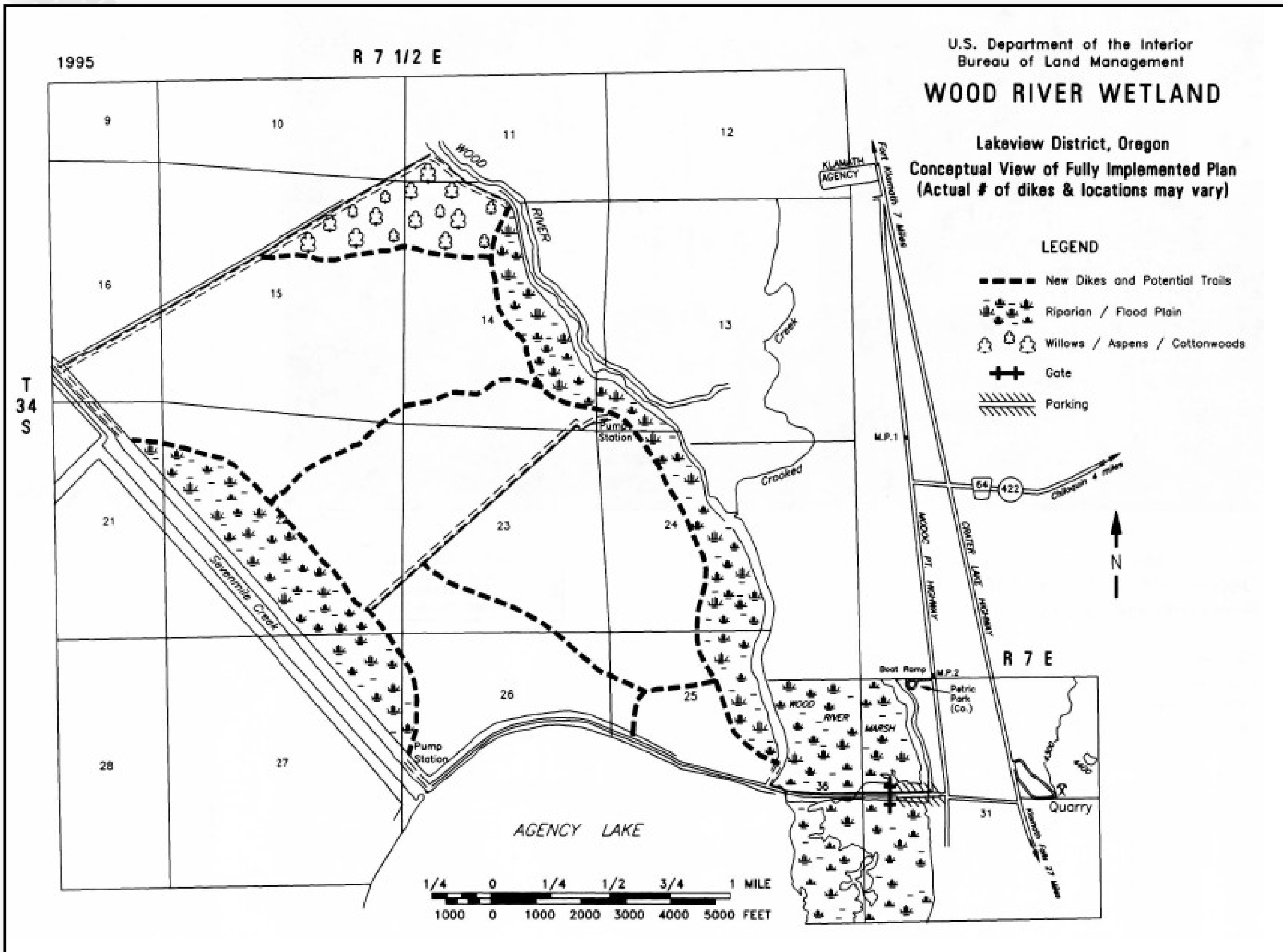


Figure S-1. Wildlife Species Checklist

Wildlife Species Checklist

Herptiles

1. Long-toed Salamander
2. Rough-skinned Newt
3. Pacific Chorus Frog
4. Bullfrog
5. Spotted Frog
6. Western Toad
7. Western Pond Turtle
8. Short-horned Lizard
9. Sagebrush Lizard
10. Western Fence Lizard
11. Western Skink
12. Ringneck Snake
13. Yellow-bellied Racer
14. Gopher Snake
15. Common Garter Snake
16. Western Terrestrial Garter Snake
17. Western Rattlesnake
18. Rubber Boa

Mammals

19. Vagrant Shrew
20. Trowbridge Shrew
21. Northern Water Shrew
22. Water Shrew
23. Merriam Shrew
24. Broad-footed Mole
25. Yuma Myotis
26. Fringed Myotis
27. California Myotis
28. Little Brown Myotis
29. Hoary Bat
30. Pallid Bat
31. Townsend's Big-eared Bat
32. Big Brown Bat
33. Snowshoe Hare
34. White-tailed Jackrabbit
35. Black-tailed Jackrabbit
36. Nuttall's Cottontail
37. Least Chipmunk
38. Yellow Pine Chipmunk
39. Belding Ground Squirrel
40. California Ground Squirrel
41. Western Gray Squirrel
42.. Yellow-bellied Marmot
43. Northern Pocket Gopher
44. Mazama Pocket Gopher
45. Western Harvest Mouse
46. Deer Mouse
47. Bushy-tailed Woodrat
48. Dusky-footed Woodrat
49. Heather Vole
50. Mountain Vole
51. California Vole
52. Long-tailed Vole
53. Townsend's Vole
54. Muskrat
55. Beaver
56. House Mouse
57. Western Jumping Mouse
58. Porcupine
59. Coyote
60. Black Bear
61. Ringtail
62. Raccoon
63. Mink
64. Long-tailed Weasel
65. Short-tailed Weasel
66. Norway Rat
67. Spotted Skunk
68. Striped Skunk
69. River Otter
70. Badger
71. Mountain Lion
72. Bobcat
73. Grey Fox
73. Red Fox
75. Elk
76. Mule Deer

Birds

77. Eared Grebe
78. Pied-billed Grebe
79. Horned Grebe
80. Clark's Grebe
81. Western Grebe
82. American White Pelican
83. Double-crested Cormorant
84. American Bittern
85. Least Bittern
86. Black-crowned Night Heron
87. Great Egret
88. Snowy Egret
89. Great Blue Heron
90. White-faced Ibis
91. Sandhill Crane
92. Tundra Swan
93. Greater White-fronted Goose
94. Snow Goose
95. Ross' Goose
96. Canada Goose
97. Common Loon
98. Mallard
99. Green-winged Teal
100. American Wigeon
101. Northern Pintail
102. Northern Shoveler
103. Blue-winged Teal
104. Cinnamon Teal
105. Ruddy Duck
106. Wood duck
107. Canvasback
108. Redhead
109. Ring-necked Duck
110. Lesser Scaup
111. Barrow's Goldeneye
112. Common Goldeneye
113. Bufflehead
114. Common Merganser
115. Hooded Merganser
116. Gadwall
117. Virginia Rail
118. Yellow Rail
119. Sora Rail
120. American Avocet
121. Black-necked Stilt
122. Long-billed Dowitcher
123. Killdeer
124. Willet
125. Greater Yellowlegs
126. Lesser Yellowlegs
127. Long-billed Curlew
128. Spotted Sandpiper
129. Least Sandpiper
130. Wilson's Phalarope
131. Common Snipe
132. Dunlin
133. American Coot
134. Ring-billed Gull
135. California Gull
136. Bobaparte's Gull
137. Forster's Tern
138. Black Tern
139. Caspian Tern
140. Golden Eagle
141. Bald Eagle
142. Northern Harrier
143. Sharp-shinned Hawk
144. Cooper's Hawk
145. Red-tailed Hawk
146. Rough-legged Hawk
147. Osprey
148. American Kestrel
149. Prairie Falcon
150. Peregrine Falcon
151. Turkey Vulture
152. California Quail
153. Ring-necked Pheasant
154. Rock Dove
155. Mourning Dove
156. Short-eared Owl
157. Long-eared Owl
158. Great-horned Owl
159. Western Screech Owl
160. Northern Saw-whet Owl
161. Common Barn Owl
162. Vaux's Swift
163. Common Nighthawk
164. Anna's Hummingbird
165. Calliope Hummingbird
166. Rufous Hummingbird
167. Northern Flicker
168. Red-naped Sapsucker
169. Red-breasted Sapsucker
170. Downy Woodpecker
171. Hairy Woodpecker
172. Western Kingbird
173. Ash-throated Flycatcher
174. Olive-sided Flycatcher
175. Western Wood-pewee
176. Say's Phoebe
177. Cordilleran Flycatcher
178. Willow Flycatcher
179. Horned Lark
180. Tree Swallow
181. Violet-green Swallow
182. Cliff Swallow
183. Bank Swallow
184. Northern Rough-winged Swallow
185. Barn Swallow
186. Belted Kingfisher
187. Scrub Jay
188. Black-billed Magpie
189. Common Raven
190. American Crow
191. Black-capped Chickadee
192. Mountain Chickadee
193. Bushtit
194. House Wren
195. Marsh Wren
196. Bewick's Wren
197. Winter Wren
198. Ruby-crowned Kinglet
199. Golden-crowned Kinglet
200. Blue-gray Gnatcatcher
201. American Robin
202. Varied Thrush
203. Western Bluebird
204. Loggerhead Shrike
205. Northern Shrike
206. Cedar Waxwing
207. Solitary Vireo
208. European Starling
209. Warbling Vireo
210. Orange-crowned Warbler
211. Nashville Warbler
212. Yellow-rumped Warbler
213. Yellow Warbler
214. MacGillivray's Warbler
215. Wilson's Warbler
216. Common Yellowthroat
217. Black-headed Grosbeak
218. Lazuli Bunting
219. Green-tailed Towhee
220. Rufous-sided Towhee
221. California Towhee
222. Vesper Sparrow
223. Brewer's Sparrow
224. Savannah Sparrow
225. Song Sparrow
226. Chipping Sparrow
227. White-crowned Sparrow
228. Golden-crowned Sparrow
229. Fox Sparrow
230. Dark-eyed Junco
231. Lincoln's Sparrow
232. Lark Sparrow
233. Western Meadowlark
234. Yellow-headed Blackbird
235. Brewer's Blackbird
236. Red-winged Blackbird
237. Tri-colored Blackbird
238. Brown-headed Cowbird
239. Northern Oriole
240. Western Tanager
241. House Sparrow
242. Pine Siskin
243. American Goldfinch
244. Lesser Goldfinch
245. Purple Finch
246. Cassin's Finch
247. House Finch
248. Evening Grosbeak
249. New ____________
250. New ____________

Help us keep an accurate list of species on the Wood River property. For any new species identified, please note the place, time, and location on the property and report the siting to the BLM office in Klamath Falls at (503) 883-6916. Thank You.

Summary of the West Eugene Wetlands Plan

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

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

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

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

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

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

An overall goal for the West Eugene Wetlands is to:

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

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

- Plans and implements wetland and stream restoration and enhance projects.
- Coordinates the West Eugene Wetlands Mitigation Bank to provide certified wetland mitigation bank credits to satisfy mitigation requirements for local development projects.
- Maintains a native seed collection program to provide seed of locally native wetland, riparian and upland species to use in restoration projects.

- Conducts vegetation and hydrological monitoring of restoration sites.
- Plans and implements land acquisition.
- Plans recreational facilities, such as multi-use paths, overlooks, and parking structures to access the wetlands.
- Implements recreation and educational programming about the wetlands.
- Fosters scientific research.

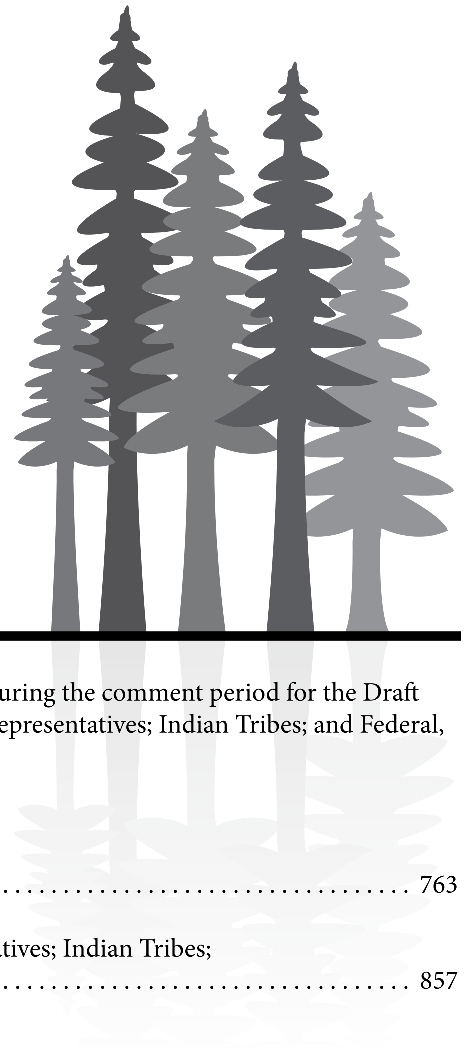
Besides the goals and policies, the West Eugene Wetlands Plan identifies individual wetland sites and recommended actions for each. Basically, the recommended actions are ideas on how to implement the policies, and therefore are not land management actions nor are they mandatory, but serve as guidance.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

In general, the West Eugene Wetlands Plan:

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

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

Appendix T
Responses to Public Comments and Comment Letters
from Congressional Representatives; Indian Tribes; and Federal, State, and Local Government Agencies



This appendix provides responses to public comments received during the comment period for the Draft EIS and copies of comment letters received from Congressional representatives; Indian Tribes; and Federal, state, and local government agencies.

In this appendix:

Responses to Public Comments 763

Comment Letters Received from Congressional Representatives; Indian Tribes; and Government Agencies 857

Introduction and Background

The five-month public comment period on the Draft Environmental Impact Statement/Resource Management Plan (DEIS/RMP) for the Western Oregon Plan Revision began on August 10, 2007 and closed on January 11, 2008. Comments were received from private citizens; interest groups; organizations; businesses; elected officials; state, local, and other federal agencies; and Indian Tribes.

More than 30,000 submissions were received in the form of letters, postcards, facsimiles, emails, and electronic postings to the plan revision website. Many of the submissions were highly repetitive e-mails, form letters, and postcards. Some submissions contained only a few lines, others contained hundreds of pages. The submissions varied widely in their desires, their scope, and their specificity. Most expressed opinions and suggestions but did not offer specifics.

Common themes were heard in the submitted comments. They included: don't abandon the Northwest Forest Plan; stop cutting old-growth; don't clear-cut; increase harvest to provide funding for county services and jobs for residents; these highly productive lands should be intensively managed for timber; increase opportunities for off-highway vehicle use, and do what you can to decrease off-highway vehicle use.

The processing of the submissions should not be thought of as a tally of votes. All submissions were treated equally and were not given weight by number, organizational affiliation, or other status of the respondents. All of the submissions received during the public comment period were reviewed. Comments in the submissions that identified, with a reasonable basis, errors in the analysis that would substantively alter analytical conclusions, provide new or missing information that would substantively alter the analytical conclusions, or proposed a new alternative that would meet the purpose and need were labeled as substantive comments. These substantive comments were summarized into "comment statements." Comment statements are summary statements that identify and describe specific issues or concerns. Similar concerns voiced in multiple letters were summarized into one comment statement.

The remainder of this appendix presents summarized comment statements and responses by issue topic. The comments and responses are intended to be explanatory in nature; if there are any inadvertent contradictions between this appendix and the main chapters of the final environmental impact statement, the main chapters of the final environmental impact state. Copies of letters received during the comment period from federal, state, and local governments and from Indian Tribes are included at the end of this appendix.

Response to Comments

Purpose and Need

1. Comment: The EIS should be revised to analyze impacts over the life of the plan (15 to 20 years). The assumption that the plan will be in effect for 100 years is unreasonable, because no plan adopted by the BLM will be implemented longer than 15 to 20 years before it is amended or revised.

Response: Limiting the analytical scope to 15 to 20 years would not address the long-term effects of the agency action, which is required by the Council on Environmental Quality regulations for implementing the National Environmental Policy Act (40 CFR 1502.16). The BLM NEPA Handbook instructs that the timeframes for analysis should be based on the duration of the direct and indirect effects of the proposed action and alternatives, rather than the duration of the action itself (BLM NEPA Handbook, H-1790-1, p. 58).

2. Comment: The EIS purpose and need should be revised, because it unreasonably restricts the range of alternatives. By focusing the purpose and need on a narrow, unreasonable interpretation of the Oregon and California (O&C) Act, the BLM restricts the range of alternatives to actions that increase the extent and the impacts of timber harvest, road building, and other associated activities to old-growth forests, the northern spotted owl, the marbled murrelet, ESA listed salmon and steelhead, other special status species, and important recreational species including big game, fish, and birds.

Response: The purpose and need articulated in the Draft EIS cannot be considered unreasonably restrictive, because it reflects the legal mandates under which the BLM must manage, including the O&C Act, the Endangered Species Act, and the Clean Water Act. The interpretation of the O&C Act presented in the Draft EIS is consistent with the plain language of the O&C Act, the legislative history of the O&C Act, and the Ninth Circuit ruling in *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990), and therefore cannot be considered unreasonable. As explained in *Chapter 1*, the Northwest Forest Plan elected to use criteria for the management of habitat from the National Forest Management Act on both United States Forest Service and BLM-administered lands, even though the National Forest Management Act does not apply to BLM-administered lands. The action alternatives increase the extent of timber harvest from the levels in the No Action Alternative, in part because the purpose and need for this action does not include applying these National Forest Management Act criteria to BLM-administered lands. The range of alternatives covers the full spectrum of alternatives that would address the purpose and need for the action. There are also numerous and varied alternatives that were considered, but not analyzed in detail, as explained in Chapter 2 of the EIS.

3. Comment: The EIS should be revised to acknowledge that the O&C Act does not relieve the BLM of its responsibility to comply with applicable environmental laws. In *Portland Audubon Society v. Lujan*, 998 F.2d 705 (9th Cir. 1993), the BLM argued that a court injunction barring logging from spotted owl habitat would violate the O&C Act. The court rejected this argument, declaring: "We find that the plain language of the Act supports the district court's conclusion that the Act has not deprived the BLM of all discretion with regard to either the volume requirements of the Act or the management of the lands entrusted to its care. Because there does not appear to be a clear and un-avoidable conflict between statutory directives, we cannot allow the Secretary to "utilize an excessively narrow construction of its existing statutory authorizations to avoid compliance [with NEPA]."

Response: The purpose and need in the Draft EIS clearly stated that part of the purpose of the agency action includes compliance with not only the O&C Act, but with all applicable laws, including the Endangered Species Act and Clean Water Act. The Draft EIS specifically detailed the major laws affecting the management of O&C lands and acknowledged the applicability of environmental laws to O&C lands. The construction of the O&C Act that the Court in *Portland Audubon Society v. Lujan* found too narrow was an interpretation that the O&C Act required that a minimum of 500 MMBF of timber be offered on an annual basis. The government argued that the injunction issued by the District Court was in conflict with that statutory duty. The Court in *Portland Audubon Society v. Lujan* merely pointed out that the procedural requirements of NEPA did not inherently conflict with the BLM's substantive duties in the O&C Act. That ruling is not in conflict with the Ninth Circuit's interpretation of those substantive duties under the O&C Act which were at issue in *Headwaters v. BLM.*

4. Comment: The EIS purpose and need should be revised to disclose that the revision is mandated by a lawsuit filed by timber industry groups, (*AFRC v. Clarke*, Civil No. 94-1031-TPJ [D.D.C.]). This lawsuit was settled out of court on August 28, 2003. Under this agreement with the timber industry, the BLM agreed to revise its resource management plans (RMPs) in Western Oregon and in this revision, the BLM would consider an alternative that would not create any reserves on the O&C lands, except those mandated by the ESA.

Response: The Draft EIS acknowledged in Chapter 1 that the RMP revision will satisfy a settlement agreement in *AFRC v. Clarke*, Civil No. 94-1031-TPJ (D.D.C). The Draft EIS also provided detailed discussion of the settlement agreement in *Appendix A – Legal Authorities*.

5. Comment: The EIS purpose and need should be revised because not meeting the Allowable Sale Quantity (ASQ) of 211 million board feet (mmbf) is not a valid reason to revise the plans. The ASQ of 211 mmbf is a limit, not a minimum standard. The courts ruled in *Portland Audubon Society v. Babbit*, 998 F.2d 705 (9th Cir. 1993) that the O&C Act did not establish a minimum volume that must be offered every year notwithstanding any other law.

Response: The ruling in *Portland Audubon Society v. Lujan* was that the O&C Act did not establish 500 MMBF as a minimum standard. The Court said that this initial minimum was no longer applicable once the Secretary determined the annual sustained yield capacity of the land, and from that time forward the minimum to be offered was derived from the Secretary's determination. Since there was no inherent conflict between the duty to offer the determined amount annually and compliance with NEPA procedures in making that determination, the injunction against timber sale offerings until the agency complied with those procedures was within the jurisdictional authority of the Court. The ruling in *Portland Audubon Society v. Lujan* should not be read as eliminating the requirement of the O&C Act that the Secretary annually offer the declared sustained yield capacity for the O&C lands. The O&C Act requires the BLM to declare the annual productive capacity of the O&C lands, and the 1995 RMPs declared an allowable sale quantity that represents the annual productive capacity.

The O&C Act also requires that "the timber thereon shall be sold, cut and removed in conformity to the principle (*sic*) of sustained yield." The 1995 RMPs explained that the allowable sale quantity is an estimate of annual average timber sale volume likely to be achieved from lands allocated to planned, sustainable harvest. The allowable sale quantity represents neither a minimum level that must be met nor a maximum level that cannot be exceeded, but it represents BLM's best assessment of the average amount of timber likely to be awarded annually in the planning area over the life of the plan. As explained in the Draft EIS, plan evaluations found that the actual level of timber harvest was 40 to 70 percent of the anticipated annual sale quality, which represents a failure to meet the RMP objective of providing a sustainable supply of timber. Failure to meet some plan objectives and new information that increases opportunities to improve the performance of other plan objectives necessitates revisions to resource management plans.

Laws and Court Rulings Affecting Management of O&C Lands

6. Comment: The EIS should be revised on page 12 where it states, "Based on the language of the O&C Act, the O&C Act's legislative history, and the decision by the Ninth Circuit County in *Headwaters v. BLM*, (914 F.2d 1174 (9TH Cir. 1990), it is clear that the management of timber (including harvesting) is the dominant use of the O&C lands …" to indicate that timber is dominant over wildlife, not all other uses.

Response: The Ninth Circuit ruling in *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990) established that timber production is the primary use and the dominant use of the O&C lands. To interpret this ruling as concluding that timber production is dominant over some uses but not other uses on the O&C lands is inconsistent with the plain language of the O&C Act and the Ninth Circuit ruling.

7. Comment: The EIS should be revised to discuss the 1939 law governing the Coos Bay Wagon Road lands and its tax-equivalence basis for calculating payments to the counties.

Response: Additional discussion has been added to the final EIS describing the distribution of receipts from Coos Bay Wagon Road lands.

8. Comment: The EIS should be revised to include more background on the O&C Act, as the discussion on page 10 provides limited information. While the Act provides 50% to the counties, it provides an additional 25% "after back taxes and reimbursements to the U.S. Treasury are settled." Thus, for some time after the late 1950's, the counties received 75% of timber sale receipts. Eventually, these receipts became so high that they approached "windfall" status, and there was talk outside of Oregon about changing the O&C Act. The counties opted to voluntarily return 25% back to the BLM. These "plowback" funds were to be used for recreation developments, reforestation, and other forest development activities. The plowback funding represented a unique Federal/County partnership, and facilitated intensive timber management on the O&C lands.

Response: Additional information on the history of the payments to counties under the O&C Act would not clarify the purpose and need for the action or how the O&C Act affects the RMP revision.

9. Comment: The EIS should be revised to be consistent with the Home builder's case. The Supreme Court's ruling in National Association of Home Builders limits the ESA's application to discretionary agency actions, and takes the performance of non-discretionary actions outside ESA reach. This ruling has applicability to the O&C Act. The non- discretionary language of the O&C Act means the BLM "does not have the discretion" to manage O&C lands classified as timberlands for any purpose except permanent forest production; it "does not have the discretion" to fail to determine and declare the annual productive capacity of those timberlands; it "does not have the discretion" to fail to sell, cut and remove the timber from those timberlands in conformity with the principle of sustained yield; and it "does not have the discretion" to sell annually from those timberlands less than one-half billion feet board of timber or their determined annual sustained yield capacity.

Response: The BLM management of O&C lands is different from the federal action at issue in *National Association of Homebuilders v. Defenders of Wildlife*, 551 U.S. ___ (2007), and that ruling is therefore not applicable to this plan revision. At issue in *National Association of Homebuilders v. Defenders of Wildlife* was legislative direction to the Environmental Protection Agency to transfer permitting authority to a State upon application and a showing that a State has met nine specified criteria. The O&C Act provides a mandate for BLM to manage the O&C lands for permanent forest production, but this mandate does not make BLM management of these lands a non-discretionary action similar to the transfer of permitting authority by the Environmental Protection Agency. The BLM has reasonable alternatives to accomplish the purpose of "permanent forest production." Because BLM has discretion in the management of these lands -- regardless of the limits on that discretion -- this plan revision is a discretionary action and is therefore subject to section 7(a)(2) of the Endangered Species Act.

10. Comment: Management of all O&C lands, including the National Landscape Conservation System, must be included in sustained yield timber production unless specific areas have received a Congressional designation that precludes such timber management.

Response: Under each of the alternatives, O&C lands are withdrawn from timber harvest for a variety of reasons other than a Congressional designation that precludes timber management. The Cascade-Siskiyou National Monument, which would be withdrawn from timber harvest under all alternatives, was established by proclamation of the President. Section 2 of the American Antiquities Act of 1906 (34 Stat. 225, 16 U.S.C. 431), authorizes the President, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and to reserve as a part thereof parcels of land.

All alternatives include riparian management areas to ensure compliance with the Clean Water Act and the Endangered Species Act. All alternatives withdraw O&C lands that are classified under the Timber Productivity Capability Classification as not capable of supporting a sustained yield of forest products. None of these O&C lands have received a Congressional designation that precludes timber harvest, yet they are properly withdrawn from timber harvest under all of the alternatives. To include these lands in the determination of the annual productive capacity would overstate the sustained yield harvest level.

11. Comment: The EIS should be revised to consider Executive Order 13443 of August 16, 2007, "Facilitation of Hunting Heritage and Wildlife Conservation," because it pertains to recreation and wildlife on public lands and it is not discussed in the EIS.

Response: The appendix listing legal authorities has been updated to include Executive Order 13443 "Facilitation of Hunting Heritage and Wildlife Conservation." Although the Draft EIS did not explicitly identify Executive Order 13443 (which was issued after the publication of the Draft EIS), it was consistent with the direction in the order, which included evaluating the effects of the alternatives on game species and their habitats, working collaboratively with State governments, and seeking the advice of State fish and wildlife agencies.

12. Comment: The EIS should be revised to include an explanation of how applicable provisions located in the Healthy Forests Initiative and the Healthy Forests Restoration Act would be addressed by WOPR.

Response: Text has been added to the Final EIS describing the provisions of the Healthy Forests Restoration Act.

13. Comment: The EIS should be revised to consider that relevant case law indicates that, to the extent BLM chooses management actions which do not maximize species conservation, that it should be prepared to describe its rationale for doing so.

Response: The Draft EIS described a range of alternatives that provide different contributions to species conservation. The record of decision will provide the rationale for selection among the alternatives. If the selected alternative does not maximize species conservation, the rationale for selection will provide an explanation for the decision.

14. Comment: The EIS (Preferred Alternative) should be revised because withdrawing 52 percent of suitable timberland to aid in achieving the "survival and recovery" of the northern spotted owl and other federally listed species is in direct conflict with the Ninth Circuit's Headwaters decision and the 1986 Legal Opinion.

Response: The Ninth Circuit ruling in *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990) concluded that withdrawing O&C lands from timber harvest to serve as habitat for the northern spotted owl violated the O&C Act. However, the Court did not explore in that opinion or in its response to the request for reconsideration in *Headwaters v. BLM*, 940 F.2d 435 (9th Cir. 1991), the extent to which the BLM could utilize its authorities under the O&C Act to further the purposes of the Endangered Species Act or what actions the BLM would be allowed to take under the O&C Act to avoid jeopardizing a species listed under the ESA or to avoid adversely modifying designated critical habitat. The EIS analyzed a range of alternatives to accomplish the purpose and need of managing these lands under the direction provided in the O&C Act, while also complying with all other applicable laws, which includes compliance with the Endangered Species Act and coordination with recovery planning for species listed under the Endangered Species Act. The PRMP withdraws lands from timber harvest to provide habitat for species listed under the Endangered Species Act and to ensure compliance with other environmental laws.

The commenter does not attach the "1986 Legal Opinion" or provide a complete citation. The "1986 Legal Opinion" is presumably a memorandum signed jointly by Gale Norton, who was the Associate Solicitor for the Division of Conservation and Wildlife, and Constance Harriman, the Associate Solicitor for the Division of Energy and Resources, dated October 20, 1986, which addressed the interaction between the O&C Act and other statutes, including the Endangered Species Act. This memorandum recognized that the O&C Act made timber production the dominant use, but not the sole use, for the O&C lands, and that the BLM has the discretion under the O&C Act necessary for compliance with other statutes. The purpose and need described in the EIS is consistent with the 1986 memorandum.

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

15. Comment: The EIS should be revised to clearly state that the O&C Act does not govern public domain lands, and develop separate management for public domain lands as it is not appropriate to propose the same management actions on public domain lands and lands governed by the O&C Act. Along with this clarification, the EIS should disclose the distribution of the roughly 400,000 acres of Public Domain lands and consider the requirements of FLPMA for these lands. These lands should be identified in the EIS and the BLM's interpretation of the O&C Act should not be applied to these non-O&C Act lands. The BLM should consider an alternative that provides a high level of conservation emphasis on Public Domain lands.

Response: The EIS acknowledges that Public Domain lands are to be managed for a multitude of values under the Federal Land Policy Management Act. The alternatives include a range of uses and management objectives for Public Domain lands in the planning area, which permits the BLM to consider multiple uses for the Public Domain lands. Additional discussion has been added to the final EIS to explain the management of public domain lands in this RMP revision. The Draft EIS described the acreage and location of Public Domain lands. A map showing the location of Public Domain lands has been added to the final EIS.

The Alternatives

16. Comment: The EIS should be revised to consider a full range of alternatives that meet the agency's legal obligations including at least one alternative that will not create any reserves on O&C lands except as required to avoid jeopardy under the ESA. In addition, all alternatives must be consistent with the O&C Act as interpreted by the 9th Circuit Court of Appeals. By only considering action alternatives that cannot meet BLM's legal duties, BLM is violating the requirement that National Environmental Policy Act (NEPA) documents discuss alternatives to the proposed action, to "provid[e] a clear basis for choice among options by the decision maker and the public." 40 C.F.R. 1502.14; see also 42 U.S.C. § 4332(2)(E); 40 C.F.R. 1507.2(d), 1508.9(b). The Council on Environmental Quality, which wrote the NEPA regulations, describes the alternatives requirement as the "heart" of any EIS. 40 C.F.R. 1502.14. "The existence of a viable, but unexamined alternative renders an EIS inadequate." *Alaska Wilderness Recreation & Tourism v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995).

Response: The EIS considered a range of alternatives that are designed to meet BLM's legal duties. The purpose and need in the Draft EIS clearly stated that the purpose of the agency action includes compliance with not only the O&C Act, but with all applicable laws. The commenter does not articulate which legal duties the alternatives cannot meet nor which viable alternatives were not examined.

17. Comment: The EIS should be revised to include a restoration alternative because there is a growing consensus among decision makers, scientists, foresters, and others that aggressive thinning and other management activities are needed to restore forests historically characterized by frequent low and mixed severity fire regimes, such as those of the Medford District.

Response: The Proposed Resource Management Plan (PRMP) Alternative in the Final EIS includes uneven-aged management in forests that were historically characterized by frequent low and mixed severity fire regimes in the Medford District and Klamath Falls Resource Area. Alternative 3 includes a partial harvest forest management regime in these forests. More generally, all alternatives analyzed in detail include some level of thinning. The acreage of thinning would vary among the alternatives, both in the harvest land base and the nonharvest land base. This variation provides a comparison of the effects of different levels of thinning and a basis for a reasoned choice among the alternatives.

18. Comment: The EIS should be revised to include a maximum timber alternative and maximum environmental alternative to set the spectrum or outer limits of alternatives within which a rigorous and documented search for a preferred alternative could take place.

Response: The EIS analyzed in detail a range of alternatives that respond to the purpose and need for action. The alternatives vary the strategy for managing land and resources for threatened and endangered species, wildlife, water quality, fish, and timber production within the context of meeting the purpose and need for action. In addition, the EIS included analysis of two reference analyses: allow no harvesting, and manage most commercial forest lands for timber production. These reference analyses provided additional information that is useful to more fully understand the effects of the alternatives. However, these reference analyses are not reasonable alternatives, because they do not meet the purpose and need for action.

19. Comment: The EIS graphs for comparing the alternatives should be revised to provide comparable data across the alternatives. For example, old growth and late successional forests are not included in the Alternative 3 graph resulting in non-comparable data across the alternatives. It is understood that Alternative 3 doesn't provide that data directly, but when asked for a comparison, an estimate based on the plan would be more appropriate. The BLM should update the graphs to make sure they each measure the same set of data, in order to allow viewers to make accurate comparisons.

Response: The Draft EIS provided comparable data across the alternatives for the abundance of structural stages. Table 150 of the Draft EIS disclosed the abundance of each structural stage over time for each alternative, including Alternative 3. Table 151 disclosed the outcome of existing old forest by 2106 under each alternative, including Alternative 3. More generally, Table 40 in the Draft EIS provided a comparison of the key impacts of the alternatives. These tables are included in the final EIS with the addition of data on the PRMP (see Tables 4-4, 4-5, and 2-63, respectively). Tables 188 and 189 in the Draft EIS did not include Alternative 3, because these tables described the amount of northern spotted owl suitable habitat within late-successional reserves or late-successional management areas, and Alternative 3 did not allocate any late-successional management areas.

20. Comment: The EIS should be revised on pages 43-44 (National Landscape Conservation System section) to include only those management actions that are consistent with the O&C Act or specific Congressional designation. For example, on Congressionally designated Wild and Scenic rivers with a scenic or recreation classification, timber harvest is allowed, and lands with such classifications should be a part of the timber base for sustained yield calculations. Only sections of rivers with Congressional wild classifications are properly withdrawn from timber harvest. The BLM lacks authority to withdraw O&C and CBWR lands from timber production on an interim basis while Congress is considering eligibility of candidate areas for inclusion in the Wild and Scenic system.

Response: The EIS explains the application of the O&C Act to Wilderness Study Areas and visual resources, including Wild and Scenic Rivers, and describes generally that protection on O&C lands would be provided if required by Congressional designation or where protection would not conflict with sustained yield forest management.

21. Comment: The EIS should be revised to include a description of the No Action Alternative. The EIS must describe the No Action Alternative in sufficient detail to provide a baseline for the reader to make comparisons to the action alternatives and assess the validity of the environmental effects section.

Response: The No Action Alternative has an important and vital role in effects analysis, because it provides context for comparing the environmental effects of the alternatives and demonstrates the consequences of not meeting the need for the action. The EIS summarizes the features of the No Action Alternative, provides a map of the land use allocations, and incorporates by reference the detailed descriptions in the 1995 RMPs. In preparing NEPA documents, agencies are directed by the Council on Environmental Quality regulations to incorporate by reference to reduce excessive paperwork. The 1995 RMPs contain the detailed descriptions of the No Action Alternative and are readily available.

22. Comment: The EIS should be revised to include a true No Action Alternative that continues current management as is outlined in the existing plans. The addition of new management under the No Action Alternative violates a primary tenant [*sic*] of NEPA to examine a No Action Alternative along with action alternatives. Therefore, the reduction of riparian reserves from 522,000 acres to 364,000 acres and subsequent increase of the ASQ by 32 percent (page 566 of the Draft EIS) should be considered under a separate alternative.

Response: The No Action Alternative would continue current management direction as outlined in the existing 1995 RMPs. There is no new management added to the No Action Alternative. The management objectives and management direction for riparian reserves (including the riparian reserve widths) are unchanged. The acreage of riparian reserves was estimated in the 1995 RMP/EISs based on the information available at that time. New information based on improved mapping of hydrologic features has demonstrated that the acreage of riparian reserves is actually smaller than estimated in the 1995 RMPs/EISs. To analyze the No Action Alternative using the estimation of riparian reserve extent from the 1995 RMPs/EISs would ignore this new information on the actual acreage that was allocated to Riparian Reserves by the 1995 RMPs and, therefore, would be inconsistent with the Council on Environmental Quality regulations.

23. Comment: The EIS should be revised to correct deficiencies in the alternatives. This can be achieved by modifying Alternative 2 to incorporate the U.S. Supreme Court's limitations on the reach of the ESA, and correcting certain other existing inconsistencies with the O&C Act. All information and data necessary for FEIS analysis is currently available in the Draft EIS. The following are suggested changes for Alternative 2:

1. Maintain existing LSMA allocation boundaries identified in Alternative 2, but do not withdraw or reserve these lands from sustained timber production. Instead, develop long-term rotation age strategies within the LSMA boundaries that would contribute to the conservation and recovery of federally listed species, while also providing for regeneration harvesting on a sustained yield basis. We

suggest using the long rotation ages contained in Alternative 3 within the areas currently identified as LSMAs, and using landscape targets for regeneration harvest within LSMA boundaries similar to requirements in Alternative 3.

2. Develop timber management objectives within LSMA boundaries that maintain and promote the development of suitable habitat for federally listed ESA species. Examples include thinnings and partial harvests that would hasten development of structurally complex forests within the LSMA boundaries. All timber harvested within the LSMAs is in the timber harvest base and the volume should be included in ASQ calculations.
3. The Secretary, apart from the WOPR process, should eliminate critical habitat designations on O&C and CBWR lands. The BLM cannot participate in a system of reserves on O&C and CBWR lands. The USFW, at the direction of the Secretary, should revise its proposed critical habitat designation to account for the BLM's non-discretionary mandates under the O&C Act.
5. Establish continuous field survey and monitoring systems within LSMAs for all federally listed species. Determine whether a location is "actually occupied" based on confirmation of the physical presence of species using the site for nesting, roosting, or foraging (owls) or nesting (murrelets), but excluding locations where there are sightings of transient, dispersing birds.
6. Protect all sites (inside and outside of LSMAs) that are actually occupied by listed species by delaying regeneration harvest of sites for so long as sites are actually occupied. See definition of "actually occupied" in comment 5.
8. In areas south of Grants Pass and in the Klamath Falls Resource Area of the Lakeview District, apply uneven-aged timber management principles where feasible to all BLM lands. This practice would reduce fire hazard and the acres of high severity fire when wildfires occur in these areas. It could also benefit suitable habitat conditions for ESA-listed species.
9. Include in the sustained yield timber management base all Congressionally designated Wild and Scenic Rivers that have a scenic or recreation classification. Exclude only those rivers with a Congressional wild classification from the timber base. Include in the timber management base all rivers that have not been Congressionally designated. Any protections for riparian areas along Wild and Scenic rivers included within the timber base would be those riparian protections generally applicable for the land use allocation of the surrounding lands.
10. Withdraw O&C and CBWR lands located in the National Landscape System from sustained yield timber management only if they have a Congressional designation requiring protection.
11. Include all lands adjacent to the Coquille Tribal Forest in the sustained yield timber management base.
13. Develop a sub-alternative for Alternative 2 that eliminates LSMA boundaries and establishes the maximum harvest that can be maintained in these areas without exceeding the amount of new growth.

Response: Taken together, these proposed modifications are so substantial as to constitute a different alternative. Such an alternative would not accomplish the purpose and need for action, because it would not comply with the Endangered Species Act and would not coordinate with recovery planning by the U.S. Fish and Wildlife Service. Furthermore, such an alternative would be beyond the scope of the action, because it would require the Secretary of Interior to eliminate critical habitat designations.

Several component elements of the commenter's proposed alternative have been considered in the Draft EIS or are included in the PRMP in the FEIS. Management within Late-Successional Management Areas using the forest management strategies of Alternative 3 would have the same effects in these areas as Alternative 3. The Draft EIS analysis demonstrated that Alternative 3 would not create large blocks of habitat for the northern spotted owl and would decrease the abundance of nesting habitat for the marbled murrelet in the first 50 years. Protection of known sites of northern spotted owls and marbled murrelets was included in the No Action Alternative and Alternatives 1 and 3; also, the PRMP includes protection of known marbled murrelet sites.

The PRMP includes uneven-aged management in forests that were historically characterized by frequent low and mixed severity fire regimes in the Medford District and Klamath Falls Resource Area. The PRMP would not establish a unique land use allocation for land adjacent to the Coquille Tribal Forest and would include those lands in the harvest land base similar to surrounding lands. The Draft EIS included a reference analysis of "manage most commercial forest lands for timber production," which established a maximum harvest level that could be maintained without exceeding the amount of new growth.

Two of the component elements of the commenter's proposed alternative are contradictory. Regeneration harvest on a sustained-yield basis within Late-Successional Management Areas would not be consistent with an objective to maintain and promote development of suitable habitat for federally listed ESA species.

Under each of the alternatives, O&C lands are properly withdrawn from timber harvest for a variety of reasons other than a Congressional designation that precludes timber management. To include these lands in the determination of the annual productive capacity would overstate the sustained yield harvest level. The Draft EIS explained the application of the O&C Act to Wilderness Study Areas and visual resources, including Wild and Scenic Rivers, and described generally that protection would be provided to these areas on O&C lands if required by Congressional designation, or where protection would not conflict with sustained yield forest management.

24. Comment: The analysis of Alternative 1, Subalternative 3 should be reevaluated because it is unreasonably constrained and it fails to consider the potential for ecologically appropriate thinning to provide for a predicable [*sic*] supply of timber. Rather than calculating and disclosing potential volume directly, the analysis is limited to estimating the number of years that harvest near the level of Alternative 1 could be sustained with thinning volume. By failing to fully analyze this subalternative for its effects on recreation, water quantity and quality, soils, invasive plants, fish, wildlife, and other resources the BLM fails to disclose the significant benefits of this approach and the significant impacts of the preferred alternative. In particular, this subalternative could provide for stable communities and a predictable level of production.

Response: The analysis of the subalternative for Alternative 1 that would allow no regeneration harvesting until thinning opportunities are exhausted did calculate the potential volume directly, but was constrained by the requirement for a sustained yield of timber production, as were all alternatives and subalternatives. The estimate of the number of years that harvest near the level of Alternative 1 could be sustained with thinning volume is an outcome of the analysis, not a constraint on the subalternative. The Draft EIS explained that the analysis of the subalternative was focused and limited to specific analytical questions. The commenter does not specify the unreasonable constraints that were placed on this subalternative.

25. Comment: The EIS should be revised on page 107 to clarify why the Naturally Selected Dead and Dying Trees Alternative was removed from consideration. It is interpreted that BLM rejected the alternative because DCA did not determine and declare the annual productive capacity of BLM lands. However, NSA has declared that it takes the dead and dying, conditional upon meeting the needs of other species. The NSA would produce not less than the annual sustained yield capacity as it would retain the net worth of the forest ecosystem which is necessary to retain maximum productivity over the long term. At the BLM WOPR technology presentation in Oct 2007 a specialist working with the models indicated that BLM has the ability to model natural tree mortality. If this is not the case, it should be clarified as this is part of the NEPA requirement placed on BLM. It appears that that the NSA was eliminated because it did not receive rigorous exploration and objective evaluation that is part of the BLM EIS process.

Response: The Draft EIS disclosed that the alternative of Harvest Only Naturally Selected Dead and Dying Trees was eliminated from detailed study, because it would not be consistent with the O&C Act and would not meet the purpose and need for action. The O&C Act requires the BLM to determine the annual productive capacity of the O&C lands and to sell that amount of timber annually. Harvest of only dead and dying trees would not reflect the annual productive capacity of the O&C lands and, therefore, would not meet the purpose and need for the action.

26. Comment: The EIS should be revised to provide meaningful response to the NSA issues raised during scoping regarding fire hazard, where 57 different supporting studies were cited, and objectively evaluate and disclose the extent and scientific basis for the controversy.

Response: The commenter does not identify the scientific controversy that the Draft EIS did not disclose. The scoping comments were considered in the development of the Draft EIS, and the Draft EIS summarized the science regarding fire hazard and fire resiliency. The alternatives in the Draft EIS considered different forest management strategies to address fire hazard and fire resiliency. Specifically, the Draft EIS identified the increasing fire resiliency as a topic to be explored in the preparation of the Final EIS. The PRMP in the FEIS includes uneven-aged management in forests that were historically characterized by frequent low and mixed severity fire regimes in the Medford District and Klamath Falls Resource Area specifically to mitigate the fire hazard that would result from the preferred alternative identified in the Draft EIS.

Natural Disturbance and Salvage

27. Comment: The EIS should be revised to acknowledge that even with enlightened management on federal lands for the next 100 years, we will reach only 75% of the historic large snag abundance measured across the interior Columbia Basin, and most of the increase in large snags will occur in roadless and wilderness areas.

Response: Projected changes in snag abundance under different management strategies in the interior Columbia Basin are not directly relevant to changes in snag abundance in the planning area because of fundamental differences in vegetation characteristics, disturbance regimes, and tree growth and mortality. The Draft EIS described future changes in habitat for snag-dependent species, but did not identify any threshold or target related to historic large snag abundance. Restoring the historic abundance of snags is not identified as a management objective under any of the alternatives.

28. Comment: The EIS should be revised to include a delay in salvage logging after a fire, because beetle dung helps forests recover from fire and immediate salvage logging disrupts the beetles and does not allow them to complete their life cycle.

Response: The alternatives in the Draft EIS varied in whether they would allow salvage logging after disturbances in the Late-Successional Management Areas. This allowed consideration in the development of the PRMP in the FEIS of whether salvage logging in the Late-Successional Management Areas should be allowed. None of the alternatives considered a delay in salvage logging after disturbance, because a delay to allow bark beetles to complete their life cycle would result in a loss of the economic value of the logs. Therefore, to delay salvage logging would have the same effect as not allowing salvage logging, which was considered in the Draft EIS.

Climate Change

29. Comment: The EIS should be revised to consider Oregon House Bill 3543, and whether the proposed alternatives' impacts to climate change adhere to this State law.

Response: Oregon House Bill 3543 provides no authority for management of BLM-administered lands. Nevertheless, none of the alternatives are inconsistent with this State law. The bill directs the State to stop the growth of greenhouse gas emissions by 2010 and to reduce greenhouse gas emissions to 10 percent below 1990 levels by 2020 and to 75 percent below 1990 levels by 2050. The bill creates the Oregon Global Warming Commission, which will evaluate among other things, the carbon sequestration potential of Oregon's forests, alternative methods of forest management that can increase carbon sequestration and reduce the loss of carbon sequestration to wildfire, changes in the mortality and distribution of tree and other plant species, and the extent to which carbon is stored in tree-based building materials. The final EIS includes an analysis of carbon storage and concludes that each alternative would result in an increase in net storage of carbon in forests on BLM-administered lands and wood harvested from BLM-administered lands.

30. Comment: The EIS should be revised to include a thorough discussion of the proposed alternatives' impacts on climate change.

Response: The greatest influence of forest management on climate change is through changes in carbon storage. An analysis of the effects of the alternatives on carbon storage has been added to the final EIS.

Carbon Sequestration

31. Comment: The EIS should be revised to include estimates of decreased tons of carbon sequestration and increased tons of atmospheric carbon from various amounts of logging.

Response: An analysis of the effects of the alternatives on carbon storage has been added to the final EIS.

Vegetation Modeling

32. Comment: The methodology in Appendix Q of the EIS should be revised. On page Q-1512, the DEIS describes a decision to use stand age for multi-storied stands assigned to the predominant layer that is being managed. This leads to the misidentification of the stand, and underestimates the acres that could be readily restored to old-growth. On BLM's Medford District and on dry, fire-prone settings found in other districts, a large percentage of multistory stands are assigned an age of the young cohorts that have filled in between older legacy trees that are more widely spaced due to past fire, or past partial thinning. Many such stands could meet the age requirements for old-growth if a percentage of the young cohort was thinned out and contribute to improved fire regime condition class in many sub-watersheds. As a result of this methodology, the description of the current condition of stands has been misrepresented, and thus skewed the degree of impact in the Environmental Consequences. We recommend that age class definitions that recognize restoration opportunities for old-growth stands.

Response: The cited passage of the Draft EIS described the existing inventory data available on BLM-administered lands. It was not describing a decision or choice in the analytical methodology. There is no available inventory data based on different age class definitions.

Forest Structural Stages and Spatial Pattern

(***<u>Note</u>*****:** This section was titled "Ecology" in the Draft Environmental Impact Statement.)

33. Comment: The EIS should be revised to cite references for the data on historic conditions, because statements regarding the percent of mature and old forest (75%) in the Cascade and Klamath provinces is contrary to other references (the Lieberg report from 1900 and the Osborne photos from the 1930's) that indicate that between 1860 and 1900 much of the land was dominated by brush and that most townships had experienced high severity fires.

Response: The Draft EIS cited references for the data on historic conditions: the estimate of 70% mature & structurally complex forest in the Klamath Province was derived from Rapid Assessment Reference Condition Models, which derive average historic conditions by modeling disturbance probabilities. These estimates are generally consistent with other descriptions of average historic conditions, as detailed in the

Draft EIS. The Draft EIS also acknowledged the variability within the Klamath province and the difficulty in deriving a province-wide characterization. The commenter did not attach the cited references or include complete citations, which do not appear to be readily available. However, these references presumably describe or portray the conditions in the late 1800s and early 1900s, after Euro-American settlement. The average historic conditions described in the Draft EIS characterize conditions prior to Euro-American settlement. Additional discussion has been added to the final EIS to clarify the estimates of average historic conditions.

34. Comment: The EIS should be revised to acknowledge that while disturbance is essential to how forest ecosystems function, long periods of growth and recovery between disturbances are equally important.

Response: The Draft EIS described the continued structural development of forests during long periods without disturbance and described some functions that differ in older forests. More detailed explorations of the changing ecosystem function over time in the absence of disturbance would not improve the description of the affected environment, which includes citations to relevant scientific research that address this topic (see, for example, Franklin et al. 2006, Spies 2006, Franklin and Van Pelt 2004, Spies 2004, Franklin et al. 2002, Spies and Franklin 1991). The description of the affected environment is not intended to be a primer on forest ecology; it should be no longer than necessary to understand the effects of the alternatives.

35. Comment: The EIS should be revised on page 510 to cite Daniel Sarr, NPS Klamath Network Inventory and Monitoring Coordinator, and others on the increase in salmonberry dominated areas in highly productive riparian areas in our region.

Response: The Draft EIS at the cited page described uncertainty about the future development of riparian red alder stands and described a likely future successional pathway. The commenter did not provide any specific citations or attach any references to Dr. Sarr's work, but recent research from Dr. Sarr described current conditions of riparian forests (Sarr and Hibbs 2007a and 2007b). This research would not provide a basis for describing future development of riparian forests. Therefore, including these citations would not improve the analysis or clarify the uncertainty described in the Draft EIS.

Socioeconomics

36. Comment: The EIS should be revised to include an analysis of tourism within the socioeconomic analysis section.

Response: The DEIS (page 535) describes the economic contribution of tourism in the planning area. There are no measurable differences between alternatives with respect to visitor use patterns within the planning area. A more detailed analysis of tourism for each alternative, therefore, would not change the analytical conclusions or ranking of the alternatives.

37. Comment: Table 154 of the DEIS should be revised to correct apparent calculation errors. Revenues under Alternative 2 should be $214.67 not $215.80 and revenues under the No Action Alternative should be $83.07 not $83.90.

Response: Refinement of the harvest projections during successive iterations of analyses reduced the average harvest levels by about 0.5%. The projected revenues, therefore, are overstated by about 0.5%. This difference is inconsequential and within the precision of the projection methods; therefore, no adjustments have been made.

38. Comment: The DEIS summary, page LII, Figure 2 should be revised to correct for inflation and show constant 2005 dollars. Correcting this oversight would alter the graph in such a way that it would show that payments under SRSA were at an average level of timber receipts between 1985 and 2000 instead of equaling or exceeding the peak levels.

Response: The EIS shows the payments as they were actually made and as they are recorded in financial records at the time of the payment. Performing an inflation adjustment would show that the payments in the early 1990s were higher than during the 2001-2005 period, in terms of constant dollars. This adjustment, however, would not change the analytical conclusions, the ranking of the alternatives, nor the relationship between the alternatives and the recent county payments.

39. Comment: The EIS should be revised on page 549 to clarify the statement that a 17% budget increase would be necessary to implement the No Action Alternative. The No Action Alternative is current management and is currently being implemented. The budget increase is needed to continue current management.

R**esponse:** The No Action Alternative is not currently being implemented at the levels anticipated in the 1995 western Oregon resource management plans. The No Action Alternative would harvest 266 mmbf annually, whereas recent harvests have averaged 117 mmbf (DEIS, page 540, Table 156). Increasing harvest from levels currently being implemented would require a budget increase.

40. Comment: The EIS should be revised to provide documentation on how BLM determined the increased budget numbers for the various alternatives. Without this information, it is impossible to validate the 60 percent increase identified for Alternative 2.

Response: The DEIS in *Appendix C* documents the assumptions used to calculate the BLM timber budget for the alternatives. A fixed + variable approach was used with the marginal cost of an additional MMBF at $159, based on historical budget information, and 78% of the 2006 budget assumed to be fixed costs held constant for all alternatives.

41. Comment: The EIS should be revised to assign economic values to recreational activities such as hunting, fishing, wildlife viewing and tourism. The EIS should also assign economic values to the ecological importance of old growth in addition to timber value of old growth.

Response: The DEIS (page 535) describes the economic contribution of tourism in the planning area. There are no measurable differences between alternatives with respect to visitor use patterns or recreation levels within the planning area. Therefore, a detailed analysis of contribution to the local economies of hunting, fishing, wildlife viewing, and tourism would not change analytical conclusions, or the relative ranking of the alternatives. Assigning an economic or market place value to the ecological importance of old growth would be speculative since it does not trade in a marketplace and the price cannot be observed. (See page 783 of the DEIS)

42. Comment: The EIS should be revised to: (1) include a definition of economic stability that is consistent with economic theory, (2) describe the current status and basis of economic stability of local communities and industries, (3) describe how additional logging contributes to economic stability of communities in relationship to other socioeconomic factors, and (4) address the evidence indicating that increased logging is not associated with greater economic stability.

Response: The EIS does not claim that any of the alternatives would provide "economic stability" in any absolute sense. Increased timber harvest, however, would generate additional economic activity: in the wood products sector where primary processing jobs would be created: in the local government sector that relies on O&C revenues; and in other sectors economically linked to these sectors. The DEIS describes the potential economic contribution of each alternative in *Chapter 4*.

43. Comment: The EIS should be revised to show how timber receipts will be calculated and shared within the six districts for each alternative.

Response: Stumpage price computation is documented in *Appendix D* of the DEIS. For each combination of district, structural stage, and harvest type, stumpages are constant across alternatives. The total stumpage value and the average stumpage price/mbf change by alternative due to the different quantities and types of harvest that occur under each alternative.

The BLM is funded by appropriation and each BLM district's allocation is determined through a budgeting process that recognizes the amount of activity on each district. Each district's projected budget is shown in Table 163 (see DEIS, page 550). In addition, the DEIS describes how BLM receipts and O&C revenues are allocated between counties based on an acre-weighted proration formula (DEIS, pages 230-231).

44. Comment: More complete comment: The BLM has failed to explain how these international markets have been accounted for in its economic models. BLM has not reported its implied assumptions about international conditions, export and import restrictions, and the value of the U.S. dollar. BLM needs to report specifically the assumptions it has employed in its economic models to account for salient international events.

Response: The prices bid for BLM timber sales reflect market values that are driven by a number of factors, including international and domestic demand for timber. These factors, however, would affect all alternatives equally and, therefore, would not change the ranking of alternatives nor the fundamental conclusions.

45. Comment: The DEIS models for economic analysis is inadequate and flawed because it ignores the effect of harvest of late-successional forest on recreation and because of its use of IMPLAN output Studies suggest that IMPLAN is inadequate for evaluating overall economic impacts of changes in regional natural resources. See T. Hoekstra, G. Alward, A. Dyer, J. Hof, D. Jones, L. Joyce, B. Kent, R. Lee, R. Sheffield, R. Williams. Analytical Tools and Information. Critiques of Land Management Planning. U.S. Department of Agriculture. Forest Service. FS-455. (1990) 47 pp., and Office of Technology Assessment. Forest Service Planning: Accommodating Uses, Producing Outputs, and Sustaining Ecosystems. OTA-F-505. U.S. Congress. Washington, DC (1992).

Response: The EIS economic effects analysis does not use IMPLAN. The 18 county-level input-output (I/O) models are constructed specifically for the Western Oregon Plan Revision EIS analysis. They are based on the most recent secondary data from the same data sources typically used in IMPLAN, but this is augmented and calibrated with primary (survey) data for key economic sectors in each county.

Secondary data is modified to increase local scale modeling accuracy. For example, industrial output is adjusted to survey data provided by the Oregon Department of Forestry, the Ehinger Mill Survey (Ehinger 2006a), and the Western Oregon Model (Adams and Latta 2007). Employment and earnings data for major manufacturers and other key components of the economic base is also updated to correspond with the Oregon Department of Employment ES-202 data (national data), plus proprietor's employment data.

An Economic Analysis Systems (EAS) team of staff economist and resource sociologist spent months on site collecting supplementary primary data. This local conditions data set includes county-by-county surveys of local government, forest products sectors and indicators of the roles of amenity migration, recreation and tourism in local service sectors. The logic and structure of the WOPR I/O models, as well as the survey process, are documented. The supplemental report is not printed in the Draft EIS, but is included in the official record.

The I/O analysis is based on a static view (snapshot) of the economy that allows for detailed representation of contemporary inter-sectoral transactions. Multipliers are very stable over time (Miller and Blair 1985, 1998; Trevz 1993). Although I/O models can be sensitive to changes in direct inputs or first round impacts, it usually takes a very significant amount of structural change in an economy to change multipliers. The multipliers used in WOPR I/O models tested as stable. Even the most changed county economy (Coos County) met stable multiplier criteria between 1994 and the new 2004 baseline.

The WOPR I/O models project 2009 job and income responses to three significant perturbations of the 2004-2005 baseline economies. In addition to the forest management alternatives considered by BLM, local government incomes from federal secure rural school funds terminate and long-run declines in the plywood sector continue. The direct effects of the WOPR alternatives and the plywood sector decline are projected by the Western Oregon Model (WOR), an econometric model of the wood products sectors' responses to harvest changes. Including three simultaneous perturbations ensured that the I/O models realistically describe likely 2009 county economies and sectors of immediate interest.

Unlike IMPLAN, the 18 WOPR I/O models do include unearned income (non-labor income) such as transfer payments, investment income, business profits, and retirement income (pensions). These are important income sources in O&C counties, typically accounting for half of the residents' income. In coastal counties, retirement and investment income is prevalent, so unearned income is a major driver of local economies. These models also account for income flows from commuting, a major factor near metropolitan areas. Survey data shows that coastal counties have already experienced permanent shifts away from natural resources extraction (wood, fishing, and agriculture) to economies more dependent on retirement and tourism. So the WOPR baseline already includes the most recent non-commodity and recreation job interactions with current BLM forest management patterns.

Although harvest levels vary among the alternatives, levels of recreation do not vary among the alternatives. Typically, dispersed recreation demand on BLM-administered lands changes primarily in response to external factors: demographics (population and age structure changes) or changes in recreation technology, such as the popularity of off-highway vehicles. On the supply side, the most important factor tends to be in recreation spending responses to new facilities such as campgrounds, trails and interpretive centers. The Western Oregon Plan Revision does not include any proposed changes in developed recreation facilities. The harvest of late-successional forests was reduced by 80% on Forest Service and BLM-administered lands in 1994 under the Northwest Forest Plan. In the 14 years since that 80% reduction in harvest level, recreation activities have not materially increased. Since there are no projected changes in recreation activities on BLM administered lands, the WOPR I/O models does not include any new 2009 multiplier effects of these types.

46. Comment: More complete comment: The EIS discusses multiplier effects without disclosing that there are credible opposing viewpoints about the economic base model that multipliers are derived from. Krone, Haynes, Reyna. 1999. Different Perspectives on Economic Base. Research Note PNW-RN-538. April 1999. http://www.fs.fed.us/pnw/pubs/rn_538.pdf

Response: The article by Crones et al. (1999) cites various shortcoming of an economic base approach. The six major criticisms listed by these authors are followed by a synopsis of how the WOPR I/O models deal with each point.

1. *Author's Criticism:* The concept of basis employment places a premium on jobs in sectors such as logging and agriculture that are dangerous jobs. It does not include qualitative aspects of employment.

Response: The value an economy places on any particular job is best expressed by the wages paid to it. Both job safety and specialized skills affect wage rates. The analyses in the Western Oregon Plan Revision includes wage and salary impacts, which incorporate some qualitative aspects of employment. Other issues related to job safety and specialized training are general societal issues beyond the scope of BLM planning.

2. *Author' Criticism:* Export base analysis only captures exports from primary goods-producing industries and does not capture exports from service and information sectors.

Response: The Western Oregon Plan Revision I/O models are individually adjusted to include exports from all sectors. Examples include tourist services from motels, eating, and drinking that are important export sales for most coastal counties. Most of the construction industry, a major employer in coastal counties, is attributed to export sales because the construction is financed by investment and retirement income earned outside local areas.

3. *Author's criticism*: The role of non-basic sectors in leakage of trade from the local economy is not given adequate consideration in base analysis.

Response: The multiplier or re-spending effect is included in WOPR models. The magnitude of the multiplier effect is directly proportion to the "openness" of a local economy. Coastal economies are fairly open economies. Dollars spent on the coast leak out to metropolitan areas such as Eugene-Springfield and Portland. Trade leakage is estimated by separately modeling the Southwest Oregon economy (counties with trade leakage to Eugene-Springfield) and the Portland area economy (counties with trade linkage to the Portland area). These models demonstrated that the metropolitan areas could see significant secondary impacts associated with their role as central cities. Impacts up and down the trade hierarchy can be significant, but are typically ignored by other impact analysis approaches.

4. *Author's Criticism:* The importance of non-labor income is not considered in base analysis.

Response: This criticism is valid for other input-output modeling programs, such as IMPLAN. The WOPR models specifically include non-labor or unearned income in each model. In most coastal counties, non-labor income accounts for over half of all disposable income. For example, Curry County is heavily dependent on retirement income, investment income, and other types of non-labor income. These types of income are more important than basic industries in understanding their export base. Commuting income is also included, as it accounts for significant portions of the economic base in several counties. For example, Columbia County residents earn more income from commuting than they earn from working within the county.

5. *Author's Criticism:* The economic base model assumes that people follow employment and that changes in basic employment correspond to changes in population. This ignores the quality of life factor in migration.

Response: Commuting and non-labor income accounts for two primary factors driving migration in western Oregon. Quality of life migration is, in most circumstances, made possible by either outside income (non-labor income) or income from commuting. Additional survey data supported the argument that quality of life is increasingly important in residence choices. Western Oregon residents are commuting long distances to find desired quality of life and living circumstances. Coastal communities report that many seasonal residents are taking up permanent residence. Non-labor income is also playing an important role in the migration to areas such as Florence, Seaside, and Gold Beach.

6. *Author's Criticism:* The externalities associated with primary goods-producing industries are not accounted for in the economic base model.

Response: Externalities of increased timber harvest are described in detail in other sections of the EIS. Watershed, wildlife, aesthetics, fishery impacts, and related externalities of timber harvest play an integral part in BLM planning. These are valuation questions, not I/O questions. The I/O models are not capable of placing values on these non-market effects (externalities).

47. Comment: The DEIS fails to evaluate the contribution its proposals would make to the economic stability of the local communities and industries in the context of the evolving regionalization of the log market and the price effect on the regional log market.

Response: The DEIS states that the BLM anticipates a price effect and that under all alternatives, log prices and harvests from price-sensitive private lands would fall as the BLM sells more timber into the log market. As manufacturing capacity adjusts to absorb the increased BLM timber, prices and harvests from other owners would adjust to previous levels (see DEIS, page 535).

Projections of harvest revenues under all alternatives assume a price impact of negative 3.5% in the first decade, after which prices rise to historic levels. This price impact was based on analysis using the TAMM model and WOR model. This information has been included in the FEIS.

48. Comment: The EIS should be revised to analyze the impacts of the alternatives on property value.

Response: There is no information that indicates property values would be affected under any alternative.

49. Comment: The economic analysis of the plan is flawed, inaccurate, and ignorant of the importance of an intact ecosystem in both local economies and as a taxable base. A 1997 study by Haynes and Horne found that in an intact roadless area, 89% of the revenue is connected to tourism and human industry. Only 11% of the revenue is connected to timber harvest. Not only does the BLM WOPR fail to recognize this reality and how it plays out in Oregon economy, the BLM analysis relies on statistics from peak economic times, over-inflated timber prices, and a lack of consideration for the economic climate such as the impact of flooding the market with timber, and the effect of logging from WOPR on local businesses and private timber owners. The fact that the BLM offers different prices for board feet in two different alternatives shows a distortion of economic facts.

Response: None of the alternatives propose changes to roadless areas. The economic analysis described in detail in *Chapters 3* and *4* of the EIS is based on historic stumpage prices. Stumpage prices differ among alternatives, because the alternatives differ with respect to factors that affect the type of harvest and the cost of harvest. These differences translate into differences in projected stumpage.

50. Comment: A recent report by the Sonoran Institute (2004) found that: "Protected lands have the greatest influence on the economic growth of rural isolated counties that lack easy access to larger markets. From 1970 to 2000, real per capita income in isolated rural counties with protected land grew more than 60 percent faster than isolated counties without any protected lands." Recent survey results also indicate that many firms decide to locate or stay in an area because of scenic amenities and wildlife-based recreation, both of which are strongly supported by wilderness areas (Morton 2000). In a study to determine the economic value of federal lands in the Interior Columbia Basin, Haynes and Home (1997) concluded that the services derived from roadless areas constitute 89 percent of the economic value of federal land. Timber constitutes only 11 percent of the total value.

Response None of the alternatives change the status of any wilderness or permanently protected lands. Neither scenic amenities nor wildlife-based recreation would differ among alternatives.

51. Comment: There is empirical evidence that counties containing a higher proportion of land restricted from timber harvests in order to promote biodiversity (late-successional old-growth or riparian reserves) actually experienced faster employment growth than counties with a greater proportion of matrix land available for harvest (Kerkvliet et al. 2007a). This evidence suggests that implementing the Northwest Forest Plan and restricting timber harvesting on public land in order to promote biodiversity conservation actually led to increased numbers of jobs, not the decrease in employment claimed by BLM.

Response: The Northwest Forest Plan monitoring of the socioeconomic effects of the plan have indicated that the adverse economic impacts anticipated in the Northwest Forest Plan FSEIS, such as job losses, actually occurred. The monitoring found that although some communities in close proximity to federal forests were doing quite well, on the whole, however, these communities were not doing as well as communities less associated with federal forests (Northwest Forest Plan, The First Ten Years Rural Communities and Economics 2004). There is no evidence that counties in western Oregon with a higher portion of land restricted from harvest (e.g., Douglas and Coos Counties) experience faster employment growth than counties with a greater portion of matrix lands. More than 80 percent of BLM lands in all counties in western Oregon have been reserved, and less than 20 percent have consisted of matrix lands for the past 14 years (1994). The economic growth of these counties has not appreciably changed from that experienced prior to 1994.

52. Comment: Recent research indicates that the economies of many areas of the West, including Oregon, are no longer much dependent on resource extraction, including logging (Rasker et al. 2004) Research indicates that economic growth in rural Oregon counties is associated with protected areas on federal land.

Response: *Chapter 3* in the EIS describes the relative importance of BLM activities and revenues for each of the 18 O&C counties. The Socioeconomics Appendix includes an analysis from the counties showing that growth from recreation and tourism cannot be reasonably expected to offset economic losses from the loss of Secure Rural School Funding. The EIS acknowledges that certain rural counties have diversified; however, the EIS analysis indicates that many rural county governments rely on timber revenues for a variety of services, and that change in harvest levels will result in changes to local economies**.**

53. Comment: The EIS should clarify why data presented in Figure 161 illustrates that BLM payments to counties totaled $65-69 Million, while 1981 data stated the figure was $18.6 Million.

Response: The EIS does not show payment to county data for 1981.

54. Comment: The EIS should explain why the stumpage prices differ between alternatives, particularly the highest price assumed under Alternative 2. The EIS analysis should address the fact that finding markets for large logs at reasonable stumpage prices is difficult.

Response: Stumpage price computation is documented in the *Timber Appendix* of the EIS. For each combination of district, structural stage, and harvest type, stumpages are constant across alternatives. The total stumpage value and the average stumpage price/mbf change by alternative due to the different quantities and types of harvest that occur under each alternative. The commenter presents no evidence that the more limited number of mills which process large logs is negatively affecting their marketability.

To presume the future demise of these mills such that current demands for such a timber supply would disappear is speculative. The fact that there is a reasonable market for such large logs is evidenced by the fact that such logs sell at a reasonable rates when offered.

55. Comment: The EIS should conduct a sensitivity analysis based on several scenarios reflecting the historical range of variability in the market for wood products, including prices, volumes, and legal impediments to harvests, and report the results of the analysis for timber volume, stumpage price, revenue, O&C payments, and employment.

Response: A sensitivity analysis would add little to the analysis, where there is no conceptual hypothesis that would suggest the relative effects among the alternatives would vary depending on the assumed scenario. To suggest varying the assumed economic returns among alternatives on the presumption that some would be more likely "legally impeded" would be inappropriate since it suggests that courts would be biased by the types of harvest made under the alternatives. Any of the alternatives would be based on the same NEPA document, and presumably all would be equally vulnerable.

To make assumptions about relative likely outcomes of litigation among the alternatives would be highly speculative. Even if there were differential risks in legal vulnerability among the alternatives, to base an analysis on such differences would necessarily involve legal analysis of such varying risk that it would force the agency to forego the right to confidential attorney client communications. This, in turn, could adversely affect the ability of the agency to get frank and unfettered advice from its legal counsel. As the commenter notes, log prices have shown considerable variability over time. To anticipate future price changes that are sensitive to the general economic level of activity is speculative and would only serve to raise or lower all alternatives in a similar manner. To present a variety of futures, all depending on the price assumptions used, would confuse rather than clarify.

56. Comment: The EIS should consider ecosystem services in its analysis, as BLM has numerous well-established methodologies that it could use to provide a more complete estimate of ecosystem values.

Response: The EIS focuses on the economic impacts of the outputs that vary between alternatives and that directly impact jobs and income. Ecosystem services do not affect economic outputs that vary between alternatives.

57. Comment: The EIS should consider "existence value" of timber, the value of simply having, but not using wilderness and other unroaded areas.

Response: None of the alternatives propose any differences in creating or maintaining wilderness areas or unroaded areas from those already in existence. It is not feasible to assign an economic or market value to the existence of timber. Qualitative and highly subjective descriptions of non-economic or non-market value of the existence of timber would be so speculative as to not inform a choice among the alternatives, particularly when none of the alternatives propose any differential treatment to those areas.

58. Comment: The EIS should evaluate the costs of sedimentation caused by clearcutting forested areas.

Response: Under all alternatives, BLM lands would be managed under Best Management Practices designed to minimize sediment delivery from harvest units (DEIS, page 761). The EIS analysis concludes that the amount of sediment delivered to streams as a result of timber harvest is inconsequential and does not materially vary among the alternatives. Therefore, any hypothetical economic impacts associated with sedimentation from timber harvest would be minimal and would not affect analytical conclusions or the ranking of alternatives.

59. Comment: The EIS should be revised to reflect that national macroeconomic variables that influence wood products demand are the cause of forest sector employment in Oregon, and studies show that forest timber cut or sold would not stabilize wood product employment.

Response: The O&C Act and the purpose and need are to manage BLM-administered lands for permanent forest production in conformity with the principles of sustained yield. The O&C Act states the purposes of permanent forest production in conformity with sustained yield include "a permanent timber supply" and "contributing to economic stability of local communities and industries." All BLM management needs to do is contribute to economic stability, not be solely responsible for that outcome, which is obviously dependent on factors other than a permanent timber supply.

The O&C lands managed by BLM have more impact than USFS lands, because of differences in how revenues are shared with and used by county governments. Conclusions based on research in areas dominated by USFS ownership would not be directly applicable to the O&C counties.

Demand for wood products creates demand for raw material (logs) and the factors (e.g., employees and capital investments) that convert raw material into finished products. Management of BLM land is not intended to create demand for wood products, but rather respond to demand through supplying raw material. The BLM timber sales will generate revenues that are shared with the counties; the sales also will create employment and income across many sectors of the economy.

60. Comment: The EIS should be revised to show the total number of jobs in each county, the net/loss gain for jobs for each alternative, and the percentage of total jobs that the net loss/gain represents in each county, in order to better illustrate the perspective of the potential impacts.

Response: Table 69 (DEIS, page 219) shows total jobs in each county. Tables 158 and 159 (DEIS, pages 543-544) shows net changes in jobs by county for each alternative. The FEIS shows the changes graphically (see FEIS, *Socioeconomics Appendix*, Figures 4-25 through 4-29). Information about employment by sector by county have been added to the Socioeconomics Appendix.

61. Comment: The EIS should be revised to take into account the demographic characteristics of the region, as in-migration is probably the single biggest driver of social and economic change in rural western Oregon at this time. The EIS should include consideration of: the variation across counties and within counties, how in-migration patterns are likely to affect demand for various types of stand structures, types of recreational infrastructure, and how the different alternatives are likely to affect communities differently depending on their demographic characteristics, amenity values migration, and the expanding role of Latino immigration in the forest sector labor force.

Response: The 18 county-level models used to project employment and income impacts were individually calibrated to take into account some demographic parameters such as retirement income. In the EIS analysis, the economic conditions of the individual counties in the planning area were carefully assessed and compared. The economic condition of the various counties is a result of many complex factors including: proximity to major population centers, proximity to I-5, education level, and population growth (in-migration). The role of population growth as a factor in the economy of western Oregon was included in the economic analysis in the EIS. The economic assessment of the counties included an acknowledgement of the importance of population growth in the metropolitan counties and the in-migration of retirees to certain rural counties (e.g., Curry County) and how that in-migration places demands on government services. The population in many rural counties has not changed appreciably in the past 15 years (e.g., Coos County, Douglas County). The alternatives are not expected to differ substantially with respect to recreation opportunities or recreation use.

62. Comment: The EIS should be revised to provide complete descriptions of the input/output model assumptions and limitations, including each county's model assumptions and inputs.

Response: Complete specification of the 18 county-level models that project employment and income impacts is too voluminous for the EIS and is available in the administrative record. Much additional information and detail, however, has been added to the Socioeconomics Appendix of the FEIS regarding county information used in the economic modeling.

63. Comment: The EIS should be revised to include adequate documentation to justify the stumpage price differences between alternatives, especially the highest price assumed under Alternative 2. For example, there is not a reference cited for BLM's claim that additional investment is being made in large log capacity (page 237). The BLM should address the possibility that it will have a difficult time finding markets for large logs at reasonable stumpage prices.

Response: The Timber Appendix describes the method for calculating the stumpage price. The price under Alternative 2 is a result of the higher level of regeneration harvest and higher level of harvest of structurally complex forest. Within each combination of harvest type, district, and structural stage harvested, the stumpage price for that combination is constant across alternatives. It is the different quantities harvested, the different types of structural stages harvested, and the different harvest methods (thinning or regeneration) that cause the stumpage prices to vary both in total and on a per MBF basis. The EIS provides a citation (Ehinger 2006a) to support the assumption regarding large log capacity. The commenter asserts, but does not provide evidence, that there is a shortage of manufacturing capacity for large logs. As shown in the DEIS (page 576), even under Alternative 2, peeler logs > 24 inches in diameter comprise only about 8% of harvested volume.

64. Comment: The EIS economic analysis should be revised to use a range of stumpage prices to forecast O&C county payments, with the range determined by the historic range of variability of stumpage and lumber prices. Given the projected continual recessed state of the real estate market over at least the next five years, it is not likely that the high stumpage prices projected by BLM will be realized. If these high prices are not maintained, BLM projections for O&C county payments are overly optimistic.

Response: An analysis using a variety of prices would add little clarity. Although the overall forecasted receipt levels would vary if prices were changed, the results for the alternatives would move nearly in unison. Even when pond values change, log grade premiums between grades (DF) change little. Log prices as of the current time (2008) are below the 10-year average. The commenter asserts that prices will remain low, but that is speculative and dependent on a variety of economic factors. Comparisons between alternatives would change little in response to variations in price assumptions for pond values of logs.

Timber

65. Comment: The EIS should be revised to reconsider the conflation of sustained yield with ecological sustainability. The calculus of extracting a maximum volume of timber in a rotation that theoretically will never dip below a maximum volume ignores the qualitative difference between a thriving ecosystem and an intensely managed rotation of cash crops.

Response: The Draft EIS did not conflate sustained yield with ecological sustainability. The Draft EIS defined sustained yield as the volume of timber that a forest can produce continuously at a given intensity of management. The identification of the sustained yield level under each alternative described only the timber harvest level. The Draft EIS presented the analysis of the effects of different forest management strategies on the ecosystem in the various chapter sections, including wildlife, botany, fish, water, and soils.

66. Comment: The EIS should be revised to provide documentation on how BLM determined the increased budget numbers for the various alternatives. Without this information, it is impossible to validate the 60 percent increase identified for Alternative 2.

Response: The FEIS *Socioeconomics Appendix* documents the assumptions used to calculate the BLM timber budget for the alternatives.

67. Comment: The EIS should be revised to incorporate a more realistic implementation schedule. For example, under Alternative 2, it is assumed the BLM will receive enough funding to sell 767 mmbf by either the first or third year of the plan. This equates to an increase of 551 mmbf over the 2007 level and an increase in the Forest Management Budget of $132.2 million assuming a cost of $240/mbf. This scenario is unlikely to occur.

Response: Consistent analysis of the alternatives requires the assumption of similar implementation schedules for all alternatives. To presume specific appropriations for any year is speculative, and in addition would mask the environmental differences between alternatives, since it then would be the budget level that would dictate environmental consequences, not the differences in management approach and intensity between the alternatives. Knowing the actual funding levels the BLM will receive in the future is not necessary in choosing among the alternatives, since in making that choice it is not the absolute numbers, but the relative differences among the alternatives that is important. The periodic plan evaluations provide opportunities to make adjustments based on the actual experience in implementing the plan.

68. Comment: The EIS should be revised to clearly explain how Alternative 2, with the greatest amount of timber cutting, can have the lowest projected miles of new roads.

Response: Alternative 2 has a higher level of new road construction than the No Action Alternative, and Alternatives 1 and 3. The projected miles of new road construction under the alternatives results from an interaction of the harvest land base, the harvest type, topography, and the existing road level adjacent to harvest units, among other factors. The amount of road construction would not necessarily relate simply to the volume harvested. For example, thinnings have nearly three times the road construction required compared to regeneration harvest on an equal volume basis.

69. Comment: The EIS should be revised to reflect the correct number of mmbf/year that would come from non-ASQ (riparian reserves and late-successional reserves) thinning in the Medford District under the No Action Alternative. Three mmbf/year is clearly too low based on sales like California Gulch, Rum Creek, Rich and Rocky, and Deer Willy.

Response: Three mmbf per year is the level modeled on the Medford District under the No Action Alternative. This level of non-harvest land base volume is the highest of all the alternatives. The sales shown in the comment were sold under the current RMP. Over the past 7 years, FY2000 through FY2007, auctioned sales within Late-Successional Reserves and Riparian Reserves on the Medford District have been

1.6 mmbf per year under the current RMP, excluding fire salvage. For example, California Gulch and Rum Creek together total 451 mbf of thinning within the Late-Successional Reserve, or about 15% of the yearly modeled total, but were sold in two separate years.

70. Comment: The EIS should explain why the stumpage prices differ between alternatives, particularly the highest price assumed under Alternative #2. The EIS analysis should address the fact that finding markets for large logs at reasonable stumpage prices is difficult.

Response: Stumpage price computation is documented in the *Timber Appendix* of the EIS. For each combination of district, structural stage, and harvest type, stumpages are constant across alternatives. The total stumpage value and the average stumpage price/mbf change by alternative due to the different quantities and types of harvest that occur under each alternative. The prices of logs at a manufacturing facility used in our analysis came from Log Lines Log Price Reporting Service as shown in the Timber Appendix, which publishes prices actually paid in the market monthly. The average price for 2005 was used. The commenter presents no evidence that the more limited number of mills which process large logs is negatively affecting their marketability.

71. Comment: The EIS should conduct a sensitivity analysis based on several scenarios reflecting the historical range of variability in the market for wood products, including prices, volumes, and legal impediments to harvests, and report the results of the analysis for timber volume, stumpage price, revenue, O&C payments, and employment.

Response: A sensitivity analysis would add little to the analysis. As the commenter notes, log prices have shown considerable variability over time. To anticipate future price changes that are sensitive to the general economic level of activity is speculative and would only serve to raise or lower all alternatives in a similar manner. To present a variety of futures, all depending on the price assumptions used, would confuse rather than clarify the effects and differences of the various management strategies of the alternatives. The purpose of NEPA analysis is to assist the agency in making a choice among alternatives for a decision. Therefore, it is the relative differences among the alternatives that is important in making this choice, rather than making the most accurate prediction on the actual prices that will be received by the government during implementation.

72. Comment: The EIS should be revised to ensure that the estimated cost of preparing timber sales under the proposed action and alternatives is consistent when compared to the actual costs incurred for similar BLM activities in 2006.

Response: The estimated cost of timber sales was prepared from historical costs including FY2006. The marginal cost/mbf is disclosed in the EIS.

73. Comment: The EIS should be revised to ensure alternatives conform to the O&C Act. It appears that Alternative 2 has a declining, even if slightly, not sustained production. The same appears to be the case for Alternative 1 and the No Action Alternative. These results need to be reexamined to ensure O&C Act conformity.

Response: As disclosed in the EIS, the total harvest volume is comprised of both the sustained allowable sale quantity from the harvest land base, and thinnings that are undertaken to improve habitat development within the Late-Successional Management Areas and Riparian Management Areas. This non-harvest land base volume from within the Late-Successional Management Areas declines over time and is identified as not part of the sustained allowable sale quantity. The EIS discloses the sum of both volume types. The total volume level declines to the Allowable Sale Quantity at the end of the period when these habitat development thinnings are completed.

74. Comment: The EIS should be revised to include adequate documentation to justify the stumpage price differences between alternatives, especially the highest price assumed under Alternative 2. For example, there is not a reference cited for BLM's claim that additional investment is being made in large log capacity (page 237). The BLM should address the possibility that it will have a difficult time finding markets for large logs at reasonable stumpage prices.

Response: The *Timber Appendix* of the EIS describes the method for calculating the stumpage price. The price under Alternative 2 is a result of the higher level of regeneration harvest and higher level of harvest of structurally complex forest. Within each combination of harvest type, district, and structural stage harvested, the stumpage price for that combination is constant across alternatives. It is the different quantities harvested, the different types of structural stages harvested, and the different harvest methods (thinning or regeneration) that cause the stumpage prices to vary both in total and on a per MBF basis. The EIS provides a citation (Ehinger 2006) to support the assumption regarding large log capacity. The commenter asserts, but does not provide evidence, that there is a shortage of manufacturing capacity for large logs. As disclosed in the EIS, even under Alternative 2, peeler logs > 24 inches in diameter comprise only about 8% of harvested volume.

75. Comment: The EIS economic analysis should be revised to use a range of stumpage prices to forecast O&C county payments, with the range determined by the historic range of variability of stumpage and lumber prices. Given the projected continual recessed state of the real estate market over at least the next five years, it is not likely that the high stumpage prices projected by BLM will be realized. If these high prices are not maintained, BLM projections for O&C county payments are overly optimistic.

Response: An analysis using a variety of prices would add little clarity. Although the overall forecasted receipt levels would vary if prices were changed, the results for the alternatives would move nearly in unison, and therefore maintain their relative differences in effects on the O&C county payments. Even when pond values change, log grade premiums between grades (DF) change little. Log prices as of the current time (2008) are below the 10-year average. The commenter asserts that prices will remain low, but that is speculative and dependent on a variety of economic factors. Comparisons between alternatives would change little in response to variations in price assumptions for pond values of logs.

76. Comment: The EIS should be revised to include a reference citation for the "improved genetics" assumption, because several published articles suggest that "improved genetics" for faster growth may also make trees more vulnerable to insect and fungal infestations.

Response: The basis and methods for analyzing the effects of genetic tree improvement are described in the *Vegetation Modeling Appendix* of the FEIS.

The principal tree species genetically selected for faster growth within the planning area are Douglas-fir and western hemlock. There is no documented evidence that genetically improved Douglas-fir and western hemlock are more vulnerable to insect and fungal infestations. If anything, the opposite is true. "In Douglas-fir, favorable genetic associations have been shown for growth and resistance to Swiss needle cast, and for growth and terpine content, a deterrent to bear damage" (Johnson 2000; pages 29-34). To minimize the chance of inadvertently favoring these or any other unintended consequence of genetic selection, a broad genetic base is maintained, resistance/tolerance to known insect and disease problems is kept neutral or improved, and only locally adapted planting stock is used for reforestation.

77. Comment: The EIS should be revised to identify and reference surveys and modeling used to justify anticipated growth of plantations, as they currently are not provided. Previous research in the Medford District (on file at Medford BLM) indicates that the ORGANON modeling program used by BLM to estimate future growth of plantations grossly overestimated tree growth while underestimating negative impacts such as clumpiness, non-stocked openings, and animal damage.

Response: The methods used for estimating the growth of plantations, as well as natural forest stands and the application of those growth projections, are described in the *Vegetation Modeling Appendix* of the FEIS. The basic data used were the BLM Current Vegetation Survey (CVS) inventory plots stratified by geographic region (southwest and northwest Oregon), age, site productivity class, species group, and existing stand condition (current density, past treatment history). This modeling approach partially compensates for the negative effects on growth and yield due to clumpiness, non-stocked openings, and animal damage. Further growth reductions are applied to the simulated yield projections to account for the effects of defect and breakage, soil compaction, snag and coarse woody debris retention, Swiss needle cast disease (Salem District only), other diseases, and insects.

The modeling approach used for the Western Oregon Plan Revision differs from that used for the Medford BLM analyses, and also that used by the BLM for the current (1995) resource management plans. The data used for the Western Oregon Plan Revision is stratified to a much higher degree than previous BLM analyses providing for more reliable estimates. In addition, each CVS subplot in a stratum is simulated separately. This stratification ensures representation of the full range of actual conditions for a forest stratum (modeling group), not just an optimum condition. Instead, the simulation results of each subplot in a modeling group are averaged together. This method is based on the fact that the CVS data presents a random sample of the forest stratum modeled. Therefore, the average of all projected curves for a modeling group represents the average projection for the forested land base represented by the modeling group.

78. Comment: The EIS should be revised to use valid "net ingrowth" conclusions, because the conclusions from the 10-year LSOG monitoring report are flawed. The modeled growth of trees from 18 or 19 inches dbh in 1994 to cross an arbitrary 20 inch dbh threshold in 2004 is merely an incremental change that cannot be compared on an acre-to-acre basis with regeneration harvest of old forests that is visible from space.

Response: The EIS acknowledges that the change occurs primarily in the lower end of the diameter range for older forest. The 20-inch diameter threshold is not arbitrary. The rationale for this and other diameter thresholds is described in the Late-Successional Old-Growth monitoring report (Moeur et al. 2005, pages 9-13).

79. Comment: The EIS should be revised to include discussion of increased exposure to herbicides that forest dwellers will experience if clear-cutting is increased on BLM lands, especially in light of the recent changes in BLM Herbicide policies as announced in the September, 2007, Record of Decision (ROD) on Vegetation Treatments Using Herbicides.

Response: The current western Oregon BLM vegetation management techniques employed in clearcuts for forest management goals do not employ herbicides. Analysis of effects in the EIS is based on the assumption of no herbicide use for reforestation and timber stand improvement purposes. The new vegetation management EIS and ROD (USDI 2007a, 2007b) does not alter the *status quo* in that regard. The vegetation management EIS specifically states: "Thus, this PEIS does not evaluate vegetation management that is primarily focused on commercial timber or other forest product enhancement or use activities that are not related to improving forest or rangeland health or work authorized under the *Healthy Forests Restoration Act of 2003*." (USDI 2007a, pages 1-5).

Any future use of herbicides for commercial forestry purposes would be done only after additional environmental analysis was completed.

80. Comment: The EIS should be revised to include an analysis of the impacts to endangered species from the use of herbicides, in particular impacts to salmon and the northern spotted owl.

Response: The BLM consulted with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, as required under Section 7 of the ESA, as part of the vegetation management Programmatic EIS (USDI 2007a) involving the use herbicides for other than commercial timber or other forest product enhancement or use of activities that are not related to improving forest or rangeland health. The effects of herbicide use on the northern spotted owl and various salmonid species were included in that assessment (USDI 2007c). Further analysis and consultation at the state and local levels tiered to the vegetation management PEIS would be undertaken before implementation occurred.

81. Comment: The EIS should be revised to address the apparent inconsistency with reporting that only one southwestern Oregon site is currently infected with Sudden Oak Death. Other studies report that at least 53 other localities are infected with Sudden Oak Death.

Response: The text in the final EIS has been revised and additional citations provided.

82. Comment: The EIS should be revised to include a definition for common silvicultural treatments and these definitions should include examples of these management styles.

Response: Descriptions of common silvicultural treatments have been added to the *Vegetation Modeling Appendix* of the FEIS.

Special Forest Products

83. Comment: The EIS should be revised to account for the diversity in special forest products, because the current analysis is too generic and does not acknowledge that variation exists across products and across species for the same types of products. Therefore the analysis is flawed.

Response: The EIS analysis describes 10 categories comprising 84 special forest products and the anticipated effects of management activities to special forest products over 10 years. There is variability of special forest products that occurs at local spatial scales and by management activities. However, the availability, abundance, quality, and distribution of most special forest products would not vary under all of the alternatives. Other special forest products would be affected by increased forest management activities at the local scale, but to what extent is speculative. Little difference is expected at the regional scale. Special forest products are collected and harvested from common species with broad distribution. Changes in the level of forest management activities under the alternatives would not result in substantial changes to current harvesting and collecting levels of special forest products.

84. Comment: The EIS should be revised to incorporate a range of existing scientific literature in the Special Forest Products analysis, because the analysis lacks sufficient documentation. Existing literature includes: Institute for Culture and Ecology. http://www.ifcae.org/ntfp/pubs/index.html. We have posted numerous reports and links to articles on SFP issues at this site. One that might be particularly useful for the FEIS is: Lynch, Kathryn A.; McLain, Rebecca J. 2003. Access, Labor, and Wild Floral Greens Management in Western Washington's Forests. PNWGTR-585. Portland: Pacific Northwest Research Station USDA Forest Service. Another key publication is: Jones, Eric T. Rebecca J. McLain, and James Weigand. eds. 2002. Non Timber Forest Products in the United States. Lawrence: University of Kansas Press. Center for Nontimber Resources at Royal Roads University in Victoria, British Columbia.
http://www.royalroads.ca/programs/faculties-schools-centres/non-timber-resources/.

Response: The special forest product literature cited provides reference information to assist in drawing conclusions for management of specific forest products and species on BLM-administered lands in response to forest management activities and habitat changes anticipated over the next 10 years at the site scale and regional scales. There is a growing body of scientific literature that provides regional perspectives of the special forest product trade. However, much of the scientific literature acknowledges, as does the BLM, the lack of information and knowledge of the distribution and abundance of these generally common, wide ranging species (Jones et al. 2007, Muir 2004, Pilz et al. 2001) and the BLM contribution within the context of the broader forested landscape. Much of the current information remains anecdotal. No studies have been conducted that attempt to segregate the portion of the harvest that occurs on BLM-administered lands from that of other landowners. Inventories of special forest products or spatially explicit habitat types associated with individual special forest products are unavailable on BLM-administered lands, as well as the amount and location of actual harvests.

Botany

85. Comment: The EIS should be revised to provide management direction for deciduous oaks. Currently, these species are combined with "hardwoods" in the vegetation section. Deciduous oaks are much different than broadleaf evergreen trees (e.g. tanoak) because deciduous oaks are shade intolerant and relatively low growing (as compared to conifers). Deciduous oaks are easily shaded out by the faster growing and taller Douglas-fir.

Response: The Draft EIS included a management objective common to all action alternatives to support natural species composition and vegetation on noncommercial areas, including: noncommercial forests, oak woodlands, shrublands, grasslands, cliffs, rock outcrops, talus slopes, meadows, wetlands, springs, fens, ponds, and vernal pools. The Draft EIS described the following management actions common to all action alternatives: natural processes, native species composition, and vegetation structure that would be maintained or restored. Management would include the use of prescribed burns; retention of legacy components (e.g., large trees, snags, and down logs); and removal of encroaching vegetation in meadows, grasslands, or oak woodlands in a manner consistent with natural or historic processes and conditions. Providing more detailed and site-specific management actions would be beyond the scope of this RMP revision and may be developed through implementation actions.

86. Comment: The EIS should be revised to address the apparent inconsistency with reporting that only one southwestern Oregon site is currently infected with Sudden Oak Death. Other studies report that at least 53 other localities are infected with Sudden Oak Death.

Response: The text in the final EIS has been revised and additional citations provided.

87. Comment: The EIS should be revised by removing the statement "However, because future spread of the disease and subsequent tree mortality in the planning area is speculative, there is no basis on which this analysis can assume future changes to forest composition, structure, and process as a result of Sudden Oak Death." This statement is contrary to the General Technical Report cited in the EIS which notes that a model for Sudden Oak Death created by the USDA Forest Service's Pacific Southwest Research Station, found that all five models examined "were consistent in their prediction of some SOD risk in coastal CA, OR and WA." Three of the five models predict high risk for almost all of the WOPR area and a 57 composite model placed most of the WOPR area in the highest two risk categories.

Response: The cited models identified various levels of potential risk, rather than predicting spread of Sudden Oak Death in the planning area. Whether Sudden Oak Disease actually spreads in the planning area will be influenced by many variables other than the potential risk identified in these models, including the effectiveness of quarantine and eradication measures currently being implemented (Kanaskie 2007, Palmieri and Frankel 2006). Regardless of the level of potential risk in the planning area, the future spread of the disease and subsequent tree mortality remains speculative.

88. Comment: The EIS should be revised on page 46, Table 19 to remove Kincaid's lupine from the list of completed recovery plans. The completed plan is not expected until summer of 2008.

Response: The Final EIS has been revised to reflect this information.

89. Comment: The EIS should be revised to acknowledge that the health of individual special status species populations, the threats to those populations, as well as the total number of populations need to be examined when considering whether to provide conservation measures, as species persistence may be a concern even when more than 20 populations exist.

Response: In the Final EIS, the term "occurrence" is used rather than "population," which was used in the Draft EIS. Each occurrence represents a record in the database as defined by the database entry standards. The BLM GeoBob and Oregon Heritage data base standards differ, but in general represent distinct field occurrences as part of a meta-population.

The BLM would apply conservation measures to Bureau special status species on all BLM-administered lands under the PRMP Alternative in the FEIS consistent with BLM National and Oregon/Washington State special status species policy. The 20 occurrence (population) threshold would not apply under the PRMP Alternative. Consequently, there is no need to undertake a detailed species by species analysis of health, threats, and total populations of the 296 special status plant and fungi species to determine species persistence.

90. Comment: The EIS should be revised to provide more information on which recovery plan actions in Appendix E would be implemented in relation to management commitments, especially for listed plants that do not have completed recovery plans. As currently presented, it is unclear how these recovery plan actions relate to management commitments.

Response: Management actions under the alternatives would direct implementation of recovery plans and conservation measures of federally listed plant species on all BLM-administered lands. The BLM would assess existing data (e.g., suitable habit, previous surveys, and known locations) for each plant species prior to planned activities and determine if additional field data is necessary, consistent with existing recovery plans, biological opinions, and BLM policy (Oregon/Washington policy and BLM national policy). Consultation between the BLM and the U.S. Fish and Wildlife Service would occur for all federally listed species without recovery plans to determine adequate species conservation measures.

91. Comment: Appendix E in the EIS should be revised to include the findings of last year's monitoring report that indicated g. Fritelaria populations are declining all over the district.

Response: Information regarding Bureau special status species has been revised in the final EIS as a result of a new species list and updated field data entries into both the BLM GeoBob data base and the Oregon Natural Heritage Information Center data base (see FEIS, Botany Appendix). Recent monitoring results of Gentner's fritillary have shown a decrease in the number of flowering plants, but the cause of this trend is unclear and there is no direct correlation with recent management activities. The summary description in the 2007 Gentner's fritillary monitoring report is apt; "In general, the usual pattern of 'no real pattern' prevailed" (Siskiyou BioSurvey 2007).

Invasive Plants

92. Comment: The EIS should be revised to include mitigation measures that could be used in the event of an introduction as apposed to focusing only on reducing the risk of introduction. The EIS should provide information on the cost and effectiveness of the measures identified.

Response: Management of invasive plant infestations are addressed in the EIS. The EIS also incorporates the analyses and decisions of the final environmental impact statement and records of decision for the Northwest Area Noxious Weed Control Program (1987) and the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (2007). In addition to the discussions presented in the FEIS, these other EISs and records of decision address measures that could be used in event of an introduction and also provide information regarding cost effectiveness.

93. Comment: The EIS should be revised to include a thorough analysis of all 11 representative invasive species, as apposed to the current analysis that briefly discusses 6 of the 11 species and lacks analysis of economic and ecosystem consequences. In addition, the analysis should correspond to the temporal horizon of the plan.

Response: All 11 species are addressed in *Chapter 3* (Affected Environment) of the FEIS. The analysis of environmental consequences in *Chapter 4* is based on a pooled data set of the distribution of all 11 species. The analysis in the FEIS addresses both the short-term and long-term risks of introduction and spread of invasive plants.

Wildlife

94. Comment: The last sentence on page 685, Volume II of the EIS includes the assumption that private forest lands will provide early seral forage if the BLM did not do so on its lands, and that the private lands would provide more of it. The BLM is required under FLPMA to provide adequate wildlife forage and cover on its lands. The assumption that private lands can provide the early seral stage habitat that happens to be under represented on the federal lands is refuted by information located on pages 196 and 206 of Volume I.

Response: The analysis in the Draft EIS demonstrated that the abundance of stand establishment forests, which provide early-seral forage for deer, is well above the average historic abundance on non-federal lands and will continue to be abundant in the future. The cited statements in the Draft EIS qualified that these stand establishment forests on non-federal lands generally have a homogeneous structure, uniform tree composition, and high tree density. As noted in the Draft EIS, this stand condition would limit the habitat value of these stands to some species, such as snag-dependent birds. However, these stands would provide deer forage. The Draft EIS disclosed that the BLM-administered lands would continue to provide forage for deer at levels that would vary over time and among alternatives.

The Federal Land Policy and Management Act requires that BLM-administered lands be managed in a manner that will provide food and habitat for wildlife, but does not stipulate that this provision be "adequate" or otherwise set any specific level or amount of food or habitat that must be provided. Nevertheless, the O&C Act prevails over the Federal Land Policy and Management Act insofar as they relate to management of timber resources on O&C lands, and there is no requirement specified in the O&C Act to provide for wildlife. See *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990).

95. Comment: The EIS should be revised to address the apparent inconsistency concerning the analysis and conclusions of foraging habitat and the projected 50% increase in deer population at the end of 50 years.

Response: The FEIS has been revised to clarify the analysis and conclusions of foraging habitat and also the increases in populations. The analysis predicting a population response as a result of increased foraging habitat has been dropped in the final EIS.

96. Comment: Table 5 of the EIS should be revised to explain why connectivity habitat for the No Action Alternative, Alternative 1, and Alternative 2 is being compared to suitable habitat for Alternative 3 within the table.

Response: This table does not discuss connectivity, but simply describes the amount of spotted owl suitable habitat on those lands not contained within Late-Successional Management Areas. Connectivity is the ability of the northern spotted owl to move across the landscape. Neither Table 5 in the DEIS, nor the preceding text that references the table, make a presumption to describe the connectivity of the landscape for the northern spotted owl.

97. Comment: The EIS figures and tables for Riparian Management Area should be clarified to resolve the apparent contradictions.

Response: Table 207 in the DEIS) (which is Table 4-83 in the FEIS)(Riparian Management Areas Across All Land Use Allocations Under the Alternatives) and the figure showing land use allocations under the alternatives (Figure 1 in the DEIS) express Riparian Management Areas as a percentage of two different base numbers and, therefore, are not comparable. The table expresses Riparian Management Areas as a percentage of total BLM-administered lands, whereas the figure expresses Riparian Management Areas as a percentage of the gross Timber Management Area. The analysis in the final EIS has been clarified to eliminate the perceived conflict.

98. Comment: The figures in the EIS should be revised to include the percentage of both landscape and land base current and future conditions of Mature and Existing Structurally Complex conditions. Including this information would help determine whether or not the alternatives meet land bird conservation objectives.

Response: In the Draft EIS analysis, the mature multi-canopy and structurally complex forests were combined for analytical purposes. This grouping of structural stages failed to provide adequate analysis for evaluating the Partners'-in-Flight objective of "[M]aintain existing old-growth forests…." and "[M]aintain existing mature forests…" (Altman 1999). The land bird analysis has been restructured in the final EIS to analyze impacts to structurally complex forests that approximate Partners'-in-Flight "old growth" and to separately analyze impacts to mature multi-canopied forest for BLM-administered west-side conifer forests.

The analysis for all landowners has required the coupling of BLM data with data from the Interagency Vegetation Mapping Project, and also the simplification of the overall data to three structural stages: stand establishment, young, and mature & structurally complex. A discussion of the limitations on the ability to address the Partners'-in-Flight habitat objectives has been added to the final EIS.

99. Comment: The EIS should be revised to address Oregon Department of Fish and Wildlife's (ODFW) assessment that blacktail and mule deer populations are in decline throughout the planning area, in part due to the loss of early seral habitat. A discussion of habitat needs found in both the ODFW Mule and Blacktail Deer Management Plans should be added. This section should also address how BLM's management actions will assist ODFW to stop the decline in forage habitat quantity and quality.

Response: The final EIS has been revised to reflect the declines in mule deer, black-tailed deer, and elk across western Oregon. The Oregon Department of Fish and Wildlife's elk and mule deer management plans were reviewed and referenced in development of *Chapter 3*. (The black-tailed deer management plan is still undergoing internal review by the department and is not available for referencing.) Neither the elk nor the mule deer management plan provide habitat targets to guide BLM in accurately assessing the value of its habitat contribution to the overall needs of these species. The BLM has ongoing efforts to coordinate with the Oregon Department of Fish and Wildlife in meeting wildlife management objectives where they are consistent with BLM land use plans. These administrative processes and intergovernmental relationships are generally not detailed in land use plans.

100. Comment: The EIS should be revised to include new significant information on pileated woodpeckers including pileated woodpeckers need for more and larger trees than nesting trees. They may use only one nesting tree a year, but use seven or more roosting trees. These management requirements should be included in the EIS.

Response: The BLM has incorporated or considered all available current information that is pertinent to the analysis in the EIS.

101. Comment: The EIS should analyze the State of Oregon's Comprehensive Wildlife Conservation Strategy that identifies 'strategy species' for the Coast Range, Klamath Mountains, and West Cascades ecoregions. This conservation strategy instructs that special attention may need to be given to certain species within late successional forests. In order to avoid trends toward listing, BLM should adopt measures to conserve these species.

Response: The Final EIS includes a review of the PRMP Alternative for consistency with the State of Oregon's Comprehensive Wildlife Conservation Strategy.

102. Comment: The EIS should strongly consider the fact that the U.S. Fish and Wildlife Service (USFWS) issued a decision on April 8, 2004 that the listing of the Pacific fisher is warranted under the ESA, but action is being deferred due to workload constraints. Actions that would be detrimental to the Pacific fisher may need to be reevaluated within the EIS due to its imminent listing.

Response: The EIS analyzed the effects of the alternatives on the Pacific fisher. The PRMP Alternative in the FEIS was crafted to best meet the purpose and need of the plan revision while complying with the requirements of the Endangered Species Act and Special Status Policy. There is no present requirement to consult on a species that for whatever reason is not listed for protection under the Endangered Species Act. If the U.S. Fish and Wildlife Service lists the Pacific fisher, the BLM will consider whether it has actions with remaining discretion that have potentially adverse effects on the Pacific fisher, and also determine whether consultation is required at that time. Not all of the alternatives being considered have adverse consequences on this species. Furthermore, BLM will consult with the U.S. Fish and Wildlife Service on any implementing projects of the revised plan that have likely adverse effects to threatened and endangered species.

103. Comment: The EIS should be revised to answer Analytical Question Number 7 on page 83 of the Planning Criteria, "What levels of elk habitat will be available under each alternative?" because it is not answered in the DEIS.

Response: The Proposed Planning Criteria and State Director Guidance was written early in the planning process with the purpose of helping to guide development of alternatives and to ensure focused data collection and analysis. It was meant to be a dynamic document, responding to changes in data availability and analytical techniques. Re-evaluation of the issues led the BLM to evaluate the habitat management areas only, versus the entire landscape, as the key areas of BLM-administered lands on the landscape. Coincidently, it was pointed out to the BLM that the western Oregon version of the Wisdom model was dated and its validity for western Oregon may be questionable; therefore, it was dropped from the final EIS. A brief discussion of the overall forage habitat and cover availability in the planning area was added to the final EIS to frame the habitat management area analysis into a larger context.

104. Comment: The EIS should be revised to explain how elk populations will be protected from expected detrimental effects of new roads being built and increased vehicle use on existing and new roads with the implementation of WOPR. Roads fragment elk habitat and increase elk take due to increased traffic.

Response: The EIS discusses impacts of vehicle traffic to both deer and elk. The EIS discussion indicated that unregulated road use causes an increased vulnerability to both legal and illegal harvest and disturbs the use of adjacent foraging, fawning/calving, breeding, and resting habitat. The EIS discusses the benefits of controlling road use: (1) decrease energy expenditure responding to vehicle disturbance and (2) increase in the availability of cover and forage that would occur with road closure. Additional discussions were added to the final EIS to categorize the relative value of habitat within 150 meters of roads open to vehicle use, versus those habitats more than 150 meters away.

105. Comment: The EIS should include further analysis on the expected effects of habitat fragmentation that would be caused by the implementation of the action alternatives, especially with regard to the reduced riparian reserves and lack of green tree retention in some alternatives.

Response: The effects of the alternatives on landscape connectivity are quantitatively evaluated for BLM-administered lands in the EIS using the northern spotted owl as the target species, in the Ecology section. Additionally, the landscape connectivity of riparian-associated species is qualitatively addressed in the special status species section of the EIS. The effect of green tree retention, or the lack of green tree retention, is clearly analyzed and discussed in the Forest Structural Stages and Spatial Pattern section of *Chapter 4* in the EIS.

106. Comment: The EIS should consider including an analysis on the effects of the proposed changes to land management on Survey and Manage instead of simply relying on an assertion that the effects are similar to those experienced by the northern spotted owl. The 9th Circuit court has found that this type of assertion does not meet the requirement of NEPA to analyze and disclose the effects of proposed actions.

Response: The EIS analyzes species effects for those wildlife species listed under the Endangered Species Act, deer, elk, bald eagle, fisher, land birds in general, western snowy plover, sage grouse, and special status species. For wildlife species that are listed as Special Status Species, many of which were formerly listed as "Survey and Manage," analysis was done by grouping species by habitat association. For plants and fungi, those species that were formerly listed as "Survey and Manage" were included in the analysis of special status species and other plants and fungi under various habitat groups. Survey and Manage is not a component of the No Action Alternative or the action alternatives and, therefore, those species are not analyzed individually.

107. Comment: The EIS should be revised to include a more in-depth analysis of the effects of the proposed actions on the Siskiyou Mountains salamander, the Larch Mountain salamander, and the Inland tailed frog. A discussion of salamander and frog biology, habitat requirements, distribution, conservation status, and existing conservation plans need to be included in the EIS.

Response: Individual special status species were not addressed for several key reasons:

- The vegetative data available to the EIS does not contain adequate information to conduct an detailed analysis of available habitat for each individual species and would result in analysis based on more generalized habitat conditions.
- Generalized habitat descriptions for each species would result in similar analysis and results being repeated for multiple individual species.
- Individual species will be addressed at the project scale where onsite mitigation would be applied, as necessary, to meet the goals and objectives of the Special Status Species policy.

108. Comment: The EIS should explain that if the habitat needs of species associated with intermittent streams would not be met under Alternatives 2 and 3, then this would violate the Clean Water Act requirements to maintain water quality for aquatic organisms.

Response: There was inconsistency between the summary text and main text of the DEIS regarding this issue. The summary has been clarified in the final EIS. The analysis in the EIS describes the adjacent vegetative communities, not in-stream water temperatures. Increasing temperatures and decreased relative humidity would be expected to occur during the summer months when intermittent stream channels are typically dry and would, therefore, not contribute to water quality issues.

109. Comment: The EIS does not adequately analyze the effects of decreased habitat and increased fragmentation of habitat under Alternative 3 to fisher and does not address the ESA requirement that federal agencies not conduct activities that lead towards listing?

Response: The analysis in the EIS discusses the effects of all alternatives to the Pacific fisher, including the increases and decreases to the available fisher natal and foraging habitat and the long-term changes in patch size and connectance measure of mature & structurally complex forests (a surrogate for fisher natal habitat).

110. Comment: The EIS should be revised to include the Migratory Bird Treaty Act as a Major Legal Authority in Appendix A, as well as a discussion of how WOPR will address Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds and the Migratory Bird Treaty Act.

Response: The Migratory Bird Treaty Act and Executive Order have been added to Appendix A in the FEIS, under Major Legal Authorities. It is the purpose of an EIS to evaluate the environmental effects of a proposed management action and to provide that information to a decision maker. A discussion of the plan's consistency with existing policy and laws will be included in the Record of Decision.

111. Comment: The EIS should be revised to strongly consider direction to conduct marbled murrelet surveys prior to timber harvests that may destroy suitable habitat. Furthermore, the USFWS recommends that BLM protect areas where occupied behaviors are observed.

Response: The requirement to conduct pre-disturbance surveys for all projects that degrade or remove suitable marbled murrelet habitat has been added to the PRMP Alternative in the FEIS. Areas that exhibit occupying behaviors would be protected under the PRMP Alternative.

112. Comment: The EIS is inconsistent with the recovery plan for the marbled murrelet

Response: The BLM management will be consistent with approved recovery plans. Although the BLM will be consistent with the overall intent of recovery plans, the plan may not implement all aspects of the plan verbatim.

113. Comment: The DEIS analysis of effects on the marbled murrelet is flawed because it only considers habitat. By not relating marbled murrelet habitat availability to effects on marbled murrelet populations, the DEIS is unable to quantitatively or qualitatively integrate habitat changes with other observed effects on the species, such as changes in marine conditions.

Response: No relationships between amount of habitat and the number of murrelets were revealed during a review of the scientific literature. Without any relationship it was not possible to determine population change due to habitat modification other than in the most basic way. The complexities of integrating changes in at-sea foraging habitat and changes in at-sea mortality due to by-catch and oil spills make forecasting population effects problematic. Without models to forecast these factors, the BLM chose to analyze only those factors influencing murrelet biology that the BLM controlled, which is available forest habitat. The BLM has received no new information that would allow the prediction of marine conditions, or to relate population levels to habitat amounts in western Oregon forests.

114. Comment: The DEIS uses a flawed analytical assumption in modeling marbled murrelet nesting habitat as all patches classified as mature and Structurally Complex forest. This modeling assumption encompasses too broad of a range of structural conditions, including some that are inconsistent with empirically derived descriptions of nesting habitat. Therefore, the DEIS habitat estimations are inaccurate and probably overestimate nesting habitat.

Response: Marbled murrelet nesting habitat definitions were based on nesting habitat definition for nesting habitat suitability 4 found in the "expert opinion" model presented in Rapheal et al. (2006). These stands had a minimum quadratic mean diameter of 20 inches. Quadratic mean diameter was calculated for the trees in the "uppermost canopy" (Moeur et al. 2005). This diameter was not comparable to the quadratic mean diameter derived from the ORGANON projects, which averaged all trees in the stand, over 8 inches in diameter. Such averaging of trees would tend to underestimate the quadratic mean diameter of older, multi-layered stands compared to the techniques employed by Moeur et al. (2005). The mature, multi-layered structural stage (which is defined as 23 or more trees per acre greater than 20 inches in diameter at breast height in the western hemlock zone; and 11 or more in the Douglas-fir zone) was used to be an adequate approximation of the Raphael et al. (2006) definition. The BLM has not found, or received, any information that this approach is invalid. Habitat analysis in the final EIS was revised to address effects to the structurally complex old forest and very old forest separate from overall gross murrelet nesting habitat.

115. Comment: The DEIS analysis of marbled murrelet habitat based on the Forest Operation Inventory is flawed because it does not consider minimum patch size, and habitat within individual polygons may not be suitable if the patch is small and isolated. In addition, the metric used to quantify edge-depth may not be biologically relevant to marbled murrelets (Ripple et al. 2003, Meyer and Miller 2002).

Response: The EIS acknowledges that patch size is positively correlated to the potential for murrelet occupancy. None of the studies referenced in the comment cite a minimum patch size below which a stand is no longer suitable. In fact, Nelson and Wilson (2002) note that murrelets will use habitat patches < 5 acres surrounded by large areas of unsuitable habitat. Raphael et al. (2006) summarized all habitat down to a patch size of 2.5 acres in Washington and Oregon and 2.0 acres in California.

The edge-depth used for fragmentation analysis is 164 feet (50 meters), which is consistent with analysis used in Meyer and Miller (2002) and data summarized in McShane et al. (2004).

116. Comment: The results from the DEIS analysis suggesting 373,000 acres of marbled murrelet habitat is inconsistent with the Northwest Forest Plan 10-year analysis which reported 289,000 acres which has been validated with empirical data (Huff et al. 2006).

Response: The actual amount of high quality marbled murrelet nesting habitat on federal lands within Zone 1 of the marbled murrelet range is 289,000 acres. The EIS identifies 244,000 acres of marbled murrelet nesting habitat within Zone 1, and 129,000 acres of marbled murrelet habitat in Zone 2, for a total of 373,000 acres. McShane et al. (2004), citing U.S. Fish and Wildlife data, showed the BLM reporting a total of 350,000 acres of marbled murrelet habitat, which is comparable to the 373,000 acres reported in the EIS. Marbled murrelet occupancy was not analyzed because it is not possible to accurately predict its response to habitat changes.

117. Comment: It is not possible to assess the accuracy of the DEIS marbled murrelet analysis because it lacks validation. The assumption between coarse habitat availability (mature and structurally complex forest) should be tested using available occupancy data for marbled murrelet.

Response: This analysis was meant to provide decision makers with a picture of the relative amounts and changes that would be expected to occur to available marbled murrelet nesting habitat under each alternative. Using different data and evaluation techniques would make comparison of alternatives difficult. Validation with known occupied sites is difficult because murrelet surveys were not randomly located. Murrelets tend to be biased either towards the best habitat because that is where regeneration harvests were planned. or towards the worst nesting habitat because of planning management actions designed to avoid murrelets. There is no evidence that the analysis in the EIS fails to provide decision makers with the ability to make an informed decision on the relative merits of each alternative as it relates to the marbled murrelet. Although the comment points out an information need that could help establish some relationship between habitat availability and the species' response, it is not information currently existing nor needed to establish a relative ranking among alternatives for their potential effects to this species.

118. Comment: The DEIS analysis of marbled murrelet habitat focuses solely on patch-scale habitat measures which is far less accurate than multi-scale models (Meyer 2007).

Response: Meyer (2007) describes a model that can assist in predicting the distribution of marbled murrelet habitat across a geographical area, and also the relative likelihood of occupancy of individual stands by marbled murrelets, by utilizing parameters calculated at four different scales. In terms of Meyer (2007), the analysis in the EIS uses a single scale (i.e., the patch, which is the smallest scale in Meyer's [2007] hierarchy).

The analysis in the EIS does not redefine the distribution of this species, nor does it treat stands of suitable murrelet nesting habitat differently based on the likelihood that they may be occupied. The analysis in the EIS simply looks at the change in the relative abundance of potential nesting habitat within a given geographical area (marbled murrelet Zones 1 and 2). This habitat model is then combined with a quantitative analysis of the landscape patterns to describe to the decision maker whether conditions on BLM-administered lands are getting relatively better or worse for the marbled murrelet under each alternative. Compared to Meyer (2007) and Meyer and Miller (2002), this is a simplified review of habitat conditions and their potential to change but it still provides an adequate basis for an informed choice among the alternatives regarding marbled murrelets. Utilizing the full modeling technique in Meyer (2007) would not change the overall conclusions or ranking of the alternatives.

119. Comment: Marbled murrelet, a rafting species, are tied to very specific marine habitats, often strongly associated with large bays and river mouths (Meyer and Miller 2002). The alternatives would have very different effects across the Plan area, and it appears (based on changes in habitat availability in DEIS, Fig. 234) that marbled murrelet populations in southern Oregon would be differentially impacted. In addition, the DEIS fails to analyze the differential, geographically bounded effect (Meyer and Miller 2002) at both the population and meta-population scale.

Response: The analysis within the EIS does evaluate potential marbled murrelet nesting habitat at two scales: (1) the entire planning area, and (2) district and marbled murrelet zones. This provides for an evaluation of the entire population of marbled murrelet habitat as a whole, as well as pinpointing specific districts and zones that may exhibit localized problems.

120. Comment: The DEIS assumption that "developed structurally complex" stands in one part of the plan area can replace harvested old-growth stands in another area as marbled murrelet nesting habitat is not supported by available data and is not supported by analysis in the DEIS.

Response: The EIS makes no such assumption. The EIS simply summarizes the marbled murrelet nesting habitat available at each time interval. The analysis has been revised to analyze the changes to structurally complex old and very old forest separately from the overall habitat analysis. The EIS makes no statement relating to the relative value of each structural stage to another.

Wildlife – Northern Spotted Owl

121. Comment: Because down wood is a critical component of spotted owl habitat and there are no down wood requirements for Alternative 1 and 2 in timber management areas other than leaving noncommercial wood, the BLM should set a minimum standard for post-treatment down wood.

Response: Under all alternatives, BLM management would be consistent with the *Final Recovery Plan for the Northern Spotted Owl* and the Final Rule on northern spotted owl critical habitat (DEIS, page 60). Under Alternatives 1 and 2, the BLM chose not to establish a specific minimum standard for downed wood.

122. Comment: The EIS should be revised to consider the importance of Red tree voles in the northern spotted owl recovery efforts. Red tree voles are important prey to the northern spotted owl and therefore, surveys should be done to determine the presence or absence of Red tree voles within the study area.

Response: The red tree vole is mentioned only once in the *Final Recovery Plan for the Northern Spotted Owl* (USFWS 2008a:49), and then only as one of several species that, collectively, "comprise a small portion of the spotted owl diet." However, even if the red tree vole were one of the principal spotted owl prey items, the Recovery Plan does not recommend pre-project survey for any prey species. The presence or absence of prey species in specific areas that would be revealed through surveys is not necessary to inform implementation of management actions that are related to the recovery of the northern spotted owl under the alternatives. The PRMP Alternative in the FEIS addresses recovery of the northern spotted owl through land use allocations (e.g., Late-Successional Management Areas) and various management actions that are independent of the localized presence or absence of red tree voles.

123. Comment: The EIS should be revised to consider not only the effects of habitat conditions on northern spotted owls, but also non-habitat factors such as impacts from barred owls which are currently being studied by the USFWS. The EIS should acknowledge that uncertainty exists concerning the effects of barred owls on northern spotted owl populations and describe the manner in which BLM intends to respond to future changes in spotted owl numbers.

Response: The PRMP Alternative in the FEIS is consistent with the *Final Recovery Plan for the Northern Spotted Owl* (USFWS 2008a). Even though the Endangered Species Act does not require the BLM to comply with a recovery plan, BLM management will comply with recovery actions in the Recovery Plan and the

Final Rule on northern spotted owl critical habitat. If additional measures are needed to respond to future situations, BLM management will evaluate information at appropriate times and continue to comply with the Endangered Species Act.

124. Comment: Page 282 of the EIS should be revised to include citation information for population information as well as include the basis for the apparent data extrapolation and indicate which demographic study areas are being used in this portion of the document.

Response: The BLM has corrected this shortcoming in the final EIS. The citation is Anthony et al. (2004) who found that, within the six demographic study areas in western Oregon, populations declined in three areas between 1983 and 2003 and were stationary in three, with an average population decline in all six of 2.8% per year. However, within Oregon, population declines in the northern demographic study areas (Warm Springs, H.J. Andrews, and Oregon Coast Range), which averaged 4.9% per year, were more pronounced than in the southern demographic study areas (Tyee, South Oregon Cascades, and Klamath), where declines averaged less than 1% per year and populations statistically were stable.

125. Comment: The EIS should be revised to acknowledge the Final Draft Recovery Plan for the Northern Spotted Owl and the 20-inch cap for snag removal. The 20-inch diameter cap is described as a "starting point" for developing province-specific Standards & Guidelines. The final draft recovery plan also provides a clear methodology to help managers develop provincial Standards & Guidelines based on the general guidance in the recovery plan. The methodology is based a scientifically derived estimates of which logs (size and species) will persist for 70 years or more.

Response: The alternatives considered a variety of options for the management of snags in spotted owl habitats. The PRMP Alternative in the FEIS does not include a 20-inch diameter cap for snag removal, because it is not part of the conservation strategy in the *Final Recovery Plan for the Northern Spotted Owl* (USFWS 2008a). Also, nothing in the BLM analysis indicated that such a cap was needed to promote owl conservation. Although the PRMP Alternative in the FEIS does not contain any such cap, the PRMP is consistent with the provisions of the Recovery Plan and the Final Rule on northern spotted owl critical habitat that the U.S. Fish and Wildlife Service has determined are necessary for species conservation.

126. Comment: The EIS analytical assumption that replacing existing older forest with younger habitat provides equal benefits is flawed and therefore the EIS has underestimated the adverse impacts of the alternatives to NSO.

Response: The DEIS did not make this assumption. The BLM acknowledges that not all habitat conditions contribute equally to owl conservation and that, in general, older forest supports owl conservation better than does younger forest. However, the DEIS was confined to those analyses needed for land use planning. Not only did the scientific literature lack consensuses on the definitions and relative benefits of "old forest" and "younger habitat," but recent studies in the California Klamath and Oregon Coast Range provinces (e.g., Dugger et al. 2005) found that habitat comprised of a mixture of older and younger forests supported owl reproduction better than habitat comprised almost exclusively of older forest.

To evaluate the alternatives, the EIS classified owl habitats according to Thomas et al. (1990:164) as refined by Courtney et al. (2004:Chapter 5); i.e., (1) habitats that support nesting, roosting and foraging, (2) habitats that support roosting and foraging but generally do not support nesting, and (3) habitats that generally do not support nesting, roosting or foraging. The EIS analysis also relied on several studies to define the metrics of a potential nest territory and to design the analysis to evaluate the development of such potential territories over time by alternative. The BLM, in collaboration with owl scientists, determined that this approach would generate the most detailed and credible evaluation of how each alternative would affect owl habitats at the scale needed for land use planning.

127. Comment: The EIS is flawed because it fails to address how the NSO population in the Klamath Province will remain stable with the elimination of late-successional reserves under Alternative 3 or how Alternative 3 will contribute to recovery.

Response: The DEIS (pages 640 and 641) states that Alternative 3 would not support the formation of large blocks of northern spotted owl suitable habitat and would increasingly fragment that habitat over time. Since large blocks of suitable habitat are needed to maintain population stability (Thomas et al. 1990), Alternative 3, as was stated, would not contribute adequately to spotted owl conservation (which includes recovery).

128. Comment: The index of the EIS should be revised to include a listing for the connectivity corridor that links the Coast Range with the Cascades at the very southern end of the Willamette Valley.

Response: The EIS was revised to more fully address the South Willamette-North Umpqua Area of Concern. The augmentation of a Late-Successional Management Area in this area, under the PRMP Alternative in the FEIS, conforms to the conservation strategy contained in the *Final Recovery Plan for the Northern Spotted Owl* to help address the issue of owl connectivity in this area.

129. Comment: The EIS should be revised to consider the legal decision in *Gifford Pinchot Task Force v. United States Fish & Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004). Specifically, the EIS should more closely analyze actions that may modify critical habitat in terms of whether the modification actually promotes the conservation of the owl and not simply whether the modification puts the species in jeopardy.

Response: The Endangered Species Act applies different thresholds to species and critical habitat. The jeopardy threshold applies only to species, whereas the threshold of destruction and adverse modification applies to critical habitat. The PRMP Alternative in the FEIS allocates areas expected to be designated as critical habitat in the Final Rule to the Late-Successional Management Area land allocation. Directions for management of the lands in this allocation are designed so as not to destroy or adversely modify critical habitat. In the PRMP Alternative in the FEIS, the BLM is using its authorities to further the purposes of the Act, and to manage the designated critical habitat of the northern spotted owl for the conservation and recovery of the species.

130. Comment: The EIS should be revised to consider its heavy reliance on the USFWS's 2007 Draft Recovery Plan for the Northern Spotted Owl because this plan has recently been the subject of intense criticism and negative scientific peer reviews due, in part, because the plan would lower habitat protection.

Response: Since the issuance of the DEIS, the U.S. Fish and Wildlife Service made significant changes to its spotted owl recovery strategy. These changes were incorporated into the Service's *Final Recovery Plan for the Northern Spotted Owl*. The BLM's PRMP Alternative in the FEIS incorporates the applicable changes.

131. Comment: The EIS should be revised to include northern spotted owl population estimates and rates of change that have been reported or assessed. The BLM should use its extensive spotted owl data bases more extensively within the EIS.

Response: The final EIS was revised to more fully discuss the results of the range-wide northern spotted owl demography studies, which are ongoing and in which the BLM participates as a cooperator. Relevant data from the BLM's spotted owl data base were included in those analyses.

132. Comment: The classification system used in the DEIS for the northern spotted owl is flawed because the separation of analytical results into quantity and quality of suitable habitat, dispersal habitat, large blocks and suitable habitat outside of large blocks (DEIS 6733) fails to provide a single integrated measure of habitat availability for the northern spotted owl, making it difficult to interpret overall impacts to owl populations.

Response: The habitat classification used by the BLM is well supported by science (e.g., Thomas et al. 1990:164 as refined by Courtney et al. 2004:Chapter 5) and is essentially the same habitat classification that has been used to evaluate the potential impacts of management actions to spotted owl habitat since 1994. The EIS analysis also relied on several studies to define the metrics of a potential nest territory and to evaluate the development of such potential territories over time by alternative. Given the myriad of non-habitat-related variables that are suspected to influence spotted owl populations (such as barred owls and west Nile virus, and our current inability to separate or quantify the effects of those influences on owl populations), there is no single variable that would show how habitat management alone would affect regional populations. To better portray how the alternatives might affect spotted owl habitat at the landscape scale, the analyses in the final EIS were augmented to evaluate how each of the alternatives would contribute to the conservation needs of the northern spotted owl.

133. Comment: The gross classification of patches (BLM Forest Operations Inventory (FOI) polygons) used in the DEIS ignores the fact that use of habitat by northern spotted owl varies across the planning area. Several studies have shown fundamentally different niches for northern spotted owl from the southern to the northern parts of the planning area (Zabel et al. 1995).

Response: The BLM acknowledges that northern spotted owls form variable niches in the planning area. The BLM also considered a variety of studies that documented these variations but determined that many of the findings were localized, inconsistent, or in other ways insufficiently determinant to allow the BLM to further refine habitat classifications in most portions of the planning area. Accordingly, it is incorrect to characterize the habitat parameters used by the BLM as a "gross classification." Considering the landscape scale of the analyses, the BLM used the best habitat data available, even though these data did not include metrics for all spotted owl niche variables.

134. Comment: The DEIS overestimates suitable habitat because it does not adequately address minimum patch size (or size of contiguous habitat patches). If minimum patch size was included as a mapping rule for owl habitat, the outcomes for the alternatives would be differentially affected.

Response: This assessment is correct, and the BLM revised the EIS to more accurately evaluate the potential affects of the alternatives to northern spotted owl suitable habitat. Revisions included the application of minimum standards for the quantity and spatial arrangement of nesting, roosting, and foraging habitat needed to support both individual breeding pairs and clusters of breeding pairs. Using these standards, the BLM evaluated each alternative in terms of its contribution to potential spotted owl nest territories and blocks of suitable habitat that would be capable of supporting stable spotted owl subpopulations. The BLM, based on the recommendation of its owl working group, determined that these standards would yield more accurate assessments of future habitat conditions and owl responses than would a reliance on minimum patch size.

135. Comment: The DEIS analysis of dispersal habitat is flawed because it does not appropriately address disjunct isolated patches that are unlikely to function as dispersal habitat. In addition, the DEIS sums dispersal habitat at the sixth field scale which is an unsupported metric for assessing effects on northern spotted owl and obscures some landscape-level driving factors.

Response: The science on the northern spotted owl does not support defining a minimum quantity or spatial arrangement of habitat needed for owl dispersal. Therefore, there is no valid means to define, map, or exclude "disjunct, isolated patches." Nevertheless, in response to this and other comments, the BLM revised the scale of its analysis based on the recommendation of its spotted owl working group, which included owl scientists. Instead of using the sixth-field watershed, the final EIS evaluates dispersal habitat at the scale of the fifth-field watershed. Jim Thrailkill (2007) believed, and the other members of the working group concurred, that this larger scale would better indicate potential problems with owl movement and survival than the scale of the sixth-field watershed. This belief is based on a sixth–field watershed being typically closer to the size of a single northern spotted owl home range, whereas the issue to be addressed pertained to owl movement between home ranges.

136. Comment: Model parameterization used for assessing northern spotted owl habitat in the DEIS would be more tenable if it were validated with existing species data from the region. Several examples of validation of northern spotted owl models exist (McComb et al. 2002, Lint 2005).

Response: The DEIS did not represent research and the BLM was not defining new habitat parameters for the spotted owl, so there were no new habitat definitions that required validation. Instead, the BLM based its evaluations on habitat parameters that have been developed and validated by researchers during the past two decades. The final EIS was revised to more fully utilize regional habitat data and to evaluate owl habitat on all land ownerships. The revised model also incorporated the isopleths mask developed by Lint (2005:Figure 3-7).

137. Comment: The DEIS overestimates the projections of northern spotted owl habitat under the alternatives because it does not assume any losses during 100 years to wildfire or other disturbances.

Response: In response to this and other comments, the BLM revised the final EIS to discuss how the alternatives would affect northern spotted owl habitat, in terms of changes in fire severity and fire resiliency, through 2106. However, the BLM can make no claim as to whether its analysis over- or under-estimates the potential impact of wildfire on those habitats because no one fully understands how northern spotted owls respond to wildfire. This is due in part to limited data, different methods of data collection, and differences between expected and observed owl uses of burned habitat (for example, see Courtney et al. 2004:Chapter 6; 4.7). This is especially true of fires that are less severe (i.e., are not stand-replacement fires), or occur in northern spotted owl habitats that are not yet suitable, or both.

In addition, our ability to predict the occurrence of fire is limited. According to the fire regime classification for western Oregon, the Coast Range and West Cascades Provinces, which fall primarily within fire regimes III and V, should experience infrequent (every 35 to 200+ years) but severe (stand-replacement) fires; the Klamath Province, which falls primarily within fire regime I, should experience more frequent (every 0 to 35 years) but less-severe (surface) fires. However, in somewhat of a contrast to this expectation, between 1994 and 2003, Lint (2005:56-63) found that, on all federally administered lands in western Oregon, the Klamath Province lost an unexpectedly high 6.6% of its northern spotted owl nesting habitat to stand-replacement wildfire, compared to a 0.8% loss in the West Cascades Province and no measurable loss in the Coast Range Province.

138. Comment: The DEIS analysis of effects to northern spotted owl is flawed because it only considers habitat and thus is unable to integrate the effects of disturbance or other species (e.g. barred owl) on spotted owl population trends. Without consideration of population change, it is impossible to consider latitudinal gradients in northern spotted owl population trends across the planning area.

Response: It is incorrect to characterize the analysis as flawed because it does not address owl population trends or suspected influences on population trends that are not directly related to habitat. Although the habitat-based analyses in the final EIS do not predict population changes, they do predict changes in the number of potential spotted owl territories over time. This is the most credible and useful method to predict the relative effect of the alternatives on the reasonable assumption that the spotted owl would respond to the management alternatives relative to the quality of habitat conditions. No one, in any venue, has predicted how implementation of a regional habitat management plan would affect the northern spotted owl population. Even at the time the Northwest Forest Plan was implemented, the single attempt to predict an owl population response to plan implementation was limited to predicting an overall trend (without population numbers) during an unspecified time period—and it turned out to be inaccurate.

Currently, with the myriad of variables that are known or suspected to affect spotted owl fecundity and survival (for example, see Courtney et al. 2003:8-13), the science on the spotted owl does not allow the BLM to estimate how disturbances such as wildfire, or other species such as the barred owl, would affect the spotted owl population to the degree of accuracy needed to distinguish the effects of the management alternatives on that population. Although the BLM recognizes that improving owl habitat conditions would not necessarily change the population trends due to factors beyond our control or to factors not fully revealed by current research, it is reasonable for the BLM to believe that the owl population would respond better to alternatives with a higher quantity and quality of those habitat conditions. The BLM analyses were designed to help the decision maker choose among the alternatives based on the relative benefits to spotted owl habitat.

Fish

139. Comment: The EIS should explain how endangered anadromous fish species recovery plans that are completed after WOPR implementation begins would be incorporated into land management actions.

Response: Completion of a recovery plan for a listed species would constitute new information that BLM would evaluate. Because of the speculative nature and unknown requirements of possible future recovery plans, it is not possible to make a reasonable conclusion regarding the process by which it would be integrated into the RMP, or whether an RMP amendment or revision and a new National Environmental Policy Act analysis would be required.

140. Comment: The EIS should be revised to more clearly differentiate work that was conducted by the CLAMS project (pages H-1082-1083) and what work was done by the Bureau of Land Management (BLM) EIS team. Citations should be altered to reflect previously published work.

Response: Kelly Burnett (of the Pacific Northwest Research Station) expanded the intrinsic potential model from the initial modeling completed for the Coastal Landscape Analysis and Modeling Study (CLAMS) project, to the extent of the Western Oregon Plan Revision planning area for coho, chinook, and steelhead. Because the modeling for the Western Oregon Plan Revision was completed by Kelly Burnett using the methods described in Burnett et al. (2007), this reference is appropriate. The text in the DEIS and FEIS are not long multi-page quotes, but rather explanations of the modeling methods completed for the Western Oregon Plan Revision. However, the FEIS has been revised to clarify which modeling was completed for the FEIS.

141. Comment: The EIS should be revised to clarify if fish distribution or critical habitat were analyzed, and to describe how range and/or critical habitat play a role in the Wood/Intrinsic Potential/Fish Productivity model analysis.

Response: Critical habitat designations were identified in the DEIS analysis. The DEIS and FEIS analyze the effects of the alternatives on aquatic habitat for all fish species in the plan area, including critical habitat. For this reason, the effects to critical habitat were not analyzed separately or as a subset. The FEIS has been clarified to reflect this. Additionally, because of concerns by scientists regarding the reliability of the productivity model, the fish productivity index has been removed from the FEIS analysis.

142. Comment: The EIS should clarify if all fish populations are cyclic by nature, and provide a reference for the statement.

Response: All fish populations are cyclic by nature. This is the fundamental basis of fish population dynamics and does not necessitate a reference.

143. Comment: The EIS should be revised to provide a better description of the survival traits of fish and why they are relevant, as the current context is unclear.

Response: The description of survival traits is taken directly from Reeves (1995); it describes populations, not individuals, and is the most recent and well accepted list from published literature. Providing additional descriptions of survival traits is unnecessary. Additionally, the FEIS does provide a logical connection to these survival traits as it describes the context of BLM's role in contributing to the survival of fish populations; including an example of how the BLM can contribute to survival traits (i.e., mobility) by improving fish passage.

144. Comment: The EIS should clarify whether or not high intrinsic potential streams have been determined for Oregon chub and special status fish species

Response: The DEIS and FEIS clearly state for which species the intrinsic potential model was modeled and for which fish it was not.

145. Comment: The DEIS analysis of fish is flawed because it relied on the analysis of intrinsic potential and failed to analyze or disclose the effects of the alternatives on bull trout, Lost River suckers, shortnose suckers, Oregon chub and special status fish species.

Response: The analysis in the DEIS and FEIS fully analyze and disclose the effects of the alternatives on all fish habitat for all fish species within the WOPR planning area. The analysis in the DEIS and FEIS does not rely on the analysis of intrinsic potential to determine the effects on fish species. Rather, the DEIS and FEIS analyze the effects under each alternative on those ecosystem processes (wood delivery, fine sediment delivery, stream shade/temperature, nutrient input, and peak flows) that have the greatest influence on fish habitat for all fish species, including bull trout and suckers. Intrinsic potential was used in the DEIS only as a tool to show the inherent value of the habitat where those effects would occur. In the FEIS, intrinsic potential is used as one tool to compare the effectiveness of aquatic restoration on fish habitat between alternatives. Additionally, none of the alternatives vary the level of protection based on intrinsic potential. The level of protection under the PRMP Alternative in the FEIS is applied to all stream segments regardless of the level of their intrinsic potential.

146. Comment: The EIS should better describe how BLM used the CLAMS project (Burnett et al. 2007) data, including the fact that the CLAMS study only assessed fish in a specific project area and what this means in the context of the EIS analysis.

Response: Kelly Burnett, Pacific Northwest Research Station, expanded the intrinsic potential model from the initial modeling completed for the CLAMS project to the extent of the Western Oregon Plan Revision planning area for coho, chinook, and steelhead. The FEIS has been revised to clarify what modeling was completed for the FEIS.

147. Comment: The EIS should be revised to clarify what method was used to determine fish productivity for coho salmon, as the text in Section 7.9 and Appendix H are unclear.

Response: Because of concerns by scientists regarding the accuracy of the productivity model, the fish productivity index has been removed from the FEIS analysis. The FEIS has been revised to provide considerably more information on wood model outputs and the effects to fish populations without summarizing the results into a single value, as was previously done with the fish productivity index.

148. Comment: The EIS should be revised to include more information about the effects of water temperature on fish, including expansion on Oregon's numeric water temperature criteria and a more extensive discussion of the extensive literature on effects of water temperature on listed salmonid fish found in the plan area.

Response: The FEIS has been revised to include more information about the effects of water temperature on fish, including expansion of the water temperature criteria to include the Oregon Department of Environmental Quality's core cold water habitat criterion and designation. Oregon's state-wide narrative and numeric criteria for water quality are listed in the DEIS and also the FEIS (*Appendix I-Water*, in the Best Management Practices section).

149. Comment: The effects of roads are not modeled or considered, even though they often contribute to increased peak flow responses (Johnson 2000, Grant et al. 2008). The EIS should be revised to model or consider the effects that roads have on anadromous fish habitat at the stream reach scale.

Response: The effects of roads on peak flows were included in the analysis for water and fisheries. Refer to the FEIS, *Chapters 3* and *4* (Water sections) and *Appendix I–Water* (Analytical questions #1 and #2).

Land use activities can generate cumulative watershed effects dispersed through space and time. Various interactions can occur, such as responses acting independently, sequentially, or synergistically, over an increasing watershed area. Researchers (Reid 1993, Megahan et al. 1992) suggest that watersheds of 10-200 square kilometers are an appropriate scale for non-point source pollution assessments. The EIS analysis conducted a peak flow cumulative effects analysis from the effects of forest management (harvest units and roads) across BLM-administered and all other lands at a sub-watershed scale of 10,000-40,000 acres, (15 to 62 square kilometers). This scale of analysis was purposeful, and was based on research recommendations from Thomas and Megahan (1988) and others.

The peak flow methodologies in the EIS for the rain and rain-on-snow hydroregions rigorously analyzed 1,192 different subwatersheds within a larger watershed context. Based on the peak flow analysis, the EIS analysis found less than 1% of the subwatersheds at risk for peak flow increase. The effects of these increases on fish habitat are dependent on the channel types at the reach-scale (as discussed in *Chapter 4*-Fish section and *Chapter 4*-Water section). Therefore, reach scale assessments are more appropriate at the project scale to evaluate the effects of these increases on the stream channel and fish habitat. Additionally, because hydrologic recovery occurs within a relatively short time period, the reach-specific analysis is better done at the time of the project using the methods suggested by Grant et al. (2008).

150. Comment: The DEIS assumes that channels with low geomorphic intrinsic potential (IP) for rearing habitat require less protection than channels with high intrinsic potential. This assumption is also unwarranted in that channels with low IP for juvenile salmonid fish may be important sources of water, sediment, organic matter or nutrients to channels with high intrinsic potential (Rice et al. 2001, Kiffney et al. 2006). In other words, the intrinsic potential of a river network is likely a result of habitat attributes as defined in the IP model, but also a result of important connections between habitat types and basal productivity. Therefore, conserving, restoring and protecting linkages among habitat and channel types may be a key action needed to increase populations of these fish species.

Response: The EIS does not assume that channels with low intrinsic potential require "less protection" than high intrinsic potential (HIP) channels. Also, the EIS does not discount the contribution of water, sediment, and organic matter from lower intrinsic stream channels to higher intrinsic potential streams. The FEIS provides comprehensive information on the location of stream reaches with the greatest potential to provide high-quality habitat for salmonids, which was generally missing within the Western Oregon Plan Revision planning area. Additionally, none of the alternatives vary the level of protection based on intrinsic potential. The level of protection under the PRMP Alternative in the FEIS, applies to all stream segments regardless of the level of their intrinsic potential.

The FEIS uses the intrinsic potential model to evaluate the location of the high intrinsic streams relative to BLM landownership patterns; the BLM's ability to influence the intrinsic potential stream channels that have a greater intrinsic potential to provide high-quality habitat for salmonids (Burnett et al. 2007); and the potential and feasibility of aquatic restoration relative to landscape characteristics. The FEIS wood recruitment rates are reported in terms of channel width classes, rather than in terms of a habitat index that included dependence on calculated intrinsic potential values. The analysis in the FEIS of environmental consequences for the PRMP Alternative demonstrates that the PRMP conserves, restores, and protects aquatic habitat and fish populations in the planning area.

151. Comment: The DEIS definition of large wood is not the same as the definition of large wood used in the literature cited by the DEIS (Beechie and Sibley 1997) to estimate frequency of pool formation. By excluding all pieces of wood less than 20 inches DBH from their analyses, the DEIS grossly underestimates the importance of wood to the formation of pool habitat, and by extension the importance of riparian forests with trees less than 20 inches DBH to instream habitat. Alternatives 2 and 3 will substantially decrease the large wood contribution to fish bearing streams relative to the No Action Alternative, and the decreases will be long-term. This is because thinning will remove wood large enough to form pools from the riparian zone (if the term large wood is defined by its ability to form pools rather than the arbitrary value of greater than 20 inches diameter) (Beechie et al.. 2000). Alternative 1 will substantially decrease the large wood contribution to fish-bearing streams from non-fish bearing streams relative to the No Action Alternative.

Response: The wood delivery model has been expanded for the FEIS to also determine the contribution of smaller wood to both non-fish-bearing and fish-bearing stream channels for the FEIS.

152. Comment: The DEIS assumes that standing stock of wood accumulates without consideration of the reduction of wood from decay, floods, and other processes. Proper modeling of wood balance would include balance of inputs vs. outputs, such as decomposition, recognition of (bedrock) bed characteristics making reaches more porous to wood (May and Gresswell 1996, Montgomery 1996), and shifts between hardwoods (fast decomposition) and conifers (slower decomposition), to quantify changes in standing crop of wood in comparison to natural abundances of wood in streams.

Response: The EIS analyses does not consider accumulation of instream wood since differences in recruitment rates and stand conditions are the most reliable measure of management effects on wood availability. Modeling a comprehensive and complete wood budget to estimate the standing stock of wood involves many poorly constrained and stochastic processes, and would not be feasible with available models.

153. Comment: There is a problem in assigning equal value to wood delivered to fish-bearing streams from debris flows as wood is delivered to streams from direct riparian recruitment or channel migration. Since large wood delivered to fish bearing streams from debris flows occurs infrequently and tends to deposit large piles of wood in and around streams, most of which contributes little to important functions such as pool formation, it may not be appropriate to consider a piece of debris-flow derived wood as functionally equivalent to wood entering streams from other sources. Because the DEIS treats all sources of large wood equally, and estimates long term annual averages, it exaggerates the average amount of functional large wood that will be in streams. For example, a stream could have very little functional wood most years, but a debris flow that deposited a large pile of wood to the stream in a single year would then boost the annual average and potentially make it appear that there was, on average, substantial amounts of functional wood in the stream, when in fact that was not the case.

Response: The FEIS has been revised to determine the potential wood contribution from each source (riparian and debris flow) separately, rather than a combined annual average, in order to evaluate the management effects on these two processes independently. The wood delivery model has also been expanded to include a sensitivity analysis on a subset of watersheds to analyze how the inclusion of stand-type dependent debris flow probabilities affect the potential wood contribution from debris flow sources. This sensitivity analysis integrates the effect of forest cover on the debris flow frequency and recurrence interval at different time periods to better capture the temporal and episodic nature of debris flow wood contribution and to demonstrate how the magnitude of large wood input, when triggered by storm events, would differ between processes (riparian vs. debris flow) for each alternative.

There is some scientific evidence that wood from different sources provide different geomorphic and habitat functions. However, the assumption that wood delivered to stream channels from debris flows contributes little to important stream functions is unsupported. This idea was challenged by Benda and others (Benda et al. 2003, 2005) who document that wood deposited from debris flow sources has a prominent role in: forming pools, wide channels, floodplains, and gravel deposits; creation of complex habitats; and increasing habitat heterogeneity. For many streams, landslides and debris flows provide a large portion of the instream wood (Reeves et al. 2003) that contributes to the habitat heterogeneity in fish-bearing streams (Miller et al. 2007) and creates complex productive stream habitats (Reeves et al. 2005, Bilby and Bisson 1998). For macroinvertebrates and fish, increasing the heterogeneity of habitat conditions (including channel width and depth, stream substrate, wood storage, and water velocity) can increase total species richness (Allan 1995). This has been documented in the Oregon Coast Range, where increased wood storage and pool formation at low-order confluences resulted in increased salmonid rearing (Benda et al. 2004).

154. Comment: The fish productivity model should be revised to include: (1) more valid assumptions about functional wood sizes, value of wood from different sources, and wood longevity; (2) the correct equation for the number of pools per channel width; (3) a more realistic view of the totality of factors that may limit fish productivity; and (4) better disclosure of assumptions and methods used to estimate fish response to stream channel changes.

Response: (1) The FEIS considers woody material to be functional if it is pool forming, based on correlations between functional piece size and stream channel width from Beechie et al. (2000). The wood delivery model has been revised for the FEIS to also determine the contribution of smaller wood to both non-fish-bearing and fish-bearing stream channels. (2) The correct pool equation was used for fish productivity index in the DEIS analysis. The fish productivity index was not included in the FEIS; however, the FEIS has been revised to provide considerably more information on wood model outputs and the effects to fish populations without summarizing the results into a single value, as was previously done with the fish productivity index. (3) Each component (wood, sediment, temperature, hydrology) is modeled independently; and the effects of each component for fish habitat and consequent productivity are evaluated independently. The FEIS acknowledges that these processes do not act independently, but existing models cannot accommodate interactions between these processes at the spatial scale of the Western Oregon Plan Revision. (4) Additional information regarding the analytical assumptions and methods has been included in the FEIS.

155. Comment: The EIS should include more clarity and specificity on how the reduced buffer widths in the action alternatives adequately address the conservation and recovery needs of listed and sensitive aquatic and riparian species.

Response: The PRMP Alternative and other action alternatives in the FEIS are designed to contribute to the recovery of ESA-listed species and to provide for conservation of sensitive fish and wildlife species that would preclude the need to list under ESA. The DEIS analysis adequately addressed the environmental consequences that would occur to aquatic species. The effects of different management actions on headwater-dwelling aquatic species has not been well addressed by past research. Therefore, there is currently little available information to assist in defining habitat needs for these species, particularly in determining the spatial extent and degree of connectivity for different forest types and the effect of different riparian management area widths on these species. However, the FEIS analyzes the effects of the alternatives on aquatic habitat in both fish-bearing and non-fish-bearing streams. This provides a basis for evaluating the impact of the alternatives to headwater-dwelling species. Additionally, the PRMP Alternative in the FEIS includes wider Riparian Management Areas than those in Alternative 2, the alternative identified as “preferred” in the DEIS.

156. Comment: The EIS should disclose the current condition of habitats and populations for fish including both special status and ESA listed species to allow an interpretation of the magnitude of projected effects, an assessment of cumulative impacts and a comparison of alternatives.

Response: The DEIS and FEIS analysis focuses on those ecosystem processes that affect aquatic habitat, and also includes a description of the current aquatic habitat condition for fish species in the plan area; including ESA and Special Status fish populations. The DEIS and FEIS analysis utilized sophisticated models, GIS mapping, and the most relevant scientific information to describe the current condition of aquatic habitats and fish populations in the plan area including the location, status, critical habitat, and limiting factors of ESA-listed fish populations; the location of high intrinsic potential stream channels; and past and current amounts of large wood in stream channels, fine sediment in streams, stream temperatures, and peak flows.

157. Comment: The EIS statement “. . .streams are ranked by their intrinsic potential to provide habitat for chinook, coho salmon, and steelhead” should be revised to explain that the intrinsic potential is for juvenile rearing habitat for chinook, coho, and steelhead.

Response: The FEIS has been revised to provide additional clarity and explanation regarding this issue.

158. Comment: The EIS statement (pg 356) “thresholds beyond which [sediment] impairment occurs in the field have not been established” is incorrect, as methods for assessment and thresholds for sediment have been identified in published literature.

Response: The FEIS has been revised to show that thresholds at which fine sediment affects fish species is highly variant between scientific studies and localized conditions. The Index of Biological Integrity (IBI) approach recently published by the Environmental Protection Agency, Western Division (Wittier et al. 2007) is one of many tools that can be used to assess the biological condition of streams, but its utility is limited for analyzing the future effects on fish of different management strategies. The IBI is more appropriate for monitoring to determine long-term trends. The western IBI used information from state fish books and professional judgment to assign tolerance classes for fish-based metrics, The authors were unable to find any IBI developers who had applied quantitative methods to assign tolerance classes to fish species. The IBI values and tolerances are based on fish assemblages found at undisturbed sites. The values do not account for natural fluctuations in fish assemblages or sediment loads.

For this EIS analysis, sediment yields to stream channels are expressed as tons/mile/year for each fifth-field watershed. This analysis cannot be related to the IBI approach (because the threshold values rely on percent embeddness). This output (tons/year) cannot be directly equated to a percent embeddedness and, therefore, the thresholds and assumptions from Cederholm and co-authors (1981) provide a better method to evaluate the differences among the alternatives than the IBI approach.

159. Comment: The EIS fails to adequately discuss the affected environment for ESA-listed and special status fish species because the large body of information regarding the current conditions of populations and habitats for these species is necessary to compare the direct, indirect and cumulative impacts of each alternative.

Response: The DEIS and FEIS do describe the affected environment for ESA-listed and Special Status fish species. The DEIS (pages 335-338 and Appendix H, pages 1,071 through1,081) and the FEIS include a description of fish species designated as threatened or endangered under ESA and Special Status Species (DEIS, Table 256). The DEIS and FEIS also include status summaries for each evolutionary significant unit (ESU) and distinct population segment (DPS) from the National Marine Fisheries Service "Updated Status of Federally Listed ESU's of West Coast Salmon and Steelhead" and from Federal Register notices for fish species listed by the U.S. Fish and Wildlife Service. The DEIS and FEIS also describe the current status, population trends, status, and location of critical habitat, as well as limiting factors for each ESU/DPS and the past and current condition of aquatic habitat.

To understand the cumulative effects of a proposed action, it is necessary to understand first what would happen in the absence of a proposed action, which is described in the analysis of the No Action Alternative. Thus, the analysis in the EIS includes the effects of past actions, other present actions, and reasonably foreseeable actions to project over time what would happen if no action is taken to revise the resource management plans. Comparing the action alternatives then against the context provided by the projected trends of the No Action Alternative reveals the incremental effect of those action alternatives. Identification of current conditions is only a step in the analysis of cumulative effects, and it is described in *Chapter 3* of the EIS. It would be erroneous and misleading to compare the effects described for the action alternatives to the current conditions and ascribe the differences as the "cumulative" effect, since that comparison would mask the effects of the other present actions and reasonably foreseeable actions.

160. Comment: The EIS should clarify how the watersheds discussed in Table 107 were selected, the current condition of each watersheds' streams, and the proportion of LSMA and other allocations is each watershed.

Response: The representative watersheds used in the DEIS to display the results of the wood delivery model were selected to show examples of various BLM ownership patterns and provinces. The data from these representative watersheds used in the DEIS was not extrapolated to any other watersheds. The FEIS does not include the use of representative watersheds because the wood delivery model is now used across the entire planning area for the FEIS.

161. Comment: The EIS should include criteria for when to thin riparian forests, and additional non-timber management actions to maintain and restore riparian areas — such as correcting damage to riparian vegetation and streambanks due to livestock grazing, invasive plants, recreational activities, and roads.

Response: The PRMP in the FEIS includes criteria for thinning riparian forests (including when to thin) and non-timber management actions to maintain and restore aquatic and riparian habitat. Thinning in riparian management areas would occur under the PRMP where necessary to speed the development of large trees in order to provide an eventual source of large woody debris to stream channels. Under the PRMP, thinning would not occur within 60 feet of a perennial or fish-bearing stream channel, or within 35 feet of a non-fish-bearing intermittent stream.

162. Comment: The EIS should disclose limitations as well as peer review, validation, and sensitivity analysis of the three wood recruitment models developed for this analysis, as these steps are part of the scientific model process and should be disclosed.

Response: Only one wood delivery model was used for the DEIS and FEIS analysis. The riparian tree-fall portion of the wood recruitment model has been discussed at length in the literature with evaluations of model sensitivity to parameters such as channel width, riparian management area width, channel-adjacent slope gradient, and riparian stand characteristics (Robison and Beschta 1990, Van Sickle and Gregory 1990, Beechie et al. 2000, Bragg 2000, Benda and Sias 2003, Meleason et al. 2003, Sobota et al. 2006). For the DEIS and FEIS analysis, the application of this framework was extended to include a spatially explicit framework with additional inputs for landsliding and debris flow. This greatly expanded the number of factors that affect model results to include basin topography and channel network structure. The model is sensitive to the spatial distribution of forest stand types to management strategies that alter that spatial distribution. Applying the model to different management alternatives provides an indication of sensitivity to changes in the spatial distribution of stand types. The wood delivery model was also revised for the FEIS to include sensitivity analysis for the effects of forest stand growth on debris flow recurrence and potential wood contribution.

In terms of model validation, the distribution of tree fall directions is based on empirical model components from (Sobota et al 2006) and calibrated to Oregon data. The debris flow model relies on empirical modeling described in Miller and Burnett (2007a), which was calibrated in the Oregon Coast Range, Cascades and Klamath Provinces. The debris flow model also relies on an empirical model of debris-flow runout described in Miller and Burnett (2007a) and calibrated to data from the Oregon Department of Forestry 1996 Storm Study (Robison et al. 1999). Estimates of channel extent, channel width, and floodplain extent were based on digital elevation data using empirical models described in Clark, Burnett and Miller (2008). Although validation of model predictions (potential wood contribution) has not been completed as part of this analysis, this is not necessarily a shortcoming in use of the model for the analysis. The wood delivery model is used to estimate the potential wood contribution based on forest stand conditions and is not used to predict actual instream conditions for a given time period. Even in the absence of field validation, the modeled predictions provide sophisticated tools to evaluate the topographic attributes that affect the debris-flow extent across the plan area and how the magnitude and contribution of wood delivered from these sources vary between alternatives; such comparisons were largely unavailable prior to development of this analytical tool.

Although modifying key assumptions to evaluate difference in model outcomes may be appropriate in scientific research, it is not directed by the Council on Environmental Quality regulation for implementing the National Environmental Policy Act, nor would it help in providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14). Agencies are directed to conduct their analyses based on actions and effects that are "reasonably foreseeable" (40 CFR 1502.22(b), 40 CFR 1508.7), rather than varying assumptions about uncertain actions and effects. Additionally, the FEIS has been revised to include additional information regarding any modeling uncertainties, errors, biases, assumptions and validation.

163. Comment: The EIS should clarify if the wood recruitment models were developed for this analysis as stated on Page H-1084, or if the method published in Miller and Burnett 2007 was used as stated in the beginning of the section.

Response: Components of previously published models and scientific studies (Miller and Burnett 2007) were used in the development of the wood delivery model developed for the DEIS and FEIS analysis by Dan Miller (Earth Systems Institute). The 10-meter Digital Elevation Model (DEM) debris flow initiation and runout model portion of the model is described in Miller and Burnett (2007), but was expanded from the initial Coast Range work and calibrated to accommodate the extent of the Western Oregon Plan Revision planning area for this analysis. The FEIS has been clarified to reflect this information.

164. Comment: The EIS should be revised to include sensitivity analysis of the numeric values chosen for any of the various key model parameters, because this data is critical to understanding the merits and consequences of model predictions, even more so when several models are used together in ways that can compound their strengths and weaknesses. As case in point: the range of value for habitat vs. coho smolt production is highly variable geographically and year to year; therefore, a geometric mean might result in erroneous assumptions.

Response: The fish productivity index has been removed from the FEIS analysis. The riparian tree-fall portion of the wood recruitment model has been discussed at length in the literature with evaluations of model sensitivity to parameters such as channel width, riparian management area width, channel-adjacent slope gradient, and riparian stand characteristics (Robison and Beschta 1990, Van Sickle and Gregory 1990, Beechie et al. 2000, Bragg 2000, Benda and Sias 2003, Meleason et al. 2003, Sobota et al. 2006). For the EIS analysis, the application of this framework was extended to include a spatially explicit framework with additional inputs for landsliding and debris flow. This greatly expanded the number of factors that affect model results to include basin topography and channel network structure. The model is sensitive to the spatial distribution of forest stand types to management strategies that alter that spatial distribution. Applying the model to different management alternatives provides an indication of sensitivity to changes in the spatial distribution of stand types. The wood delivery model was also revised for the FEIS to include sensitivity analysis for the effects of forest stand growth on debris flow recurrence and potential wood contribution. The FEIS has been revised to include a more thorough description of the sensitivity analysis, model parameters, and modeling assumptions.

165. Comment: Further explanation and evidence should be added to support the statement "differences among the alternatives, in terms of fish productivity, would be less than 3%" and to support the information about fish habitat.

Response: The fish productivity index has been removed from the FEIS analysis.

166. Comment: The EIS should discuss impacts on the survival and recovery of Oregon Coastal Coho Salmon Evolutionary Significant Unit and Southern Oregon Northern California Coho Salmon ESU. The WOPR action Alternatives are most similar to Alternatives 7 and 8 in the Final Supplemental Environmental

Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl (USDA and USDI 1994b) and Alternatives A, B, C in the Medford District Proposed Resource Management Plan and Final Environmental Impact Statement (USDI, BLM 1994e; see p.xix for comparisons of Riparian Management Area Protections and narrative comparisons on p. 4-19). These FEIS's made scientifically credible comparisons between alternatives that contained all aspects of the Aquatic Conservation Strategy (WOPR No Action with ACS) and alternatives which primarily rely on minimized riparian protective buffers (WOPR action alternatives).

Response: The EIS analyzes the effects of the alternatives on aquatic habitat for all fish species in the planning area, including Oregon Coast Coho salmon and Southern Oregon Northern California Coho. The FEIS analysis uses scientific information and analytical tools that were not available in 1994 for the Northwest Forest Plan analysis. It would be inappropriate to incorporate an analysis completed 14 years ago for alternatives that do not match the alternatives analyzed in this EIS and that fail to address new information and scientific analyses.

167. Comment: The EIS environmental consequences for Fish should be revised to provide an integrated discussion that determines compliance with the ESA because legal compliance with the ESA for listed fish species is currently based on compliance with the Aquatic Conservation Strategy (ACS), which is not discussed in the EIS and BLM projects are legally required to meet all ACS objectives.

Response: Management actions implemented under the FEIS would not be legally required to meet ACS objectives. Demonstrating compliance with the Aquatic Conservation Strategy objectives to ensure compliance with the Endangered Species Act (ESA) for listed fish species is not a statutory or regulatory requirement. Rather, compliance with the ACS objectives is a requirement only under Northwest Forest Plan, which is neither a statute nor regulation.

The Endangered Species Act requires the BLM to consult on actions authorized, funded, or carried out to ensure they do not jeopardize any listed species or destroy or adversely modify designated critical habitat. The BLM will meet this requirement by consulting under section 7(a)(2) of the Endangered Species Act with the regulatory agencies (USFWS and NMFS).

168. Comment: The modeling inappropriately uses large wood as a surrogate for fish production, which is not adequate for providing certainty of protection for ESA listed species.

Response: The FEIS analysis regarding the effects of the alternatives on fish habitat and fish populations has been revised, and the fish productivity index was dropped from the FEIS analysis.

169. Comment: The analysis of environmental consequences to fish is flawed because the analysis decouples sediment and stream temperature impacts from logging which eliminates numeric negative "multipliers" from logging.

Response: The FEIS analysis focused on the ecosystem process that affects fish habitat and fish populations including: large wood delivery, fine sediment delivery, stream temperature, and peak flows. The analysis did not separate sediment and stream temperature impacts from timber harvest. Rather, each component of the analysis relied on the forest stand projections that accounted for timber harvest over time under each alternative, and the effects on these aquatic ecosystem components are shown.

170. Comment: The analysis of environmental consequences to fish is flawed because it is inconsistent with the analytical assumptions and conclusions of the series of BLM 1994 programmatic impact statements which showed differences among alternatives with respect to the impact analysis for salmonids due to substantial differences in amounts of riparian protection from logging.

Response: The analysis completed for the NWFP used a delphi, outcome-based scale methodology to determine the range of possible aquatic habitat trends and future habitat conditions on federal land and the likelihood of attaining a set of habitat outcomes for each fish population. The FEMAT (1993) acknowledged that the Northwest Forest Plan viability assessment did not directly correspond to the actual population viability of the species since limited science existed to establish direct relationships between land-management actions and population viability (FEMAT 1993).

Since 1994, analytical tools have become available that greatly increase the ability to project forest conditions and determine the outcomes for aquatic habitat under management scenarios. The FEIS analysis does not correlate the condition of the aquatic habitat over time to the viability of fish populations, because analytical tools to assess population viability are limited at the scale of the Western Oregon Plan Revision planning area. Unlike the analysis completed for the current (1995) RMPs/EISs, the FEIS analysis utilizes new scientifically credible analytical tools and other updated scientific methods that can be used to make direct correlations between the effects of the PRMP Alternative and the other action alternatives on aquatic habitat that was not possible at the time of the current (1995) RMPs. Although many of these correlations are based on extrapolations of data to the planning area, the FEIS analysis provides a greater ability, beyond what was available in previous analysis, to evaluate future conditions and process rates, and is far more comprehensive than other existing wood delivery models (Reeves 2005).

171. Comment: The EIS should clearly state whether risk of salmonid extirpation increases or not due to (1) poor riparian protection standards and (2) no restraint on road building, which exist when the management of BLM lands and private lands are intermingled.

Response: The FEIS includes a cumulative effects analysis for fish habitat and fish productivity, which includes an assessment of the effects of various riparian management actions and road construction activities for each alternative relative to land ownership patterns. The premise in the comment that under the alternatives the riparian protection standards would be poor and that there would be no restraints on road building is false. The EIS analysis does not show the deleterious effects implied in the commenter's presumption. In analyzing effects of road building, the EIS analysis must be based on what is reasonably foreseeable. On the intermingled BLM and private lands, the road systems providing access to these lands are already in place and have been for many decades. The EIS analysis must assume that private landowners will abide by laws and regulations, rather than the commenter's presumption that they will be unrestrained. The EIS analysis is based on the likely levels of road construction, which in turn is based on historical experience over the past few decades, rather than unsupported speculation.

The FEIS concludes that the contribution to fish habitat, including salmonids and fish productivity, would increase from BLM-administered lands under the PRMP Alternative in the FEIS. Therefore, the risk of extirpation would decrease under the PRMP.

172. Comment: The EIS should quantify or evaluate the impact of fine sediment from OHV use to salmonids.

Response: The DEIS and FEIS included a qualitative analysis to evaluate the impact of fine sediment from off-highway vehicle use on fish habitat. The environmental conclusions regarding the effects of fine sediment on fish habitat in the DEIS and FEIS concluded that, compared to the current condition, fine sediment delivery to stream channels would be reduced under the PRMP Alternative and the other action alternatives, since a more restrictive OHV-use designation has been adopted under the PRMP and the other action alternatives, and because the Best Management Practices in the FEIS include measures to minimize or eliminate effects to water quality from OHV activities. Under the PRMP Alternative and the other action alternatives, OHV area designations would move from "open use" designation (under No Action) to "limited" or "closed," where off-highway vehicle activities would be limited to existing roads and trails.

A quantitative analysis on the fine sediment effects from off-highway vehicle use is not possible at the scale of the Western Oregon Plan Revision planning area, since designated trail and road locations, proximity to stream channels, OHV use levels, and season of OHV use is unknown. Additionally, off-highway vehicle use would be the same under the PRMP Alternative and all other action alternatives, and would only differ in the No Action Alternative. The qualitative analysis used to evaluate the impacts was sufficient to compare the effects of off-highway vehicle use on fish habitat between alternatives, particularly since OHV use did not vary between the PRMP and action alternatives.

173. Comment: The EIS should be revised to include streambed scour and fill as an important mortality factor for egg-to-fry survival of fall spawning salmonids, as scouring flows may scour out and kill incubating salmonid eggs, in particular the coho salmon population in Evans Creek.

Response: Determining the amount of streambed scour and fill is a reach level analysis. Analyzing reach level effects at the scale of the planning area would not be appropriate because: 1) Whether an increase in peak flows translates to an increase in stream bed scour depends on the channel type and existing substrate of the stream reach. Including channel type and stream bed information for all streams within the planning area is not possible, nor is the data available. 2) Analyzing reach-specific impacts at the planning area would require speculation about other actions taking place at the time of the project-level actions and weather conditions during the period of hydrologic recovery.

Additionally, the filling and scouring of stream channels does not correlate well with increases in peak flows. Stream filling does not happen at higher stream flows, but rather in low velocity areas at stream margins or during the recession of stream flows. Although, the FEIS identifies four sixth-field watersheds (<1%) that are susceptible to peak flows, it does not imply that adverse impacts to stream channels would occur for the following reason: (1) The majority of stream channels on BLM-administered lands in the planning area are small headwater channels where streambed material is collected and transported downstream, rather than along lower gradient alluvial channels where streambed material is stored and scour and fill typically occur (Grant et al. 2008). Site-specific information regarding stream types and the resistance of each channel reach to flows would need to be considered during subsequent NEPA analysis where peak flows and scour and fill are issues requiring analysis.

174. Comment: The EIS should revise the peak flow impacts to fish and analyze much smaller watersheds where coho salmon are known to spawn (e.g., upper West Evans Creek), and analyze areas where watershed analyses have identified peak flows from rain-on-snow as a threat.

Response: The FEIS analyzes peak flow impacts at the smaller sixth-field subwatersheds (a U.S.Geological Survey hydrologic unit) scale, because they are small enough areas to capture the patterns of BLM forest lands and because tributary streams are more sensitive to vegetation and runoff-related changes. The FEIS identifies the susceptible sixth-field sub-watersheds to peak flow increases in both rain-dominated and rain-on-snow hydroregions. The sixth-field sub-watersheds identified in the FEIS as "susceptible" to peak flow increases in the rain-on-snow hydroregion do not match those identified in previous watershed analysis. Watershed analysis generally relied either on the Equivalent Clear-cut Acre (ECA) method to determine where increases in peak flow would occur, or considered all rain-on-snow watersheds to be susceptible to increases in peak flows. Although this ECA method may be useful in the rain-dominated hydroregion, since response is roughly proportional to area harvested, merely tallying acres of harvest in a watershed does not address the underlying mechanisms of how snow accumulates and melts in the rain-on-snow hydroregion.

The vertical and horizontal dimensions of forest openings and their size, as well as their distribution and juxtaposition at the stand level, are sensitive to snow accumulation and melt processes (Harr and Coffin 1992). In this hydroregion, melt is enhanced by energy released from condensation of moisture onto snowpacks during warm and windy weather. This relationship is scaled by size; there are greater wind speeds in larger openings that promote the process (Harr and McCorison 1979).

Since watershed analyses were completed, new scientific methods have become available to better evaluate the watersheds that are susceptible to increases in peak flows in the rain-on-snow hydroregions. The peak flow analysis in the FEIS is a more reliable and current method compared to ECA, because it utilizes an empirical analytical technique to identify susceptible subwatersheds to peak flow increase within the rain-on-snow hydroregion. This technique is patterned after the Washington State Department of Natural Resources hydrologic change watershed analysis methodology (Washington State DNR 1997a). The peak flow analysis is based on up-to-date published regression equations to generate a winter snowpack (Greenburg and Welch 1988) that relates to snow accumulation by elevation using the snow telemetry (SNOWTEL) data from the National Resources Conservation Service; basin characteristic regression analysis with gauged watersheds that have long-term records (Harris et al. 1979); flood frequency equations; GIS spatial analysis; satellite imagery for non-BLM-administered lands; and snowmelt equations from the U.S. Army Corps of Engineers (USACE 1956, 1998).

175. Comment: The EIS should evaluate the impacts to fish from episodic land-sliding and elevated sediment transport in the action alternatives because several large storm events are certain to occur on lands denuded by logging and road-building. Models for mass erosion and threshold for fish impacts are “available information” as defined by NEPA in previous BLM impact statements that analyze logging and road building impacts to fish.

Response: The susceptibility of landsliding from forest management in the Timber Management Area has been modeled in the FEIS, using a state-of-the-art geomorphological methodology (Miller and Benda 2005). The procedure determines susceptibility of shallow colluvial landsliding and delivery to a stream channel and the subsequent results to fish habitat. (Refer also to comment 101).

176. Comment: The treatment of debris flows is biased in the DEIS because the models used in analyzing potential debris flows favored those area that would provide beneficial large wood to streams (DEIS, pages 732 and 1,089) and ignored those areas where shallow landsliding harmful to fish would occur in logged areas. The intermittent stream channels with the highest probability of debris flows to fish bearing stream channels (DEIS, page 732) are not protected with 100 ft no cut buffers unless they were “stream channels that are below unstable headwalls (as identified by the timber production capability classification (TPPC) codes indicating significant instability (i.e. FGNW, FPNW, and FGR2).” See DEIS:80 footnote 4. This will create inevitable sediment impacts to fish since there will be streams at high risk for contributing huge amounts of fish killing sediment as evidenced by photos from Seattle Times and numerous case studies (Frisell 1992, FEMAT V-19) that will not be protected with 100 ft no cut buffers. In addition, the BLM’s use of timber production capability classification (TPCC) to identify areas that would periodically deliver large wood to streams is flawed.

Response: The debris flow component of the wood delivery model is not based in any way on TPCC, but rather with a highly detailed 10-meter Digital Elevation Model topographical analysis that identified landslide initiation sites across the entire planning area. This analysis determines the susceptibility of every 10-meter Digital Elevation Model pixel to deliver small and large wood to fish-bearing and non-fish-bearing stream channels. Additionally, the PRMP Alternative of the FEIS includes a one-half site potential tree height distance and one site potential tree height distance Riparian Management Area along all streams, which increased the Riparian Management Area width from the preferred alternative in the DEIS.

177. Comment: The EIS should adequately describe or quantify impacts to fish and fish habitat from earthflows because earthflows are a second type of mass movement quite different from debris flows. Once activated, the earthflow can deliver sediment directly to stream channels for years if not decades, and chronic sediment from earthflows is particularly damaging to fish and fish habitat. "Occasional failures" identified in the DEIS could be catastrophic for specific populations of coho salmon.

Response: The location and susceptibility of all shallow landslides, including debris flows, was modeled for the DEIS and FEIS analysis. The location of deep seated landslides, including earthflows, was not included in the DEIS or FEIS analysis. There are no existing models or scientific literature that provides the ability to predict deep seated landslide locations, behaviors, or how management would affect the susceptibility. Preliminary research is being done for the Tyee-Sandstone geographic region, but is too preliminary to be extrapolated outside of the Tyee-Sandstone region, nor does it provide the ability to determine the response of timber harvest on the susceptibility of failure. Additionally, the FEIS has been revised to include additional analysis on the effect of land stability at a watershed-scale. That analysis is based on forest stand projections using a GIS-based mass wasting hazard model (Miller and Burnet 2007) to estimate debris flow susceptibility and the relative amount that would occur within the Timber Management Area outside of the TPCC withdrawn areas and the relative effects to aquatic habitat.

178. Comment: The EIS should be revised to analyze impacts on the expected viability of coho salmon in West Evans Creek and other locations where it is federally listed, because the data from various BLM and state watershed analyses conclude that the viability of coho in West Evans watershed is at risk of extirpation because of logging related sediment, which would increase under the WOPR action alternatives.

Response: Background rates of sediment in stream channels vary between watersheds. Within the planning area, some watersheds function with higher background rates of sediment than others. The Evans Creek Watershed was used as an example to show that in some cases viable fish populations continue to exist within stream channels with higher levels of fine sediment. This discussion has been revised in the FEIS for additional clarity.

179. Comment: The EIS should include an analysis of the adverse impacts that suction dredge mining disturbance has on fall-spawning salmonids, such as the coho salmon. Egg-to-fry survival decreases regardless of the size of suction dredge.

Response: Table 290 of the DEIS is a scenario. The actual future locations of where the suction dredging would occur are unknown. Because programmatic, ongoing activities (i.e., suction dredging, road rights-of-way, etc.) would occur at the same rate under all alternatives, and because it is impossible to predict at the plan-level scale where these activities would occur in the future, the site-specific effects of these actions on aquatic habitat and fish populations will be analyzed in setting the context for determining the cumulative effects of subsequent project-scale NEPA analysis.

180. Comment: The EIS should analyze Oregon's requirement, where salmon spawning and rearing is a designated beneficial use, and in which the surface water temperature exceeds 64 degrees Fahrenheit, to allow no measurable surface temperature increase from anthropogenic activities.

Response: The DEIS and FEIS contain a detailed analysis of stream shade and temperature and the effects to fish populations using the Oregon Department of Environmental Quality's water temperature criteria and standards for fish species within the plan area. The analysis of environmental consequences in the FEIS for the PRMP Alternative and the other action alternatives conclude that management actions occurring on BLM-administered lands would not contribute to an increase in stream temperature.

181. Comment: The EIS should include analysis about how large wood should be balanced with some disturbance near the stream to increase light and primary production to create “hot spots” in order to benefit to fish populations.

Response: The FEIS has been revised to include an analysis of the effect of increased light near stream channels and subsequent effects on primary production and fish species.

182. Comment: The EIS should specify which fish passage standards for new and replacement culverts the BLM will use.

Response: The objective of providing fish passage is clearly stated in the FEIS. Specifics of fish passage and stream crossing design would occur at the project implementation stage of the resource management plan. Determining project-level protective measures and specifications at the scale of the planning area would be inappropriate because it would eliminate flexibility needed to adapt to site-specific conditions. Therefore, detailed specifications and protective measures based on applicable fish passage standards would be incorporated at the project scale.

183. Comment: The analysis of sediment impacts to anadromous fish and their habitat is flawed because it describes a linear comparison that equates the increase in stream sediment (1%) to a decrease in fish survival (3.4%). The assumption that this relationship is linear and can be applied universally across the planning area is oversimplified and flawed. In addition, the DEIS states (page 741) that fine sediment delivery analysis will focus on changes in sediment that would “overwhelm the ability of fish to cope with or avoid the stress” of sediment. There is no such analysis described in the DEIS.

Response: A linear, inverse relationship between fine sediment and the effects on fish species has been documented frequently since the 1960s (Bjornn 1968, Phillips et al. 1975, Cederholm et al. 1981) and more recently (Suttle et al. 2004). For this analysis, sediment yields to stream channels are expressed as tons/mile/year for each fifth-field watershed. Since this output (tons/year) cannot be directly equated to a percent embeddness, the thresholds and assumptions from Cederholm and co-authors (1981) provide the utility of a relative increase method to evaluate the differences between the action alternatives, including the PRMP Alternative. The DEIS and FEIS sediment analysis utilize this particular threshold to determine where increases in fine sediment would overwhelm the ability of fish to cope with stress or to avoid stress. The FEIS has also been revised to include an analysis of the non-lethal physiological effects that may occur to fish species below this threshold.

184. Comment: The DEIS (page 741) contends that “thresholds have not been established for the levels of sediment that would cause impairment to fish”. There is a wealth of literature on the effects of fine sediment and aquatic organisms including salmon (Suttle et al. 2004). It is possible to establish targets that avoid most sediment impacts to salmonid fish, their forage organisms, and their habitat.

Response: The FEIS has been revised to reflect this information and to include an analysis of the non-lethal physiological effects that may occur to fish species below these thresholds.

185. Comment: The DEIS conclusion that there will be no effect to fish populations from increased sediment loads is flawed because it is based on an assumption that no additional landslides would occur under increased intensity of land management due to the use of the TPCC. This DEIS conclusion is also flawed because it relies on optional BMPs and the ability of fish to avoid turbidity. Relying on optional practices and potential avoidance behavior of fish is not a reasonable basis to base the conclusion that anadromous fish and their habitat will not be affected by sediment.

Response: The environmental consequences under the DEIS and FEIS are not only based on the landslide analysis, but other variables as well. However, the FEIS has been revised to include additional analysis on the effect of land stability at a watershed scale based on forest stand projections using a GIS-based mass wasting hazard model (Miller and Burnett 2007) to estimate the susceptibility to shallow landsliding under the action alternatives, including the PRMP Alternative. The landslide model was used to determine the relative amount of unstable lands that would occur within the Timber Management Area outside of the Timber Productivity Capability Classification (TPCC) withdrawn areas and the relative effects to aquatic habitat.

The use of Best Management Practices is not optional; rather, the RMP will direct managers to use appropriate BMPs in designing projects that would be used to maintain water quality standards.

The DEIS and FEIS discuss the direct effects of fine sediment (substrate) and increased concentrations of suspended sediment (turbidity) and the direct effects on fish behavior.

The DEIS and FEIS point out that it is well known that fish have the ability to avoid high concentrations of suspended sediment (Hicks et al. 1991); however, the conclusions were not entirely based on this assumption. The analysis of environmental consequences in the DEIS and for the PRMP Alternative in the FEIS concluded that the timing and magnitude of increased suspended sediment has the greatest effect on fish species; and that activities under all alternatives would increase suspended sediment during low flow periods when fish are most vulnerable. The analysis of environmental consequences in the FEIS also concluded that these effects would be short term and localized because of the application of Best Management Practices and the local nature of the activities. This discussion in the FEIS has been strengthened with a more thorough description of the direct effects to fish species from suspended sediment.

186. Comment: The preferred alternative is likely to increase water temperature in fish bearing streams. This will result in increased adult mortality of salmonids, reduced growth of alevins and juveniles, reduced competitive success with non-salmonid fish, out-migration from unsuitable areas, increased disease virulence, delay, prevention or reversal of smoltification and potentially harmful interactions with other habitat stressors.

Response: The analysis of environmental consequences of the DEIS concluded that stream shade would be insufficient to maintain stream temperatures only within the Management Area Adjacent to the Coquille Forest land use allocation. However, the Coquille Tribal Management Area, which is included in Alternatives 2 and 3, has not been included in the PRMP Alternative in the FEIS. The analysis of environmental consequences in the FEIS concludes, as did the analysis in the DEIS, that management on BLM-administered lands would not contribute to an increase of stream temperatures under the PRMP Alternative and the action alternatives, except in the Management Area Adjacent to the Coquille Forest land use allocation under Alternatives 2 and 3.

187. Comment: The DEIS also asserts (page 763) that shallow landslides will not increase over the next 10 years under any alternative because of the TPCC, and because of site-specific review of proposed activities. However, the DEIS has not provided information about the effectiveness of the TPCC withdrawals, or about the procedures, decision criteria, and effectiveness of the site-specific reviews. Because of the increased amount of timber harvesting under Alternative 2, NMFS assumes the risks of sedimentation from landslides will also increase.

The EIS should disclose potential effects related to the effectiveness of the TPCC withdrawals, the risks of egg to fry survival of anadromous fish from probable increases in sedimentation, degradation of interstitial habitat that support rearing juveniles, and decreases in production of invertebrate forage organisms in affected stream reaches.

Response: The FEIS has been revised to include additional analysis on the effect of land stability at a watershed scale, based on forest stand projections using a GIS-based mass wasting hazard model (Miller and Burnett 2007) to estimate the susceptibility to shallow landsliding under the PRMP Alternative and all other alternatives. Additionally, the DEIS and FEIS include a thorough analysis of fine sediment delivery to stream channels and the effects to fish species including: egg to fry survival (Cederholm et al. 1981), degradation of interstitial habitat, and decreases of forage (Suttle et al. 2004). Additionally, a riparian management strategy with wider riparian management areas and with more restrictive management direction than that for Alternative 2, which was identified as the preferred alternative in the DEIS, has been adopted in the PRMP Alternative in the FEIS.

The FEIS has been revised to include additional analysis on the effect of land stability and forest stand projects under the PRMP Alternative and other action alternatives using the Miller model developed for the plan area (based on Miller and Benda 2005). The analysis determines the susceptibility of 10-meter Digital Elevation Models to shallow colluvial landsliding.

188. Comment: The EIS should be revised to consider the effects of the alternatives on other factors limiting fish populations, such as water temperature, substrate sediment, and passage.

Response: The DEIS and FEIS analysis focused the analysis on those ecosystem processes that directly influence aquatic habitat and limiting factors for listed fish species in the planning area. The DEIS and FEIS used updated information from the National Marine Fisheries Service and Southwest Fisheries Science Centers biological review teams regarding limiting factors for listed salmon and steelhead ESUs/DPSs in the planning area (Good et al. 2005). Habitat degradation was determined to be a limiting factor for the majority of the ESUs/DPSs. Maintaining or increasing the amount of woody debris in stream channels is one of many factors analyzed relative to the effects on fish productivity, because it has been documented as an important factor in creating and maintaining habitat complexity that addresses this limiting factor.

For example, the Independent Multidisciplinary Science Team (IMST) and NMFS, as part of the Oregon Coastal Coho Assessment (2005), found that although a diverse set of conditions affect the viability of the ESU (water quality, ocean conditions, hatchery impacts, etc.), increasing freshwater habitat complexity provides the greatest opportunity to improve fish productivity of the ESU. Nickelson (1998) also documented in the Habitat-Based Assessment of Coho Salmon Production Potential and Spawner Escapement Needs for Oregon Coastal Stream's assessment that a large part of the recovery process of coho salmon involves improvements in the habitat conditions in fresh water. As did the DEIS, the FEIS also includes a thorough analysis on the other limiting factors for fish populations, including the effects of fine sediment delivery, water temperature, peak flows, nutrient input, and aquatic restoration activities (e.g., fish passage) on fish habitat and populations for the PRMP Alternative and the other action alternatives.

189. Comment: The EIS should disclose the effects of eliminating the Aquatic Conservation System (ACS) on BLM Lands, which was designed to provide for the survival of at-risk resident and anadromous fish populations in the face of a severely degraded environmental baseline. The BLM should conduct a viability analysis similar to that done in the NWFP for seven stocks of salmonids to determine the percent likelihood that populations would be well distributed, be restricted to refugia or extirpated under each alternative.

Response: The Aquatic Conservation Strategy (ACS) was a region-wide strategy designed to protect those processes and land forms that contribute habitat elements to streams and promote good habitat conditions for fish and other aquatic organisms (FEMAT 1993), which is a component only of the No Action Alternative. The FEMAT (1993) recognized that other aquatic conservation strategies are also effective to maintain and restore aquatic habitat. The Riparian Management Area objectives in the action alternatives are designed to provide for the survival and recovery of listed fish populations in the planning area. The FEIS fully discloses the effects to fish populations for the No Action Alternative, which utilized the Aquatic Conservation Strategy, and for the PRMP Alternative and other alternatives. The analysis of environmental consequences for the PRMP Alternative in the FEIS concludes that the PRMP would provide for the survival and recovery of fish populations over time.

The viability assessment done for the Northwest Forest Plan used a delphi, outcome-based scale methodology to determine the range of possible aquatic habitat trends and future habitat conditions on federal land and the likelihood of attaining a set of habitat outcomes for each fish population. The FEMAT (1993) acknowledged that the Northwest Forest Plan viability assessment did not directly correspond to the actual population viability of the species since limited science existed to establish direct relationships between land management actions and population viability (FEMAT 1993). However, since 1993, existing science and analytical tools has greatly increased the ability to project forest conditions and to determine the outcomes for aquatic habitat under management scenarios. However, analytical tools are limited at the scale of the Western Oregon Plan Revision to correlate the condition of the aquatic habitat over time to the viability of fish populations. Unlike the analysis completed for the Northwest Forest Plan, the FEIS analyses utilized sophisticated GIS, forest growth modeling, 10-meter Digital Elevation Model (DEM) analysis, and other scientific methods to make direct correlations between the effects of the PRMP Alternative and the other action alternatives on aquatic habitat. The BLM's obligation under NEPA, to describe the effects of BLM actions on aquatic habitat and fish species, has been fulfilled in the FEIS analysis.

190. Comment: The EIS should analyze the effects of the alternatives on the Lost River and shortnosed suckers, bull trout, McKenzie River bull trout populations, and Oregon chub which are species listed as Endangered under the ESA as well as special status fish species.

Response: The FEIS analyzes the effects of the alternatives for all fish species in the plan area. The FEIS includes a thorough analysis and discussion of the affected environment, current habitat condition, species status, existing and historical distribution, and effects of the alternatives for all threatened and endangered fish species in the plan area including the Lost River and short-nose suckers and bull trout. The FEIS acknowledges that the requirements for habitat and the responses to habitat changes vary by fish species and the life history stage of the species. However, the habitat requirements for fish species within the planning area are similar enough to permit an analysis of the effects for all aquatic and fish species together. Therefore, a species-specific analysis and discussion was unnecessary. The Columbia River chum salmon and the Oregon chub do not occur on BLM-administered lands in the planning area; and management activities occurring on BLM-administered lands would not affect these species. The FEIS has been revised for clarity to reflect this information.

191. Comment: The EIS conclusions regarding forest activity effects on downstream water temperature are flawed because the EIS discounts the importance of both site-specific and cumulative effects from forest practices, which is contrary to the scientific literature and extensive temperature assessment efforts completed as part of DEQ's total maximum daily loads.

Response: The FEIS does not discount the effects of forest practices on water temperature. The FEIS documents the science used to design Riparian Management Areas in the alternatives (*Chapter 3,* Water section). Further, the analysis of environmental consequences in the FEIS concludes that the levels of shade retention are expected to meet water quality standards and non-point source Total Maximum Daily Load (TMDL) waste-load allocations under all alternatives. Additionally, the Oregon Department of Environmental Quality's core cold water designations have been included in the FEIS.

192. Comment: The EIS should be revised to clarify what method was used for the Fish Productivity Model, and the EIS should disclose any peer review of validation of the Lawson model.

Response: Because of concerns by scientists, the fish productivity index has been removed from the FEIS analysis. Additionally, the FEIS has been revised to include a more detailed description of the analytical methods and assumptions used for the analysis.

193. Comment: The EIS should be revised to identify the Oregon Coast Coho Salmon Evolutionary Significant Unit as threatened.

Response: Because the Oregon Coast Coho Salmon ESU was listed under the Endangered Species Act subsequent to preparation of the DEIS, the FEIS has been revised to include the Oregon Coast Coho Salmon as a listed fish within the planning area.

194. Comment: The BLM should run the large wood delivery model with different assumptions and input variables to include smaller minimum tree diameters, higher site-potential tree heights, and different distances from debris-flow prone streams over which trees can be incorporated into debris flows.
Response: Based on interaction with Pacific Northwest Research Station Scientists, the Western Oregon Plan Revision Science Team, and National Marine Fisheries Service, the input variables for the wood delivery model were revised for the FEIS analysis to include: 1) the contribution of smaller wood, based on correlations from Beechie et al. (2000), to fish-bearing and non-fish-bearing stream channels; 2) highly detailed stand-level tree height information for each 10-meter Digital Elevation Model (DEM) pixel to determine site-potential tree height.

For the debris flow modeling, the model assumes that all standing trees and downed wood within a debris flow track will be incorporated into the debris flow delivery. The modeling assumption is that downed wood accumulates within a tree height of the stream channel, and that the debris flow tracks are six meters wide, which is the average width reported for debris flows in the Oregon Department of Forestry's 1996 storm study (Robison et al. 1999). Because the model examines every possible debris flow track traced on the DEM, starting from every DEM cell with landslide susceptibility greater than zero, the model effectively includes all potential wood sources to debris flows that can be resolved with the Digital Elevation Model.

Water

195. Comment: The EIS should disclose the specific strategies and action that the BLM will use to replace each aspect or component of the Aquatic Conservation Strategy and components that are not specifically part of the Aquatic Conservation Strategy, but that were intended to further the goals of the Aquatic Conservation Strategy

Response: The Aquatic Conservation Strategy is part of the land use allocations and management direction of Northwest Forest Plan that this RMP revision proposes to replace. The action alternatives were not designed to accomplish each aspect or component of the Aquatic Conservation Strategy, because the purpose of this RMP revision differs from the purpose of the Northwest Forest Plan. The Draft EIS analyzed the effect of each alternative on various resources, including fish, water, and aquatic and riparian special status species. This provides a basis for comparing the effects of the No Action Alternative (which includes the Aquatic Conservation Strategy) with the action alternatives.

196. Comment: The EIS should be revised to fully discuss the ecological role of BLM lands within areas of mixed ownership including an examination of all potential sediment sources, including roads currently excluded from analysis, harvest activity, debris flow, and blowdown.

Response: The Draft EIS analyzed the ecological role of BLM-administered lands within areas of mixed ownerships. For many resources, the Draft EIS analyzed conditions both on BLM-administered lands and across all ownerships with unprecedented detail and quantification. Specifically, the analyses of sediment included the effects of activities across all ownerships. It is not possible to model activities on other ownerships with the same degree of precision and accuracy as the analysis models activities on BLM-administered lands. However, the analysis of the cumulative effects of the BLM action together with actions on other ownerships is sufficient to compare the effects of the alternatives.

197. Comment: Table 211 of the DEIS should be revised to include clearcutting on non-federal lands. The action alternatives are very likely to push watersheds over thresholds of concern for peak flows.

Response: The analysis considers the effects of management actions on all lands, including non-federal lands. The data are separated for the rain and rain-on-snow hydroregions (refer to the FEIS, *Chapter 3*-Water section, and *Appendix I-Water*, Analytical Questions 1 and 2). Table 211 in the Draft EIS shows the projected BLM stand establishment acres for each time period by alternative. There is no similar reference for the variability of harvest from private lands, as such information is proprietary or market driven. For all non-federal lands, the BLM relied on satellite imagery to develop acres of open conditions (similar to stand establishment), and then compiled this information by hydroregion and particular methodology to determine the likely effect on peak flow for the alternative projections.

198. Comment: The DEIS should be revised to explain the derivation of the ground cover correction factor that applies to cut and fill slopes. Without knowing where the vegetation cover data came from, it is impossible to evaluate the accuracy of the final vegetation correction factor layer.

Response: The ground cover correction factor data were supplied by district hydrologists who are familiar with each watershed; they used a combination of district knowledge, aerial photography, and satellite imagery. A public set of aerial photography is available for copying at each district office. The Interagency Vegetation Mapping Project using satellite imagery was a collaborative effort between the United Sates Forest Service (USFS) and the (BLM). Imagery can be obtained at: http://www.blm.gov/or/gis/data-details.php?theme=dt000003&grp=IVMP&data=ds000103. The ground cover correction factors that were used are included in the FEIS, in *Appendix I-Water*.

199. Comment: Alternatives 2 and 3 in the DEIS should be revised because they lack a sound scientific basis for the aquatic/riparian strategy. Alternatives 2 and 3 would have substantial, long-term impacts to water quality and exacerbation of current exceedances of water quality standards in streams listed as impaired under Section 303(d) of the Clean Water Act (impaired waters) are anticipated. Other issues include significant impacts to drinking water and aquatic species that could be corrected by project modification or choosing another feasible alternative. Direct, indirect and cumulative impacts would affect waters on both BLM and non-BLM lands.

Response: The BLM sees no substantive basis for these conclusions. It is well known that the primary water quality parameters of concern from forest management in Northwest streams are variations of stream temperature and deliverable sediment (Meehan 1991). Forest width and density of the Riparian Management Areas (RMAs) under the alternatives are structured to maintain fully shaded perennial streams, as well as provide an effective sediment filtration area along all stream channels. Under Alternatives 2 and 3, water quality would be fully protected because a sufficient forested Riparian Management Area of varying width from 25 to 100 feet would be retained along each side of all stream courses to meet water quality goals. In Alternative 2, the Riparian Management Area varies from 25 feet for intermittent streams, to 100 feet for perennial and debris flow streams. Contrast the design of the BLM Riparian Management Areas for these alternatives with private lands RMAs, where small streams are not required to include retained merchantable trees at all in the RMAs (versus 25 feet from the stream edge for BLM), and perennial streams are only required to maintain 20 feet of continuous retention from the stream edge (versus a minimum of 60 feet for BLM). The strategy for BLM invokes considerable greater riparian management areas and functionality, even though the Department of Environmental Quality found that RMAs on private forestlands in Oregon to be sufficient for water quality protection (ODF and DEQ 2002).

In addition to the BLM Riparian Management Area strategy, Best Management Practices would be applied to maintain water quality. For source water watersheds, this may involve having seasonal restrictions, limiting road development and stream crossings, controlling access, or taking other measures. Water quality in 303(d) listed waters would be maintained by Riparian Management Area design and Best Management Practices. Water Quality Restoration Plans coordinated between BLM and the Department of Environmental Quality would be followed, where Total Maximum Daily Loads (TMDLs) and waste-load allocations have been determined. Therefore, the BLM sees no significant impacts to drinking water or aquatic species, or furthering of 303(d) impairment under these alternatives.

200. Comment: The EIS predictions for steam temperatures should be revised based on the Heat Source model run by the environmental Protection Agency (EPA), which resulted in an increase substantially higher than the results reported in the Draft EIS (DEIS). The EPA conducted several temperature model runs for Canton Creek. Canton Creek is a temperature-impaired waterbody located in the Umpqua Basin for which a total maximum daily load (TMDL) was recently completed. We employed the Heat Source model used in development of the Umpqua TMDL to evaluate the temperature change resulting from the application of Alternatives 2 and 3. This modeling demonstrates that the application of Alternatives 2 and 3 would increase the 7-day average daily maximum (ADM) stream temperatures on Canton Creek over 0.7° F. This is substantially greater than the 0.2° F per mile temperature increase predicted by the DEIS (p. 750). Further, the EPA modeling results indicate that management on BLM lands under Alternatives 2 and 3 would increase instream temperatures on downstream “private” lands along Canton Creek.

Response: A point of clarification is that the Oregon Department of Environmental Quality (ODEQ) rather than the Environmental Protection Agency constructed a temperature report for the Western Oregon Plan Revision with Heat Source modeling runs using data from Canton Creek in the North Umpqua Subbasin (ODEQ 2007). Canton Creek is atypical because of “naturally occurring grassy meadows, wetlands, or open canopy forest” (ODEQ 2007). The simulations found the largest cumulative temperature increase (0.9° F) that would increase the 7-day average daily maximum, to occur in these areas, which is different than a typical, fully stocked, forested riparian management area.

Furthermore, BLM asserts there are various discrepancies within the simulations:

1) Reducing the model distance step from 328 feet (used in TMDL analysis) to 164 feet to increase model sensitivity may not be appropriate. If the distance step was not increased, the ODEQ 2007 shows error statistics of 1.0° F versus 1.6° F for the plan simulations. This error is greater than the predicted cumulative temperature increase. The simulations indicate multiple small spike elevations of stream temperatures above the TMDL load allocations and then sharp returns to the pre-existing

stream temperatures over very short distances (ODEQ 2007, Figures 10, 12 and 13). This suggests that the predicted stream temperature change is false (would not actually occur) because of the sharp temperature reversals not normally found in natural stream systems. Rather, it is more probable that as sensitivity is increased, error noise is also increased.

2) The 303(d) listed stream segments are normally listed from mouth to headwaters. Streams warm slowly in a downstream direction over long distances due to a variety of factors (e.g., stream turbulence and ambient air temperature). Conversely, small streams higher in the watershed that are typical of many BLM streams can recover when flowing from an opening into a downstream forest. The Oregon Department of Forestry and the Oregon Department of Environmental Quality (ODEQ) sufficiency analysis review of the Oregon Forest Practices Act (as reported by Dent and Walsh 1997) showed that by using Analysis of Variance statistical tests, the streams higher in watersheds showed a decrease in temperature 500 feet downstream of treatment, whereas streams lower in a watershed did not. Figures 10, 12, and 13 in ODEQ (2007) show this temperature reversal when proceeding from the simulation areas into system potential forest.

Reasonable measurement error of stream temperature with monitoring instruments (considered to be 0.9° F) has not been taken into account. The BLM suggests that a 0.9° F measurement error threshold level be shown on the ODEQ 2007 figures for comparison.

The spatial and temporal scale of the management activities would be far different than ODEQ 2007 modeled simulations. The BLM would not apply continuous treatments of thinning to 50% canopy closure in the secondary shade zones of Riparian Management Areas (RMAs), nor continuous RMA boundary regeneration harvests. Although BLM has shown that the RMA strategy in Alternatives 2 and 3 that provide 80% effective shade as a surrogate for stream temperature increases at an antidegredation level, the BLM spatially distributed pattern of harvest in watersheds within and adjacent to RMAs over time would provide an additional factor of safety.

201. Comment: The EIS should be revised to use the BLM inventory of riparian stream channels in its analysis, and should present data by appropriate watershed scales into functional condition classes.

Response: It is not practicable to use BLM inventory of specific riparian stream channels in the analysis of areas as broad as that of the Western Oregon Plan Revision, which is approximately 2.6 million acres. At the field level, the BLM may assess the condition of riparian areas by using the process for assessing Proper Functioning Condition (USDI BLM 1993) or similar methodology. These intensive inventories, involve field crews and specific funding, and have only been completed primarily on portions of the Medford District. The assessment data is on field forms and has not been assimilated in such a way as to make comparisons for broad areas possible. The usefulness of the assessments as a surrogate for the planning area is not practicable because of the breadth of data and replications required by the community type differences of riparian management areas on other districts. Factors that make meaningful comparisons problematic include: differing physiographic provinces, topography, riparian vegetative communities, valley bottom types, stream types, stream channel condition, and watershed condition.

202. Comment: The EIS should disclose how BLM plans to ensure the use of Best Management Practices (BMPs) to prevent significant water quality impacts, and should provide analytical data to support the effectiveness of the BMPs.

Response: The introduction to the Best Management Practices in the FEIS, *Appendix I-Wate*r, has been revised to show how BMPs would be typically selected and used. The BMPs are not designed to be an engineering handbook showing design specifications, nor provide analytical or monitoring details to prove effectiveness. Notwithstanding, the BMPs do provide stringent measures to maintain water quality. The BMPs have been developed by specialists over many years of field trials, adaptive learning from monitoring, and knowledge gained from specific research studies.

203. Comment: The EIS should disclose whether or not the models used analyzed the effect of timber harvest and road building on debris flows and landslides.

Response: Approximately 90,000 acres (3.5% of BLM-administered lands) are currently withdrawn due to land stability concerns under the BLM timber productivity capability classification (TPCC) inventory. Based on commenter inquiries, an additional assessment has been made to analyze the effect of land stability at a watershed scale from forest management projections of timber harvest and road building. Miller (2003), Miller and Benda (2005), and Miller and Burnett (2007) have developed a GIS-based mass wasting hazard model for western Oregon to estimate the susceptibility to shallow colluvial landsliding. This model was used to determine the relative density of unstable lands that 'as modeled" may occur in the harvest land base. The results of this analysis are presented in the FEIS, in *Chapter 4* (Water section). Because the TPCC inventory included ground reviews in addition to aerial photography interpretation, it is considered to be more accurate and reliable in mapping areas of instability, and is believed to have captured the most likely sites. However, Best Management Practices for soil and water protection (included in the FEIS, *Appendix I-Water*) require that project planning for a proposed harvest area include completion of geotechnical investigations. Where susceptibility to landsliding is indicated, criteria would be developed for adjustments to the manner or location of harvest and road building. If additional lands are found that would have high mass wasting potential, they would be added to the TPCC withdrawn areas.

204. Comment: The EIS should be revised to explain how the anti-degradation provisions of the State of Oregon's water quality standards would be met by each alternative.

Response: Oregon's rules on anti-degradation (OAR 340-41-0004) designate waters as either Outstanding Resource Waters (ORW), High Quality Waters, or Water Quality Limited Waters. There are no ORW on BLM-administered land in the planning area. High quality waters are maintained by meeting applicable numeric or narrative water quality criteria to meet standards by alternative design or by the application of best management practices. Water quality limited waters usually identified on 303(d) lists, become part of a basin scale Total Maximum Daily Load (TMDL).

Waste-load allocations for TMDLs are apportioned among basin landowners, depending on land condition, level of collaboration, and ability to contribute. A component of Oregon's TMDL process is Water Quality Restoration Plans (WQRPs). These management plans are coordinated between the agency and DEQ and specify passive or active restoration actions. To date, most of these plans involve stream temperature reduction and specify passive restoration actions over time necessary to achieve results. The applicable WQRP targets for the parameter of concern, such as stream temperature, are reviewed during project planning to identify actions necessary to meet milestones. This method is used to implement anti-degradation provisions on BLM-administered lands where there are 303(d) listed waters with a TMDL and WQRP.

205. Comment: The EIS should be revised to discuss whether or not BLM will seek NPDES permit(s), per recent legislation on the issue.

Response: Under the Federal Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permitting program, administered by the Environmental Protection Agency and the Department of Environmental Quality, regulates the discharge of pollutants to surface waters. Pollutant discharges may be from point sources (discrete discharges) such as those from wastewater treatment plants, or industrial processing plants. Pursuant to the Clean Water Act amendments (1987), the Environmental Protection Agency developed a Storm Water Program that applies to three sources of nonpoint discharge: industrial sources, construction sites, and municipal separate storm sewer systems. Logging operations, road building, and the array of silvicultural activities fall under the construction sites category and are viewed as nonpoint in nature. In 2002, the 9th Circuit Court of Appeals issued an opinion that requires an NPDES permit for aerial pesticide applications over forest lands (*League of Wilderness Defenders v. Forsgren*, No. 01-35729, 9th Cir 2002) where pollutants enter surface through other than stormwater runoff. The BLM is evaluating this issue, but has no plans to apply for NPDES permits for activities at the present time. In any case, since this revision is not making any decision on whether to aerial spray or not any specific area, there is no basis on which to request an NPDES permit.

206. Comment: The EIS should define intermittent stream, as the definition impacts how many streams may be clearcut over with no buffer.

Response: The glossary has been updated with a working definition: *A 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.*

207. Comment: The EIS should include a modified sediment analysis that avoids the assumption that the timing of sediment delivery is more important than the volume, considers effects of both the existing road network and proposed roads, and that includes consideration of long-term sediment routing and effects.

Response: Timing and volume of sediment delivery are intertwined. The volume of sediment delivery is highly dependent on streamflow level, where the few high flows of each annual series of stream flows carry the majority of the sediment load (Luce and Black 1999). The analysis considered the effect of sediment delivery from existing and proposed roads within a sediment delivery buffer by using the Department of Natural Resources methodology (see the FEIS, *Chapter 3*-Water section; also see *Appendix I -Water*, Analytical Question # 3). The modeled sediment yields are separated for new roads (less than 2 years old) and existing roads (more than 2 years old), and when summed give a picture of long-term potential sediment delivery. The model parameters and processing were not sensitive enough to infer seasonal timing of potential sediment delivery. The BLM has observed that under normal precipitation and runoff, many roadside ditches carry little to no water or sediment. The BLM expects this seasonal pattern of a few large storms to produce higher runoff and to yield the majority of the sediment load. Additionally, the variability of watershed intrinsic factors in unmanaged areas, including widely scattered and infrequent landsliding and streambank erosion, occurs with the few high annual stream flows and reduces the contributory effect of road delivered sediment as a percentage of total sediment.

208. Comment: The EIS should explain whether the stream sizes, tree types, and heights used in the Brazier and Brown (1972) study used by the EIS to explain how angular canopy density varies with different buffer strip widths are applicable to the entire plan are, how that was determined, and what other information is available. If the SHADOW model is used to support assumptions about angular canopy density, stream shade, and water temperature, then the EIS should: better describe the data set used to develop the model; disclose what streams were used to develop the statistical relationships; document model validation in the different ecoregions covered by the WOPR; and report confidence limits, assumptions, and uncertainties.

Response: Table 3 in the Northwest Forest Plan Temperature Total Maximum Daily Load (TMDL) Implementation Strategies (2005) was used to support assumptions about angular canopy density. The derivation of Table 3 to determine the width of the primary shade zone was developed with a number of Shadow model runs by the developer, Chris Park. Data from southwest Oregon, as well as the original data from the Brazier and Brown study (1972), was used in the model runs to optimize the primary shade zone width for different hillslopes and forest vegetation heights (Chris Park 2007). The BLM chose the largest distance in Table 3 (60 feet) to use as a primary retention area.

209. Comment: The DEIS does not provide sufficient information to support the assumption that areas farther than 100 feet from streams do not contribute to shade. The DEIS analytical assumptions regarding the effectiveness of stream buffers to regulate temperature are inconsistent with existing science (Kiffney et al. 2003).

Response: The BLM does not dispute that areas further than 100 feet from streams may provide shade to streams. However, studies with the Shadow and Heat Source models show that this shade is secondary, is of very marginal importance, and has little bearing on overall effective shade duration or quality throughout the day. The BLM is satisfied, based on Shadow modeling, that normal stocking of riparian forest young-mature trees at 100 feet width provide 80% or greater effective shade. The DEQ modeling with Heat Source for the Western Oregon Plan Revision showed that shade and temperature goals could be met at 150-foot riparian area widths, even though BLM believes that some of the modeling assumptions may not represent average and fully stocked forested conditions.

210. Comment: The analysis in the DEIS is inadequate because it does not assess the likelihood of blowdown of riparian trees under the various strategies, and analyze how this factor could affect stream shade and water temperatures

Response: The riparian area analysis has been expanded to include blowdown of riparian trees, and to show how some alternatives include riparian area widths that act as a factor of safety (see FEIS, *Chapters 3* and *4*, Water sections).

211. Comment: The DEIS analysis is inadequate because it does not provide sufficient information about the status and trends of water temperature on BLM lands, the status of stream shade on BLM lands, and how land management has contributed to these conditions. These current condition and trends are necessary to understand the effects of the alternatives.

Response: The status of stream shade has been added to the FEIS (see *Chapter 3,*Water section). Options modeling for riparian trees within 100 feet of fish-bearing streams (includes all perennial and intermittent fish bearing) indicates that 4% are currently in the stand establishment structural stage, 41% are young, 28% are mature, and 27% are structurally complex. Based on comparing this forest structure with shade levels of potential natural shade, there is a very high confidence that 80% effective shade goals are being met on more than 55% of the Riparian Management Areas, and a high confidence that goals are met on more than 96% of the Riparian Management Areas. The BLM believes the status and trends of water temperature on BLM-administered lands parallel improvements in riparian area forest structure, resulting in increased shade. Although there is insufficient data to confirm this premise, stream monitoring is required for most Total Maximum Daily Loads with Water Quality Restoration Plans to indicate the trajectory of water temperature with forest tree growth. The BLM will use the results of these monitoring efforts to confirm that the objectives for Riparian Management Areas are meeting water quality standards .

212. Comment: The EIS must consider the following factors in analysis of the effectiveness of riparian management areas: stream orientation, sinuosity, aspect, bank and channel stability, channel migration, and the potential for sediment loading.

Response: The factors of stream orientation, sinuosity, and aspect were included within Shadow modeling to determine a sufficient Riparian Management Area that would provide adequate shade to maintain stream temperatures. Bank and channel stability and channel migration is an “in field” higher level inventory, and these attributes are usually included within riparian assessments such as Proper Functioning Surveys (USDI BLM 1993). Further, the stream channel stability attribute is not needed to make a reasoned choice among the alternatives for the plan revision. The Riparian Management Area widths as described for the alternatives in the FEIS, *Chapter 2*, are retained for a migrating stream channel, because the zone includes the channel migration zone.

213. Comment: The EIS should be revised to explain or resolve apparent inconsistency in choosing to include private land as a variable in predicting large wood inputs to streams while also choosing to exclude private roadways as variables in predicting sediment impacts.

Response: Existing mapped private roads were included within the analysis (see the FEIS, *Appendix I- Water*, Analytical Question #3, and Step # 4). The BLM GIS general transportation (roads) data layer was used. This coverage includes all BLM primary, secondary, and tertiary roads and a high proportion of private roadways. On BLM under the alternatives, roads needed for the types and amounts of forest management indicated are projected into the future for the 10-, 20-, 50- and 100-year time periods. No such comparison can be made for private land roads, because future management and transportation system options are unknown.

214. Comment: The EIS should be revised to properly estimate the number of watersheds susceptible to peak flow increases and related water quality impacts. The modeling approach taken in the DEIS likely underestimates the contribution of sediment from the road network, land management activities, and debris flow events (see analysis enclosed with comments).

Response: The BLM used a modeling approach to screen for watersheds that may be susceptible to peak flow increases from the effects of vegetation management. First, the planning area was separated at a sixth-field watershed scale (10,000 to 40,000 acres) by rain-dominated and rain-on-snow hydroregions. The analysis was completed using GIS resource layers and computer programmed scripts that use logical and mathematical relationships based on hydrological science (see the FEIS, Appendix I-Water, Analytical Questions #1 and #2). The hydrological sciences used the relationships of rain and/or snow accumulation and melt with rain (Grant et al. 2008, USACE 1998) and effect on water available for runoff from different vegetation conditions (Harris et al. 1979, WA DNR 1997a). The FEIS, *Chapter 3* (Water section) has been further expanded to include Grant et al. (2008*)* science report findings from the review of northwest experimental watershed studies. The BLM uses equivalent area relationships with basal area for the rain-dominated hydroregion, and an empirical modeling approach for the rain-on-snow hydroregion. The BLM believes the approaches are valid and reflect the hydrological processes involved.

The modeling approach used in the DEIS to model potential deliverable sediment from roads was based on an existing model (WA DNR 1997b). The BLM automated the model to include spatial GIS data layers such as soils, roads and ownership (see the FEIS, *Appendix I-Water*, Analytical Question #3). This road model does not consider land management activities or channelized debris flow events, but only road sources of fine sediment from the cutslope, road tread, and fill slope (see the FEIS, *Appendix I-Water*, Analytical Question #3; and *Chapter 3*-Water section).

The roads methodology that was used lacks a subroutine to calculate small road-related slumps or slides that may sometimes occur. The random and non-intelligent nature of these occurrences leads to modeling difficulties, and as such is an under-estimation of potential sediment delivery at a gross scale. The degree of underestimation is uncertain, because road construction practices have dramatically improved in the last 20 years with corresponding fewer road failures (see the FEIS, *Chapter 3*-Water section). Extensive slide inventories, which do not exist, would be required in each physiographic region to determine an adjustment factor. However, the purpose of the plan-level roads sediment model was not to determine an absolute mass balance of deliverable sediment, but rather to determine a consistent relative baseline, and then show how each alternative compared to the baseline and the percent of departure. As such, the existing modeling is a powerful tool to assess differences between alternatives, and is much improved over past land management impact assessments where relative ratings or Likert scales were used.

215. Comment: The EIS should be revised to include data and reference to work completed by Swift on roads where slash was used to increase roughness and reduce travel distance, because while Swift is referenced in this discussion, these results were omitted. Another reference to incorporate on travel distance research is Woods et al. 2006.

Response: This section in *Chapter 3* (Water section) discussing road-related sediment travel distances has been revised for the FEIS to include expanded discussion from Swift 1986 and others.

216. Comment: The buffer width model assumptions should be revised in the EIS, because EPA believes they are flawed and that the model significantly underestimates shade levels and the potential temperature responses of Alternatives 2 and 3. There are a number of limitations to the use of the Brazier and Brown study which are not acknowledged in the DEIS. It is also important to acknowledge that the Brazier and Brown shade study did not account for the likelihood of riparian corridor blow-down, disease, or other factors that reduce angular canopy density.

Response: The Riparian Management Area width design portrayed under Alternatives 2 and 3 for perennial streams is based on published science findings. The commenter is unsatisfied with the statistical design of the landmark Brazier and Brown (1972) study, but offers no proof that the study does not support the angular canopy density and riparian shade width conclusions. The Steinblums (1984) study science findings on angular canopy density and riparian width from blowdown have been included in the FEIS, *Chapters 3* and *4*, Water section.

217. Comment: The EIS should be revised to correct the conclusion that 80% effective stream shade "…corresponds to less than a 0.2°F change in stream temperature per mile of stream…" (DEIS, page 750), because this approach relies on a non reach-specific temperature model sensitivity analysis conducted in 1999 as part of the Upper Sucker Creek Temperature TMDL analysis. In this analysis, the model sensitivity analysis was not used to evaluate stream temperature response. The DEIS, however, uses these modeling results to predict temperature response to timber harvest across the plan area. Because this model is not reach-specific and does not consider site specific conditions or seasonal temperature variation, EPA believes this approach does not predict or evaluate stream temperature response to the proposed alternatives in a meaningful way.

Response: The commenter is referring to Figure 3-106, Stream Shade and Change in Water Temperature, in the FEIS. This figure illustrates that as effective shade increases beyond 40%, there is a corresponding reduction in stream temperature to a point (e.g., approximately 80%) beyond which further reduction in stream temperature as a function of shade is not measurable (Boyd 1986). Boyd (1986) demonstrates that the various temperature heat exchange pathways between a stream and its environment (in addition to direct solar such as diffuse solar, long wave radiation, conduction or convection) introduce noise and negate incremental additions of effective shade above the 80% level. In other words, shading by forest vegetation has little effect above the 80% effective shade level because of other temperature fluxes operating in the environment.

The BLM agrees that 0.2°F change in stream temperature per mile of stream, at an 80% effective shade level, may not always capture site-specific conditions, but this does not diminish the broader scale value. These relationships of effective shade and temperature increase were developed during low streamflow conditions during a short temporal, maximum stream warming period (August) where seasonal variation is portrayed as the worst case. The BLM only has control over riparian area forest vegetation management and uses shade as a surrogate measure for stream water temperature increase. Therefore, the use of the Upper Sucker Creek TMDL sensitivity analysis over a summertime period almost certainly exaggerates changes in stream temperatures, which would further diminish the possibility that shade contributions beyond the 80% level would have any meaningful effect, contrary to the assertion of the commenter.

218. Comment: The sediment modeling in the EIS should be revised to account for forestry related activities such as yarding, skidding, site preparation, and canopy removal which have been demonstrated to contribute to surface, gully and large-mass soil movements, because they are currently not being considered.

Response: Potential sediment delivery impacts from cable yarding and ground-based skidding were dropped from detailed plan-wide consideration because effects on water quality are minor and site specific when Best Management Practices are applied at the time of project activity (Refer to the FEIS, *Appendix I-Water,* Best Management Practices). Specific BMPS (e.g., suspension over certain stream channels, or ground-based equipment limitation zones) are identified to minimize or prevent sediment delivery to streams and waterbodies to a negligible level. Discussions in the FEIS (*Chapter 3,*Water section; as well as *Appendix I-Water*, Analytical Questions #2 and #3) provide details about forest canopy removal. The principal effects are relevant to streamflow runoff response being scaled by hydroregion, watershed size, and level of forest basal area removal. Aside from burning, overland flow is seldom observed in the analysis area because infiltration capacities in undisturbed forest soils most often exceed 3 inches per hour, which is greater than the most intense precipitation periods of characteristic storms (Meehan 1991).

Site preparation broadcast burning can have temporary effects on increasing onsite soil loss and potential sediment delivery to watercourses, because of the consumption of ground cover and possible temporary hydrophobic effects from hot burns. To maintain soil fertility, alleviate potential sediment delivery concerns, and lower risk of wildfire, there are prescriptions for the majority of site preparation broadcast burning to be completed in the late winter and spring. Soils and fuels moisture contents are higher during these time periods and burn intensities are expected to be low. Furthermore, BLM broadcast burning prescriptions often leave areas unburned (swamper burn), as long as replanting can achieve satisfactory results. The shrub and noncommercial 25-foot Riparian Management Area along intermittent streams under Alternative 2 would have the highest probability for sediment delivery from burning. The anticipated amount of regeneration harvest broadcast burning was estimated for each alternative and time period (see the FEIS, *Chapter 4*, Water section). In summary, to differentiate between the alternatives, the BLM has analyzed the important sediment pathways at a plan scale, which are the effects from harvest placement and roads on land sliding and sediment delivery. Best Management Practices for individual forestry activities are specified when site-level NEPA is completed. When implemented correctly, the hypothetical effects of concern to the commenter are prevented.

219. Comment: The EIS should be revised to clarify which datasets were used to determine removal of basal area and to provide the rationale for dataset and "surrogate measure" selection (i.e., 10% crown closure) for the following reasons: On BLM lands, stand establishment structural stage was used as a surrogate for the removal of basal area. For adjacent non-BLM lands areas of less than 10%, crown closure was used as a surrogate for the removal of basal area (DEIS, page 384). Data underlying the peak flow analysis on BLM lands was derived from the OPTIONS model, and data for "other lands" was derived from the 1996 Interagency Vegetation Mapping Project (IVMP).

These methods raise a number of issues:

1) Rationale for establishing surrogate measures for the removal of basal area is not provided.
2) Methods employed to evaluate surrogate measures use two different time frames (BLM lands used modeled outputs and non-BLM lands used a 1996 dataset).
3) Use of 10% crown closure as a surrogate for the removal of basal area may underestimate the

actual area which should be included as part of the "surrogate measure". The 1996 Interagency Vegetation Mapping Project (IVMP) produced several high quality datasets. The EPA identified four IVMP datasets that could be used to estimate the canopy cover conditions on non-BLM lands: 1) "Vegetation Canopy Cover" 2) "Conifer Canopy Cover" 3) Harvest History (1972 through 2002).

4) Size Class (Quadratic Mean Diameter). EPA analyzed each of these IVMP datasets as potential "surrogate measures" for "basal area removal". Our analysis found that the number of 6th field HUCs shown to exceed 40% cut varied depending on the dataset considered (between 0 and 19%). This discrepancy calls into question the DEIS conclusion that only 1 out of 635 subwatersheds in the rain hydroregion (DEIS, page 385) and only 3 out of 471 subwatersheds in rain-on snow hydroregion (DEIS, page 387) within the Plan Area are currently susceptible to peak flow increases. We recommend that the Final EIS (FEIS) address this discrepancy, clarify which datasets were used, and provide the rationale for dataset and "surrogate measure" selection (i.e., 10% crown closure).

Response: The 1996 Interagency Vegetation Mapping Project (IVMP) ARC classified satellite imagery dataset "Vegetation Canopy Cover" that was used by BLM in several peak flow analysis. The IVMP "Vegetative Canopy Cover" dataset is 1996 data. The IVMP "Harvest History" change detection dataset can assess open conditions from 1996-2004. This change detection dataset was unintentionally omitted in the DEIS. However, re-analysis for the rain and rain-on-snow using this additional dataset has been completed for all alternatives in the FEIS.

When evaluating the alternatives, the findings for private or other lands open areas are held constant, because there is no available information on which we may determine how age class distribution on private lands would change over time. Much of this data is proprietary and market driven. Therefore, it was assumed that existing proportions of forest age classes comprising the stand history in each sixth-field watershed is near an equilibrium condition. Almost all private timber lands have now been managed for a period longer than their average rotation cutting ages and, therefore, it is reasonable to assume that the current age class distribution will roughly reflect the rate of change at the stage of equilibrium. Each alternative effect is measured by determining the amount of the stand establishment structural stage on BLM-administered lands in each sixth-field watershed for the 10-, 20-, 50- and 100-year time periods and the amount of open area on other lands from these IVMP datasets. Specific details for the peak flow planning criteria using these data layers is shown in the *Table* below and in *Appendix I-Water* (Analytical Questions #1 and #2). Peak flow susceptibility in the rain-dominated hydroregion is based on removal of forest tree basal area and equivalent clear-cut area; however, the rain-on-snow analyses uses physical processes of snow accumulation and melt and requires a range of forested and open cover classes.

Table T-1. Vegetation Data Layers used in the Peak Flow Analysis

Data Layer	Rain Hydroregion	Rain-on-Snow Hydroregion	Domain
IVMP Vegetation Canopy Cover	<30% crown closure	<10% crown closure	BLM & private for current condition
IVMP Vegetation Canopy Cover		> 70% crown closure & <75% of the crown in hardwoods or shrubs	BLM & private for current condition
IVMP Vegetation Canopy Cover		10% - 70% crown closure & <75% of the crown in hardwoods or shrubs	BLM & private for current condition
IVMP Harvest History	<10% crown closure, 1996-2004	<10% crown closure, 1996-2004	BLM & private for current condition
IVMP Vegetation Canopy Cover; Nonforest		Included	BLM & private for current condition
Options Structural Stage	Stand establishment	Stand establishment without legacy	Alternatives

For the rain-dominated hydroregion, the DEIS was in error on page 384, which reported that "10% crown closure was used as a surrogate for the removal of basal area" for non-BLM lands. The correct figure of <30% crown closure was reported in the DEIS analytical methods in Appendix I (page 1,096). The error on page 384 of the DEIS has been corrected in the FEIS. As seen in *Chapter 3*-Water section, Ziemer (1981, 1995) found a nonstatistical (4%) increase in peak flow for 80-year old conifer stands that were harvested where 50% of the basal area was retained. It is reasonable to expect that any increases in peak flow would decrease as the intensity of treatment decreases. For example, a greater increase in peak flow would be expected from regeneration harvest (many acres) versus small patch cuts (less than one acre to several acres) and thinning, the latter of which would have the least decrease. Although this general relationship is reasonable, past experimental studies of peak flows in the Northwest have not fully examined the differences in peak flows relative to many contemporary forest practices (Grant et al. 2008). The surrogate used in this analysis for other lands in the rain-dominated hydroregion was set at less than 30% canopy closure. For a given timber stand species, age spacing, etc, there are variations of crown area on the IVMP datasets when cross-walked with basal area removed (Grant et al. 2008) for susceptibility of peak flow increase.

The BLM looked at tree diameter/crown diameter where ratios vary from 0.7 for mature trees, to 2 for trees in young plantations. A normal forest density management treatment may remove one-third of the volume and one-half of the stem count, resulting in 80 to 100 remaining trees per acre. For harvestable coniferous forest stands, vertical projections were made to determine the area of remaining crowns after this normal treatment. Stand summaries indicate that 40-50% canopy closure as a surrogate measure would maintain 50% of the basal area. However, as discussed in the FEIS planning criteria, canopy closure as a surrogate for basal area removal was set at <30% canopy closure. This is because there are large areas of low density unmanaged forest not attributable to timber harvest activities. These unmanaged low density forests are not equivalent clearcut forest and could not be reasonably separated in the analysis, because the GIS algorithms that processed the IVMP satellite imagery cannot distinguish between forest harvest and natural low density forest. The affected subwatersheds are more numerous in southern Oregon in areas of higher fire frequency and low precipitation. The degree in nonharvested area is uncertain.

A number of iterations by area inspection showed that the false identification increases as the canopy closure is increased, even though the BLM did not absolutely quantify the differences over broad areas. From these trial optimizations, the BLM chose to use the <30% canopy closure as a surrogate for basal area removed. Others (Rothacher 1973, Harr 1976) have shown that decreases in evapotranspiration are expected to scale somewhat lineally with the amount of vegetation removed by forest harvest. Although Grant et al. (2008) defines a process to measure effects in the rain hydroregion using basal area removal with envelope curves, they do not address the underlying hydrological processes for contemporary forest practices, especially partial removals.

The Stratum-Weighted Accuracy for Vegetation Cover on all Lands by Interagency Vegetation Standards Categories is 79% for the Oregon Coast Range and 67% for the Klamath region (Congalton and Green 1999). No IVMP accuracy data is available for the Western Cascades or Willamette Valley.

220. Comment: The EIS sediment analysis should be revised using a computer-based model that predicts slope stability of potential landslide initiation sites based on slope, topography, rainfall, and other variables, such as SHALSTAB. Papers developing the SHALSTAB model and showing its application include Dietrich et al. 1992, 1993, 1995; Montgomery and Dietrich 1994; and Montgomery et al. 2000. This model works various topographic data sources such as digitized 7.5 minute USGS quadrangle maps with enhanced topographical contours at 10-rn intervals. The model assigns to each 1 0-m topographic cell a relative hazard rating (low, medium, or high). Other slope stability models using similar input variables are also available. If it is not possible to run such models for the entire plan area before the FEIS, then the FEIS should describe a plan to update its slope stability investigations to include computer modeling.

Response: Computer landslide modeling was undertaken in the FEIS. The Shalstab model was considered, but was rejected in favor of the Miller and Burnett (2007) model. This landslide model includes two components: a measure of landslide susceptibility and an estimate of landslide runout potential. Both components are necessary to estimate sediment and wood delivery to stream channels from landsliding. SHALSTAB also provides a measure of landslide susceptibility, but no estimate of runout potential. SHALSTAB is a process-based model that can be applied without calibration. It utilizes certain simplifying assumptions (e.g., surface-parallel flow of shallow groundwater) with which topography and soil properties can be related to the spatial distribution of soil pore pressures under steady-state rainfall conditions. These assumptions have been challenged by Iverson (2000), who presents an alternative framework for estimating spatially and temporally variable pore pressures. The model for landslide susceptibility that BLM has used is empirical, so it must be calibrated and relies solely on spatial correlations among mapped landslide locations and topographic and land cover (forest type, roads) attributes. The basis for the landslide susceptibility portion of the model is described in Miller and Burnett (2007), and the basis for the runout portion of the model is described in Miller and Burnett (2008).

221. Comment: The EIS should be revised to apply other models for validated peak flow response in rain-on-snow hydroregion or compare the WOPR's analytical model with other validated, peer-reviewed models, because the model used (Washington Department of Natural Resources 1997) represents an untested hypothesis with a series of untested parameters. (WOPR_PAPER_01962-18).

Response: The Washington Department of Natural Resources Hydrologic Change module has been used in a number of watershed assessments and follows the fundamental science of the generation of peak stream flows from water stored in shallow snowpacks. The BLM is aware of only one other model to assess peak flow response in the rain-on-snow hydroregion: the Distributed Hydrology-Soil-Vegetation Model (DSHVM). It is a GIS water balance model developed at the University of Washington that simulates runoff and the impact of forest roads on watershed hydrology (Wigmosta et al. 1994). The model involves a high level of parameterization, is costly to implement, and is not suitable for large planning areas.

222. Comment: The EIS TMDL ISE methodology should be revised, because it is simply a white-paper on temperature modeling, and is a flawed basis for riparian management. The white-paper is technically weak and incomplete despite its much iteration. It selects the Brazier and Brown (1973) shade curve rather than the Steinblums et al. (1987) shade curve (the competing shade curve that has traditionally been reported jointly with Brazier and Brown) because it permits narrower buffers. This approach increases risk to aquatic resources greatly. Some assumptions in the white-paper do not comport even with Brazier and Brown. Others are not internally consistent. The Brazier and Brown model itself is so poorly documented and ridden by technical flaws that its use is highly suspect. In addition, shade and temperature modeling by the BLM is not consistent with ODEQ TMDL standards and goals.

Response: The analysis in the FEIS has been expanded to include the Steinblums et al. (1987) shade curve. This study includes the influence of blowdown. In order to accommodate similar sun blocking ability as in the Brazier and Brown (1973) study, Riparian Management Areas become wider because there are fewer trees resulting in lower forest density and fewer tree crowns to provide shade. See the FEIS, *Chapter 3* (Water section) for explanation of solar physics and influence of topography and forest trees. The BLM views the Steinblums et al. (1987) shade curve as a factor of safety because the 40 study sites had a range of blowdown from 11-54%, which is substantially higher than blowdown observed within riparian management areas in a managed forest. Where higher levels of blowdown are present in the riparian zone, the Steinblums et al. (1987) shade curve shows that 80% effective shade is reached within a riparian management area at 120 feet from the stream, compared to 100 feet with incidental or no blowdown.

The Department of Environmental Quality (DEQ) has used their Heat Source shade and stream temperature prediction model to evaluate the alternatives and find that stream temperatures do not change when riparian management areas along perennial streams are a minimum of 150 feet in width. The BLM believes that DEQs assessment methods may have some technical shortcomings. Nevertheless, DEQs results indicate that the Riparian Management Areas for the No Action Alternative, Alternative 1, and the PRMP Alternative would fully meet shade goals and stream temperature water quality standards.

223. Comment: The EIS Peak Flow analysis should be revised to properly incorporate Gordon Grant's research results. The threshold for increases is percent in open category, not basal area (DEIS, page 1,096). Grant (2007) suggested the threshold was at 30%. Rain-on-snow modeling in WOPR does not agree with results using different techniques in NEPA documents and watershed analyses. Sensitivity testing is needed on watersheds that were known to be damaged from recent 96/97 rain-on-snow events (e.g. Fish Creek near Salem District, Sucker Creek in Medford District). The analysis did not look at 5 year events which are certain to occur (see effects to SW Washington/ Veneta, Oregon from December 07 rain only storm).

Response: In the FEIS, the peak flow analysis in the rain hydroregion has been revised, using Grants findings where maximum response at detection level is 29% of the watershed area cut with roads and a mean of 45%. Analytical Question #1 in the FEIS, *Appendix I-Water* has been revised with 29% open area used as the threshold.

The rain-on-snow modeling undertaken in the Western Oregon Plan Revision is a more rigorous approach than techniques previously or even currently used in watershed analysis or other NEPA documents. The model uses information on climatology, topography, hydrology, and physical processes to calculate water available for runoff. This degree of rigor is greater than the most commonly used method that involves interpolating a risk diagram. The user enters a risk class figure with area information, which is the percent of land within a rain-on-snow elevation, and the percent of the rain-on-snow area with less than 30% crown closure, to determine a risk of peak flow enhancement (Watershed Professionals Network 1999 IV-11). This methodology ignores some rather obvious major factors that would determine a watershed's susceptibility to peak flow issues, such as the climate and topology in the watershed. Although ongoing verifications are underway, the output from the analytical rain-on-snow procedure used in preparation of the Western Oregon Plan Revision certainly results in more accurate and supportable conclusions in terms of susceptibility as this risk procedure.

All event sizes are certain to occur from ordinary to extreme, but the recurrence interval increases for the larger runoff events. The methodology used for peak flow analysis in the rain dominated hydroregion is not recurrence interval specific and, therefore, covers all return periods. The methodology used for peak flow analysis in the rain-on-snow hydroregion looked at 2-year events rather than 5-year events, because these stream flows are in the range of effective streamflow that do the most morphological work on the channel (modification of bed and banks) in the long run (Leopold 1994).

Different land areas within the same watershed or different watersheds have different susceptibilities to landsliding and stream channel changes based on inherent watershed characteristics. Precipitation and runoff may vary widely from extreme storms in watersheds with differential effects. The BLM does not consider landsliding, deposition of sediments, or large wood from extreme storms to be "damage" unless watershed equilibrium has so markedly shifted that it can be traced to anthropogenic activities. Despite differing watershed characteristics and uncertain climatology, the BLM has withdrawn from timber management the majority of susceptible mass wasting lands under the Timber Productivity Capability Classification.

224. Comment: The EIS should be revised to provide adequate cumulative effects analysis of the 16 subwatersheds deferred from timber harvest in 1994. The current analysis does not demonstrate that conditions have improved enough to warrant renewed timer harvest as proposed in the WOPR action alternatives.

Response: This comment refers to the Medford District 1995 RMP management direction: "Defer the following areas (approximately 49,636 acres) identified as having high watershed cumulative effects from management activities, including timber harvest and other surface-disturbing activities for ten years, starting from January 1993…. The following areas will be reevaluated during the next planning cycle or by January 2003."

This 49,636-acre area within 16 subwatersheds on the Medford District was analyzed in the Western Oregon Plan Revision DEIS for cumulative watershed effects. Important cumulative watershed effects across all lands were evaluated, including a peak flow analysis and a roads potential sediment delivery to streams analysis (refer to the DEIS, *Chapter 4,* Water section). Variations in modeling assumptions were evaluated in the DEIS: 1) deferrals were continued for one decade under the No Action Alternative, and 2) deferrals were continued under Alternative 1, with no ASQ simulated (refer to the DEIS, *Appendix Q-Vegetation Modeling*, page 1,568). The results of these analyses in the DEIS did not reveal environmental impacts that warrant reinstating the 1993 deferral of harvest.

225. Comment: The EIS should be revised to consider cumulative impacts of stream shade variation in mixed ownership areas, because streams flowing through mixed ownerships will be affected by lower shading levels on private lands.

Response: The BLM recognizes a disparity of stream shade rules between federal and state agencies. Although appearing intuitive, the observation that "streams flowing through mixed ownerships will be affected by lower shading levels on private lands" does not necessarily translate to stream temperature increase. As is the case on many private forests, the majority of streams on BLM-administered lands are headwater streams, where approximately 67% of the stream network is intermittent and do not require shade to ameliorate temperature increase. Many other channels have low summer stream flows. For small streams (<2 cfs average annual streamflow), streams flowing through unbuffered regeneration harvest units receive significant cooling downstream as the streams re-enter the forest (Robison et al. 1995). Dent and Walsh (1997) showed, based on Analysis of Variance statistical tests, that streams higher in watersheds showed a decrease in temperature 500 feet downstream of treatment, whereas streams lower in a watershed did not. Their conclusions infer that streams warm naturally in a downstream direction. This is partly due to wider, low gradient streams in the valleys with more surface area exposed to solar heating and lower rates of water flow.

Larger streams in lower watershed areas more frequently encounter private lands. State Forest Practices protection measures along riparian management areas include 20 feet of continuous no-cut area along each side of medium and large streams with a variable basal retention area up to 350 square feet outward to 100 feet (100 x 1,000) (OAR 629-640-0200). Dent and Walsh (1997) reported for a sample of medium to large private forestland streams that stream temperatures were at or below the 64°F numeric criteria 90% of the time. Furthermore, they could not differentiate the proportion of the temperature increase that was due to a partial decrease in shade from the proportion attributable to expected downstream increases in stream temperatures.

In consideration of the foregoing, it is concluded that the cumulative impacts of stream shade variation in mixed ownership lands are not being aggravated by BLM. The BLM conservative shade rules manifested in the design of Riparian Management Areas under all of the alternatives already promote an anti-degradation standard with a high level of effective shade. Higher levels of effective shade beyond 80% are not expected to change stream temperature profiles from ambient conditions (see FEIS, *Chapter 3*-Water section).

226. Comment: The EIS should be revised to disclose the impacts to aquatic resources from logging on private land as well as on public land. Although the BLM asserts that sediment delivery to streams from

1,000 miles of new roads and hundreds of thousands of acres of new clearcuts is negligible, the cumulative impact of sediment delivery from these types of actions are expected to be significant.

Response: Based on literature findings (in *Chapter 3*-Water section), and as indicated in the planning criteria (DEIS, Appendix I, pages I-1106 to I-1113), water runoff from roads that could deliver sediment to streams was modeled across all BLM and private lands by fifth-field watershed. A 200-foot sediment delivery buffer was used as a reasonable approximation for the source area of potential road erosion. Each alternative's total miles of new roads were considerably reduced when this methodology was applied. It is important to consider that much of the road system is already developed within watersheds, along transportation routes that cross streams, and the road additions to forest treatment areas include many short road segments on ridges or topography well separated from streams. Findings from the analysis for all lands show that miles of new permanent road, within a potential sediment delivery distance to streams under the alternatives as an addition to the existing roads (reported as a watershed average), ranged from less than 0.005 to 0.14% increase, which is a negligible amount. Furthermore, the analysis showed the potential fine sediment delivery addition to streams from all lands (reported as a watershed average) to be less than 0.27 tons per year addition, which is also a negligible amount (refer to the DEIS, *Chapter 4*, Water section, Table 212).

227. Comment: The EIS should be revised to take a more conservative approach to classifying and managing landslide prone areas. The assumption that "the rate of susceptibility to shallow landsliding from timber harvests…would not increase… because fragile soils that are susceptible to landsliding…would be withdrawn" (DEIS, page 763) marginalizes the issue, and conflicts with observed landslides on BLM lands not withdrawn from timber harvest. Given the observed landslides on BLM harvest units and research demonstrating that clearcut logging on unstable landforms increases landslide frequency, this approach should be revised.

Response: The BLM has not attempted to marginalize the issue of preventing landslides in managed areas. The BLM soil scientists have identified 89,937 acres (3.5% of BLM-administered lands) that need protection due to land stability concerns. These areas are currently withdrawn from programmed timber harvest. During project-level planning in the Timber Management Area, field reconnaissance by specialists would also identify any further stability concerns that are more discernible with the closer site-specific look taken during project planning. Based on these assessments, the type or area of proposed harvest would be adjusted. Additionally, for the FEIS, a GIS computer modeling landsliding assessment (Miller and Burnett 2007) was made, based on forest management projects, to analyze land stability at a watershed scale and to disclose any related impacts within the harvest land base and other BLM-administered lands, by alternative.

228. Comment: The EIS should be revised to consider the potential effects of increased magnitude, duration, frequency, or timing of peak flows, and how increased peak flows may affect the biological communities and primary constituent elements of critical habitat of listed salmonid fish within susceptible subwatersheds.

Response: The magnitude and frequency of peak flows from management activity and potential effects has been analyzed and discussed thoroughly in the FEIS, *Chapters 3* and *4*, Water sections. The potential effects to biological communities and associated primary constituent elements for fish have been discussed thoroughly in the FEIS (*Chapters 3* and *4*, Fish sections). Duration or timing of peak stream flows is primarily dependent on climatic conditions. Demonstration of an impact on biological communities and primary constituent elements of critical habitat of listed salmonid fish within susceptible subwatersheds is guided by site-specific evaluation procedures.

The DEIS and FEIS (*Chapter 4*, Water sections) have shown that less than 1% of the subwatersheds are susceptible to peak flow increase from the degree of forest management activities described under all alternatives. No studies have shown a direct correlation between peak flow changes due to forest harvest and measured changes to the physical structure of streams (Grant et al. 2008). This is partly due to the problems separating causal mechanisms. Nevertheless, within the few susceptible subwatersheds, a useful framework described by Grant et al. (2008), that will be used during site-specific NEPA, would be to classify the stream types as cascade, step-pool, gravel-bed, or sand-bed (Montgomery and Buffington 1997). A rigorous channel cross-section assessment would be required. In general, percent increases in peak flows from forest management would be indexed against the capacity of the channel to move sediment; however, sediment movement does not imply destruction of the channel armor layer. Risk factors could also be used to consider the degree of road connectivity to streams by roadside ditches, drainage efficiency, forest patch size, and characteristics of riparian buffers. Based on these findings, a determination would be made for the likelihood of potential to affect and the degree of channel change.

229. Comment: The EIS should address the impacts of road-related changes in peak flows for both hydroregions and also consider the frequency and duration of peak flows and their effects to stream processes and the biological communities.

Response: Runoff response from roads was considered in the analysis. Within the rain hydroregion subwatersheds, the area of forest harvest and roads was summed in aggregate, divided by the subwatershed area, and compared against the maximum reported change envelope curve of Northwest experimental studies (Grant et al. 2008). Results from this aggregation are discussed in *Chapter 4* (Water section). Within the rain-on-snow hydroregion, roads were modeled as open areas along with non-forest, agricultural lands, and waterbodies, and they were subject to the same snow accumulation and melt processes within rain-on-snow elevations. These results are discussed in *Chapter 4* (Water section).

230. Comment: The EIS should be revised to analyze and disclose the effects of soil compaction caused by roads, landings and logging; the impacts of roads on peak flows; and the amount of area occupied by existing landings.

Response: Soil compaction was not analyzed in detail because the area of compaction from new roads, landings, and logging for forest management operations seldom reaches a level that statistically increases runoff. At the catchment scale, Harr (1975) indicates that peak flows on Deer Creek in the Alsea experimental watersheds were increased significantly when roads, landings, and skid trails occupied more than 12% of the watershed. For somewhat larger watershed areas (1.7 square miles), Keppeler and Ziemer (1990) found that the roads, landings, and skid trails that occupied 15% of the South Fork on Caspar Creek in northern California had no significant effects on peak flow. An average of 64% of the timber volume was also removed in a three-year period in the same watershed. Based on these findings at the site level, Best Management Practices specify "plan use on existing and new skid trails, to be less than 12 percent of the harvest area" (refer to FEIS, *Appendix I-Water*). Grant et al. (2008) concludes that peak flow response can never be greater than at the site level, and that larger watershed scales diminish peak flow levels for a variety of reasons (refer to the FEIS, *Chapter 3*, Water section).

From the effect of the alternatives, the net effect of road building versus road decommissioning results in less than 1% increase over the current road and landing acreage in Alternatives 2 and 3, and a net decrease in acres in the No Action and Alternative 1 (refer to *Chapter 4*, Soils section). At the fifth-field watershed level, the BLM assessed several individual watersheds and derived estimates of total compacted area, summing the area of existing and new roads, landings, and logging disturbance under alternative projections. Findings from these assessments show that compacted area does not exceed 6% of the watershed area, which is below a peak flow response level. Therefore, significant effects on the elevation of peak flows from management activities of road building and harvest are not anticipated from any of the alternatives.

231. Comment: The EIS should provide references for the assertion that sediment generation by overland flows (the mechanism for sediment from cutting and yarding timber) is not an issue because of high water infiltration in forest soils.

Response: Infiltration capacity in forest soils is the rate at which rain or melted snow enters a wetted soil surface. This rate is governed by soils composition and the depth, size, and shape of pore spaces. Coarse-grained soils derived from colluvium, alluvium, or tills are highly permeable, whereas fine-grained soils derived from marine materials or weathered siltstone, sandstone, or volcanic rocks usually have lower permeability. Two studies in the western Cascades (Coyote Creek, located on the South Umpqua Experimental Forest; and the H. J. Andrews Experimental Forest) show that fall infiltration capacities average 4.8 inches per hour (Johnson and Beschta 1981). A review of soil survey data, from the Natural Resources Conservation Service, in the analysis area reveals that infiltration rates can vary from 2 inches to 6 inches per hour, depending on location. The Pacific Northwest precipitation amounts rarely exceed these infiltration capacities of forest soils on an hourly basis.

232. Comment: The EIS should be revised to assess the impacts of eliminating riparian reserve buffers on unstable slopes.

Response: The BLM Timber Productivity Capability Classification identifies susceptible landforms to mass wasting, and these lands have been withdrawn from management activity (see *Chapter 3*, Water section).

233. Comment: The EIS should be revised to address the physical and biological impacts of reduced riparian reserves considering all relevant information available, particularly relevant considering that BLM produced many of these documents.

Response: The DEIS and FEIS include a thorough analysis on the different riparian management widths for each alternative and the effects to water and fisheries resources using state-of-the art modeling, analytical methods, and current scientific literature. The FEMAT scientists originally proposed *interim* riparian management areas, pending the outcome of watershed analysis. Riparian forest effects on streams as a function of buffer width (FEMAT 2004 V-27) show that most attributes (including root strength, litter fall, shading, and coarse wood cumulative effectiveness) to be leveling off at 0.5 tree height (approximately 100 feet from the stream edge).

Riparian “buffer effects science” in the last 10 years reveals that primary functionality, including riparian buffer effects on microclimate, can be retained within this distance (Chan et al. 2004, Rykken et al. 2007). These conclusions demonstrate the adequacy of the Riparian Management Area design for the No Action Alternative, Alternative 1, and the PRMP Alternative for all streams. By retaining sufficient widths for large wood delivery, perennial and intermittent debris flow streams in Alternative 2 and perennial streams in Alternative 3 are also fully functional for the primary attributes. In Alternatives 2 and 3, intermittent stream channels are fully functional where harvest does not occur, and are functional to an undetermined but lesser degree for some attributes in riparian areas adjacent to areas of regeneration harvest.

234. Comment: The DEIS analysis of impacts to stream temperature are flawed because it is based on a limited and selective view of riparian science that is heavily skewed toward consideration of only the shade function.

Response: The BLM recognizes land uses that can contribute to stream heating include vegetation removal (resulting in loss of shade), stream channel modifications (resulting in wider and shallower streams), floodplain dissection and downcutting (resulting in loss of cooler stored water that can exchange with stream water), and hydrologic alterations (such as groundwater withdrawals). To determine primary effects in most situations, the BLM relies on the shading ability of forest vegetation as a surrogate for temperature change. When considering all energy fluxes of temperature gain or loss, direct solar radiation has been shown to be the greatest contributor to stream heating from the loss of shade (Brown 1969, Boyd 1996, Chamberlin et al., 1991).

In forest watersheds during the summer months, the combination of direct solar radiation reaching the stream surface, the relative number of stream tributaries, and a decrease of stream discharge has the greatest effect on stream temperature change in a downstream direction (Beschta et al. 1987). The BLM has little to no control over seasonal stream discharge, but has shown in Chapter 4 (Water section) that the Riparian Management Area strategies under the alternatives and resulting effective shade is expected to fully meet water quality standards along most stream reaches. Stream channel modifications, floodplain downcutting, and withdrawals are unique, reach specific analysis, and are best suited for evaluation during development of a project activity.

235. Comment: The EIS analysis of impacts of harvest in riparian areas on stream temperature, and impacts to fish and other aquatic biota is flawed because it did not consider data from FWS, EPA and NMFS evaluations (Oregon Department of Forestry and Department of Environmental Quality 2002; National Marine Fisheries Service 2001).

Response: The FEIS analysis utilizes the best scientific information available from a variety of sources. Additionally, the PRMP Alternative and FEIS fisheries and water management actions and analysis were revised in part based on evaluations and input from the Environmental Protection Agency, Fish and Wildlife Service, National Marine Fisheries Service, and other cooperators. For example, the BLM examined the stream temperature modeling by the Department of Environmental Quality for the various alternatives. Also, due to comments received from the Environmental Protection Agency and the National Marine Fisheries Service, the PRMP Alternative in the FEIS has an additional area beyond 100 feet as a factor of safety for the primary and secondary shade zone for episodic occurrences of blowdown.

236. Comment: The EIS should more fully acknowledge the risks to the water, fish and wildlife in the Coos Bay District from coal bed methane development; analyze these impacts and the develop protective lease stipulations, including a prohibition on discharge of produced water and an option to require treatment of produced water prior to reinjection. The EIS should also list the requirements for management of produced water.

Response: For the Western Oregon Plan Revision, Reasonably Foreseeable Developments (RFDs) oil and gas potential impact assessments were prepared for each district (including Coos Bay) (see the Energy and Minerals Appendix). The assessments provide an overview of potential hydrocarbon energy resources within the planning area. Overarching leasing stipulations are also listed in the Energy and Minerals Appendix. The analysis of effects in *Chapter 4* shows how the Reasonably Foreseeable Developments interact with the land use allocations to determine the appropriate lease stipulations. Further assessments of the Coos Bay District coal bed methane development beyond that in the RFDs will be completed in subsequent project-level NEPA. The BLM is not making any decision on whether to proceed to develop coal bed methane under this FEIS. Management of produced water would be addressed through the Department of Environmental Quality's authority, as delegated by the Environmental Protection Agency through the Clean Water Act. The BLM, and state and federal agencies, would be involved in determining measures to mitigate potential impacts to fish and wildlife. Where needed, area-specific leasing stipulations would be augmented at the application for Permit to Drill (APD) level through Conditions of Approvals (COA).

237. Comment: The EIS should be revised to address the fact that vegetation removals (and in particular, logging) exacerbates seasonal extremes of water runoff from watersheds.

Response: The BLM has described the effect of vegetation removal from timber harvest on water runoff in watersheds in *Chapter 3* (Water section). The discussion focuses on stream flows that fill the active channel up to a 6-year recurrence interval event. These are the stream flows most susceptible to having stream forms changed or biological communities negatively impacted from the effects of forest management. It is well known that low flows are increased by forest management (Ziemer 1998, Jones and Grant 1996). However, these stream flows are well contained within the boundaries of the active channel and normally do not have enough stream power to mobilize and carry sediment. Increasing seasonally low stream flows has beneficial effects as well, such as augmentation of water volume to buffer against summertime stream heating. As discussed in *Chapter 3* (Water section), large floods (>6- year recurrence interval event) are not evaluated either because the runoff effects from forest management are overridden by the storm flow volume of runoff, or because the smaller effects of forest management are subsumed by the far larger effects of the storm itself.

238. Comment: The EIS should provide justification for the five representative watersheds that were selected in the analysis. It certainly does not describe Lost Creek on the Middle Fork Willamette, which is an intense rain-on-snow watershed. This needs to be addressed and analyzed in the WOPR.

Response: Representative watersheds were not used in the peak flow analysis. Rather, all subwatersheds (10,000 to 40,000 acres) within the rain-on-snow hydroregion were analyzed for the susceptibility of enhancement of peak flows (refer to *Chapters 3* & *4*, Water sections).

239. Comment: The EIS should take into account the mobility of aquatic corridors over time.

Response: In drainage evolution, the most probable state always exists to satisfy physical requirements. New drainage is built or extended only if erosion exceeds resistance to erosion. Further, geomorphology obeys laws of geometrical proportions for the resulting stream network (Leopold et al. 1964). The rates of channel development within incipient headwater channels are episodic, but slow; changes are certainly not important in a management plan timeline. Meandering rivers or streams can migrate laterally over time, depending on the equilibrium between bed and bank materials, stream slope, width and depth, discharge, and sediment supply (Rosgen 1996). Little lateral movement occurs under most ordinary streamflow conditions, but changes can occur during large flood events, with scour on the convex side of the river or stream and accretion on the concave side. For these unique situations, the FEIS includes delineation criteria for measuring Riparian Management Areas from the ordinary high water line of the channel migration zone.

240. Comment: The EIS should address the fact that Alternatives 2 and 3 would result in substantial, long-term impacts to water quality and exacerbate continued exceedance of water quality standards in streams listed as impaired under Section 303(d) of the Clean Water Act (CWA).

Response: The BLM believes that Alternatives 2 and 3 would maintain water quality just as well as the other alternatives. The BLM has shown in *Chapter 3* (Water section) how the primary and secondary shade zones would maintain effective shade at levels of 80% or higher, which is near potential system shade in most watersheds.

The BLM has cooperated with DEQ regarding Water Quality Management Plans in TMDL watersheds, and many are either approved or in development. These plans specify active or passive restoration and monitoring to coincide with the assigned temperature allocation.

241. Comment: The EIS should address the fact that Alternatives 2 and 3 are not consistent with the TMDL Strategy (Northwest Forest Plan Temperature TMDL Implementation Strategies 2005) and do not meet the terms of the DEQ conditional approval.

Response: The majority of BLM streams are not 303(d) listed for stream temperature, and the management goal along these streams is to meet the applicable DEQ numeric criterion of 64 degrees Fahrenheit in most basins (OAR 340-041). Only a very small portion of BLM streams (<4%) are TMDL listed for temperature. The Riparian Management Areas, including width and retained forest tree density, under all alternatives were designed using the primary elements within the Northwest Forest Plan Temperature TMDL Implementation Strategies 2005 (TMDL strategy), which included a primary and secondary shade zone along summertime waters. Furthermore, the minimum requirements for these Riparian Management Areas under the alternatives were developed using primary science findings contained within the TMDL Strategies (Brazier and Brown 1972) and Shadow Temperature Model iterations.

The BLM adopted the width of the primary shade zone from Table 3 of the TMDL Strategies (referenced above), using the most conservative assumptions (greatest width), as well as the 50% canopy cover recommendation for the secondary shade zone. Therefore, Alternatives 2 and 3 are believed to be entirely consistent with the TMDL Strategy. The BLM has an ongoing agreement with DEQ as a Designated Management Agency for implementation of the Clean Water Act and amendments on BLM-administered lands. This agreement is currently being updated and will be revised to reflect the PRMP Alternative of the FEIS.

The DEQ performed a temperature analysis on Canton Creek, which in BLM's view has some shortcomings. The BLM encourages DEQ to retest Alternatives 2 and 3 along several other forested stream environments using the design for Riparian Management Areas for Alternatives 2 and 3. The Riparian Management Areas would be shown to be effective.

242. Comment: The EIS should discuss the limitations of the Brazier and Brown study, including (1) that the study was done on a small non-random sample of 13 reaches along nine small mountain streams in Oregon; (2) the relationships identified in the study may be subject to artificially high R2 values; and (3) the study did not account for the likelihood of riparian corridor blow-down, disease or other factors that reduce angular canopy density. The EIS should also explain the complex nature of the analysis of buffer width.

Response: (1) The 1973 Brazier and Brown study "Controlling Thermal Pollution in Small Streams" does not include information about randomness of the selected sample reaches. The sample reaches were split between two physiographic provinces: the Oregon Coast Range and the Cascades. Although the BLM believes that having two samples are important because overstory and understory forest vegetation type and density varies between regions, the results were remarkably similar. (2) In an effort to remove non-comparable influences, the study did exclude several reaches from the sun blocking (change in heat) and buffer width relationships. As noted by the authors, the overriding topographic influences, stream channel shape, and influence of groundwater within the study reach were separated to derive better comparisons. Whether or not this separation led to artificially high R^2 values in the regression equations is a matter of opinion; however, the Brazier and Brown study findings were reinforced by combining data sets with the Steinblums et al. (1984) study. (3) Discussion was added to the FEIS regarding riparian corridor blowdown, disease, other forest risk factors, and the effect on shade. The complex nature of riparian forest community types, topography, and stream factors in providing effective shade has been described in *Chapter 3* (Water section).

243. Comment: The EIS should address the conclusions that a 0.2°F increase over 1 mile, and that this is "within the range of natural variability" (DEIS, page 750) would conflict with the TMDL load allocations established for some basins.

Response: In a planning area context, less than 4% of BLM total stream miles are listed on the 303(d) list for temperature, and a lesser subset is covered by completed Total Maximum Daily Loads (TMDLs) load allocations. The most restrictive load allocations given to BLM as a target are 0.1°C (0.18°F) temperature increase, which is nearly equivalent to 0.2°F. For example, the Umpqua Basin TMDL (approved by EPA 04/12/2007) has 0.1°C temperature increase allocated to nonpoint source activities. Further, surrogate measures as effective shade targets for riparian vegetation translate the numeric TMDL allocation. Although these shade targets sometimes exceed 80% in the TMDL, the objective is to stay within the temperature allocation. The BLM has shown how maintaining 80% effective shade would limit water temperature increase to this range (refer to *Chapter 3*, Water section).

Additional points to consider regarding the 0.1°C TMDL allocation level of precision are:

1) Stream temperatures increase naturally in a downstream direction, regardless of riparian vegetation removal, and this warming effect is difficult to separate from harvesting effects on stream temperature (Dent and Walsh 1997).
2) At this expected level of attainment, stream monitoring studies are inconclusive because the variance of temperature measurement instruments is greater than the variance of the expected results. For example, measurement errors in water monitoring studies can be up to 0.5 °C (0.9°F) different, even when initially calibrated against a National Institute of Standards and Technology (NIST) thermometer. Reasons for the differential may include drift throughout the temperature range due to irregularities in hardware manufacture or programming algorithms, placement in the stream, or other factors.
3) Heat losses to stream temperature occur normally (e.g., stream bed conduction or groundwater inflows confound interpretation).
4) Proximity factors leading to stream temperature fluctuation over space and time cannot be separated out.

244. Comment: The EIS should analyze the contribution of sediment from a larger portion of the road network and its impacts to water quality. A 1997 study of channel network extension by forest roads in the western Cascades of Oregon found 57% of roads are hydrologically connected to streams (Wemple et al. 1996).

Response: Results for sediment delivery from roads planning criteria (refer to FEIS, *Appendix I-Water*) estimate that 36% of all roads on BLM-administered lands are within the likely sediment delivery distance. All streams mapped on the BLM GIS streams layer (updated prior to the Western Oregon Plan Revision) received a 200-foot sediment delivery buffer, and then the GIS roads layer was merged with the common areas of the streams and the sediment delivery data layer. This 200-foot coverage was based on the results of research within different geologies, and for different parts of the road corridor (cutslope, travelway, ditchline, fillslope) where mean sediment travel distances range from 12 feet to 126 feet (refer to *Chapter 3*, Water section).

The commenter notes that Wemple et al. (1996), in a study in the Cascades, found that 57% of all roads surveyed drained to stream channels. However, this study also reveals that 34% of the roads surveyed actually drain to stream channels, but the remaining 23% were ditch relief culverts draining to a gully that traveled a minimum of 35 feet below the road. The study notes that most of these gullies are discontinuous and do not link with a stream. Inasmuch as the emphasis of this paper focuses on the hydrologic implications of extension of stream channels by roads and not sediment delivery, it is inappropriate to use these results in the FEIS because there is not a sediment travel pathway from a discontinuous gully to a flowing stream.

Another monitoring study in western Oregon, where road systems were randomly sampled in watersheds within five physiographic provinces, found that for 285 miles of forest road, 25% drained directly to streams and another 6% were rated as possible (Skaugset and Allen 1998). The BLM estimation of road length with stream connectivity, although calculated differently, appears to be very similar to research and monitoring findings. Therefore, the BLM maintains that the portion of the road network analyzed is appropriate.

245. Comment: The EIS conclusions regarding water quality in relation to source water are flawed because they are inconsistent with DEQ/ODF Sufficiency Analysis February 28, 2001. The RMA boundaries and no cut zones along perennial streams under Alternatives 2 and 3 are similar to prescriptions in place on private lands that EPA, NMFS and USFWS have found are not sufficient to protect water quality and restore salmonid fisheries. We recommend the proposed action in the FEIS maintain the network of key watersheds as mapped under the No Action Alternative and continue to manage those areas consistent with direction obtained from watershed analyses and source water protection plans.

Response: The comparison of BLM Alternatives 2 and 3 to the DEQ/ODF Sufficiency Analysis and evaluation of Oregon Department of Forestry forest practices is not appropriate because the management prescriptions are far different. The commenter suggests that the boundaries of the Riparian Management Areas along perennial and intermittent streams under Alternatives 2 and 3 are similar to the Oregon Department of Forestry forest practices. However, there are large differences. The DEQ's source water guidance defines sensitive zones along streams within an eight-hour travel time to the withdrawal point of a public water supply, rather than whole watersheds (even if mapped for location purposes). Oftentimes, the entire sensitive zone or source water protection area is downstream of BLM-administered lands, or within perennial stream areas on BLM-administered lands, where the widths of Riparian Management Areas under the alternatives vary from 100 feet to approximately 440 feet.

Source water watershed locations have little correlation with key watersheds developed under the Northwest Forest Plan. Source water watersheds should be managed consistent with source water protection plans when they are developed. The FEIS concludes that streams contributing to source water sensitive zones from BLM-administered lands are adequately protected by BLM actions based on:

- a pattern of lands that are distant relative to many public water supply intakes
- Riparian Management Area designs that retain the functionality of stream systems and are expected to maintain water quality
- Best Management Practices that would be applied during projects where the objective of maintaining water quality is not expected to be attained

246. Comment: The EIS should be revised to ensure that the cumulative impacts of existing conditions and proposed actions on peak flows are analyzed and disclosed from soil compaction caused by grazing.

Response: Livestock grazing is currently allocated on approximately 560,000 acres in the Medford District and Klamath Falls Resource Area. However, under the PRMP Alternative in the FEIS, grazing authorizations would decrease to approximately 419,000 acres, which is a net reduction of 25% of the current grazing lands. The decrease represents allotments that are vacant and not currently grazed. Livestock distribute unevenly on the range resource, often being controlled by topography and the availability of water. For example, cattle and horses both generally prefer grazing on slopes less than 20%, unlike deer (Ganskopp and Vavra 1987). During the growing season, there is a propensity for increased grazing in riparian areas because of the low slopes, increased forage, and close availability of water.

Riparian areas in rangeland systems often comprise less than 5% of the watershed area. Within an allotment, compacted areas could occur from livestock hoof action. There is an array of variables including the type of livestock, season of use, and grazing system. Also, livestock may congregate on susceptible soils that lack adequate ground cover during wet conditions. The effects of livestock that may compact the ground surface are correlated with vegetation and soil properties. Different vegetation types show variation in responses to hoof action, which could affect the impacts of livestock on riparian areas (Kauffman et al. 1983). The proportion of sand, silt, and clay in soils determines their water-holding capacity and surface firmness during wet conditions.

Although there is an intuitive causal mechanism, the BLM is unaware of any specific range studies demonstrating livestock compaction and an effect on peak flows. This lack of specific studies may be due to livestock habits and livestock management in a watershed, where total compacted area is too limited to measure an effect.

Grazing evaluations done to determine specific effects are best performed at the project level. The BLM will manage livestock grazing in accordance with the *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington.* General guidelines include providing adequate vegetation and plant residue cover to promote infiltration, promoting surface soil conditions that support infiltration, and avoiding sub-surface soil compaction that retards movement of water in the soils. The FEIS closures of 25% of the analysis area rangelands, along with management and planned improvements of livestock fences and off-stream water development would have a beneficial effect on further reducing livestock compaction (see *Chapter 4*, Grazing section).

247. Comment: The EIS should be revised because the action alternatives would violate the Clean Water Act, as water quality management plans for 303(d) listed streams on BLM land would no longer be valid because the criteria and standards from the ACS would no longer apply to BLM lands with the WOPR action alternatives.

Response: The Aquatic Conservation Strategy (ACS) as defined under the Northwest Forest Plan does not confer any water quality standard. The BLM finds that ACS objectives are goal statements or concepts that cannot be reasonably measured under forest plan spatial and temporal scales. Where possible, important elements of the ACS objectives have been retained within the design of the alternatives and within Riparian Management Areas in the action alternatives. The environmental conclusions for the PRMP Alternative and other alternatives (including the No Action Alternative with ACS) in the FEIS, are that the alternatives meet water quality standards and nonpoint source TMDL waste-load allocations and, therefore, would not violate the Clean Water Act.

Currently, it is BLM's understanding that approved TMDLs by the Department of Environmental Quality and the Environmental Protection Agency, and appurtenant Water Quality Restoration Plans (WQRP), do not have provisions for updating when agency land management plans change. However, the BLM's portion of the nonpoint source TMDL waste-load allocations do not change, nor does the BLM commitment to maintain water quality. As a designated management agency, the BLM is working with the Department of Environmental quality to update WQRPs to reflect how BLM will meet the nonpoint source TMDL allocation.

248. Comment: The EIS conclusion (DEIS, page 723) that alternatives other than 2 and 3 would not result in increases in stream temperature that would affect fish habitat or populations is flawed because it conflicts with watershed analysis of Sucker Creek drainage in Josephine County that stream temperatures would increase due to Port-Orford-cedar mortality. Stream temperature analysis in the DEIS (page 756) is flawed because it does not take into account mortality of Port Orford cedar.

Response: *Chapter 4* (Fish and Water sections) have been clarified in the FEIS to show that the BLM conclusions regarding effective shade levels and effect on stream temperature do not include riparian areas along waterbodies with infected or infested Port-Orford-cedar (POC) forest stands. The mortality of Port-Orford-cedar within riparian areas has been previously analyzed under the FSEIS for *Management of Port-*

Orford-Cedar in Southern Oregon (2004). The Port-Orford-cedar infestations are limited to no more than 40 feet downslope from roads, except where streams or wet areas are present to facilitate further movement (Goheen et al. 1986). Further, Port-Orford-cedar infestations occur lineally, close to the stream channel. In a downstream direction, high risk vectors for Port-Orford-Cedar spread include water flowing in stream channels and connected off channel areas and floodplains. Predicted stream temperature increases from Port-Orford-cedar mortality were modeled within the Port-Orford-cedar FSEIS (Appendix 9). Results show that for small and large watersheds, temperature increases of no more than 0.5 to 1.2 °C per mile would occur where the first 15 feet of the stream-side stand is killed.

249. Comment: The DEIS analysis of OHV activity is flawed because it fails to adequately address point and non-point source discharge resulting from OHV use and the effects of OHV use on water quality, particularly drinking water.

Response: The FEIS recreation management actions for off-highway vehicle area designations (refer to *Chapter 2*, Alternatives section) indicate no acres in the "open" use designation, an increase from 2,156,712 acres to 2,373,908 acres in the limited designation, and an increase in the "closed" designation from 84,589 acres to 98,795 acres when comparing all alternatives against the No Action Alternative. For the action alternatives, Chapter 4 (Water section) has been corrected to show that these off-highway vehicle designations would have a positive impact on water quality compared to the No Action Alternative. This is because there is no open acreage where OHV traffic is allowed to have indiscriminate pathways across the land nor unrestricted access and crossing of streams. Within the largest designation of "limited," off-highway vehicles are restricted to existing roads and trails, and this acreage has been increased. The Best Management Practices for soil and water protection (*Appendix I-Water*) include more than 15 measures for off-highway vehicles. These conservation practices are expected to maintain water quality and are applied at the site level, where needed, regardless of whether the area is within a source water watershed or within the Timber Management Area.

250. Comment: The EIS should be revised to include an operational definition of Channel Migration Zone.

Response: Channel migration zone has been added to the glossary. It is the extent of lateral movement of a river across a floodplain toward the convex side of an original curve.

251. Comment: The EIS should explain how the BMPs outlined in the EIS are different from existing BMPs in order to allow a comparison of effectiveness in preventing resource damage.

Response: The BLM chose a Best Management Practice (BMP) framework in the FEIS that displays, side by side, a BMP by forest activity category, causative mechanism, and applicable water quality standards (see *Appendix I-Water*). This logic path shows potential pathways for nonpoint source pollution to affect water quality, the reference water quality standard, and the Best Management Practices that are expected to control such impairment. In contrast, past plans show objectives for categories of forest practices and corresponding Best Management Practices expected to minimize water quality degradation. However, in the past plans, primary causative mechanisms are not identified nor are the expected attainment level to maintain water quality.

The Best Management Practices in the FEIS, including those from past plans, were selected by resource professionals and determined to be effective through field trials or monitoring. A soil and water interdisciplinary team (IDT) compiled the Best Management Practices for the FEIS by reviewing BMPs in each district's current (1995) resource management plans. Those Best Management Practices that, in practice, are highly effective were included in the FEIS. The BMPs that showed marginal benefit through implementation or effectiveness monitoring, or professional experience, were not included in the FEIS. Furthermore, some Best Management Practices have been modified or deleted altogether due to improvements in forest technology, equipment, and methods or erosion control materials.

Each interdisciplinary team member worked individually on a specific category of forest practices and corresponding Best Management Practices; therefore, the merged lists cannot be easily disentangled to show additions or deletions from past plans. However, Best Management Practices were only included in the FEIS when there was consensus among the interdisciplinary team members following review. In some cases, these Best Management Practices were further modified where internal cooperators or public comments indicated revising them for clarity, or to address situations where Best Management Practices may have been overlooked.

Fire and Fuels

252. Comment: The EIS should disclose the degree of confidence in their estimates of how many trees might die post-fire, and the risk and consequences of false positive findings of tree mortality.

Response: Analysis of the effects of such disturbances prior to their occurrence and the possible associated salvage would require making so many speculative assumptions regarding specific circumstances that the conclusions of the analysis could not be used to make reasonably informed decisions regarding management action. Such detailed analysis is only possible after fire occurrence when specific circumstances can be analyzed. Determination of post-fire mortality is done after analysis of site-specific information such as fire severity, scorch height, species, and diameter of trees that were burned.

253. Comment: Table 213 of the DEIS should be revised to include another important principle of fire resiliency which is that an ample canopy cover helps provide cool, moist and less windy conditions and helps suppress the growth of ladder fuels.

Response: The EIS acknowledges the role of canopy cover in fire resiliency. Table 213 in the DEIS relates structural stages to various principles of fire resiliency. The amount of canopy cover cannot be derived from BLM data bases or structural stage information. The EIS acknowledges that a complete and detailed assessment of fire hazard and fire resiliency is dependent on site-specific stand conditions including canopy density, which cannot be modeled at the scale of analysis necessary for the Western Oregon Plan Revision.

254. Comment: The EIS should be revised to include wildfire modeling within the alternatives analysis.

Response: A detailed modeling of wildfire is dependent on many variables (e.g., location and weather conditions); therefore, such analysis would be so speculative as to have little utility. In addition, detailed modeling of wildfire behavior requires site-specific information that is unavailable at the scale of analysis of the Western Oregon Plan Revision. The analysis in the EIS is based on fire behavior models. Specific fire behavior models have been assigned to the various structure classes to provide examples of the surface fire behavior that can be expected from each structure class. This process facilitates the analysis of long-term effects on surface behavior between various alternatives as structure classes change over time.

The level of detail in the data is not sufficient to allow modeling with change over time by a more sophisticated model such as Flammap. The Flammap model, which would be necessary to model crown fire behavior, requires site-specific information. This type of fire behavior modeling is more appropriate at the landscape or project level. The analysis in the DEIS revealed the need to develop a silviculture prescription in the high fire frequency areas of Medford and Klamath Falls to address fire hazard and fire resiliency. The application, in the PRMP Alternative in the FEIS, of an uneven-age management prescription and area to which the prescription would be applied is a result of the information gained through analysis completed in the DEIS.

255. Comment: The EIS should analyze the impacts that increased fire risk would have on habitats and resources of concern. The EIS should take into consideration the following when determining the distribution of fuel treatments: the topographic diversity of the WOPR planning area and its unique weather patterns during fire season.

Response: The EIS analyzed fire severity, hazard and resiliency and also ranked the alternatives in terms of these factors. The analysis in the EIS included consideration of diversity within the planning area and unique weather patterns. Accordingly, the analysis was separated into different geographic areas to more effectively address topographic and weather conditions. In *Chapter 3* of the EIS, the burning index (degree of fire behavior) is discussed as a function of weather patterns. The EIS analysis addresses the importance of height to live crown and canopy base height. In addition, the significance of tree diameter and basal area were considered. Management direction was incorporated into the PRMP Alternative in the FEIS to address the dry forests of Medford and Klamath Falls in acknowledgement of fire risk to habitat and resources of concern.

256. Comment: The EIS should be revised to consider the effects altered fire regimes and increases in disturbance by fire will have on forest species. The EIS currently discloses the changes to fire regimes under the action alternatives but does not analyze impacts to biodiversity, listed species, big game, or other species.

Response: The Draft EIS analyzed the effects on listed species, big game, and other species that would result from the same changes in vegetation conditions that would result in changes in fire severity and fire hazard ratings. This analysis was included in the wildlife, botany, and fish sections. However, the Draft EIS did not specifically analyze the effects of future wildfires on species. The Draft EIS identified that there is inadequate information to predict the location, timing, severity, and extent of future wildfire. Additional discussion has been added to the Final EIS to provide more description of the general effects of wildfire.

Recreation, Wilderness, Wilderness Characteristics, Off Highway Vehicles

257. Comment: The EIS should be revised to explain the apparent contradiction concerning OHV designated areas. The planning document states that all alternatives would reduce the amount of OHV areas, but the EIS itself states that all alternatives would increase opportunities for OHV use.

Response: The action alternatives reduce the amount of acres of areas where motorized vehicles are permitted to travel cross country off existing trails (open areas). Due to the terrain and dense vegetation that characterizes much of the planning area, most OHV use occurs on existing trail surfaces. The change in designation from “open” to “limited” would not by itself result in a reduction of off-highway vehicle opportunity, since during the interim period before route designation, all existing routes would continue to be available for use. The determination of which of these existing trails would remain open for OHV recreation will be determined at a later date through the Comprehensive Travel Management Plans that will be completed after the plan revision is finalized.

Compared to the No Action Alternative, the action alternatives in the FEIS (including the PRMP Alternative) increase the number of areas in the planning area where off-highway vehicle recreation would be emphasized and receive focused management. The No Action Alternative has 3 OHV emphasis areas, and there are between 4 and 17 under the action alternatives. The perceived contradiction may be explained by the fact that OHV Emphasis Areas and Special Recreation Management Areas that focus on off-highway vehicle recreation improve OHV opportunity by enhancing the quality of the recreation experience through trail maintenance and other management activities, while at the same time reducing the areas open to unregulated OHV use.

258. Comment: The EIS should be revised to examine additional areas for wilderness characteristics. On the Medford District, the Wellington Mountain/Long Gulch, Dakubetede, Wild Rogue (including the Whiskey Creek area) and the Enchanted Forest roadless areas are all over 5,000 acres in size and should be protected as Wilderness Study Areas (WSA) like the Soda Mountain WSA. Failure to consider these areas as WSAs using updated inventories violates FLPMA. The BLM must assess the wilderness qualities in the WOPR and include the information in the ElS, regardless of whether the BLM believes that the areas are exempt from wilderness review due to the presence of O&C lands. See *Portland Audubon Society v. Lujan*, 998 F.2d 705, 709 (9th Cir. 1993) (NEPA was "passed after the O&C Act" and it applies "to all governmental actions having significant environmental impact, even though the actions may be authorized by other legislation"); *Portland Audubon Society v. Lujan*, 795 F.Supp. 1489, 1507 (D. Or. 1992) ("There is not an irreconcilable conflict in the attempt of the BLM to comply with both NEPA and the O&C Act").

Response: The Department of the Interior, Bureau of Land Management completed the wilderness review of public land in Oregon as required by the Federal Land Policy and Management Act (FLPMA) on October 7, 1991. The Oregon and California Railroad Company lands (O&C lands) were exempted from the wilderness review by the provision in Section 701 (b) of FLPMA that directs that the management of timber resources shall prevail on lands administered under the O&C Act when a conflict or inconsistency arises between the two Acts. The designation of wilderness study areas (WSAs) through the wilderness inventory and study process, and the subsequent management under the non-impairment standard required by FLPMA, was determined to be inconsistent with the management of these areas for timber resources. The BLM's authority to designate additional lands as Wilderness Study Areas expired on October 21, 1993 as affirmed in the agreement that BLM settled in *Utah v. Norton*.

The BLM may accord management protection for special values, including wilderness characteristics, through the land use planning process by the designation of Areas of Critical Environmental Concern and Special Recreation Management Areas, to the extent such designations are consistent with laws, regulations, and the resource management plan. The areas cited in the comment were evaluated by the Medford District to determine if they contained wilderness characteristics. Dakubetebe and Whiskey Creek were found to contain wilderness characteristics that included naturalness and were selected for ACEC designation in the PRMP Alternative in the FEIS. Wellington Mountain/Long Gulch was found to have outstanding opportunities for primitive and unconfined recreation, but did not warrant designation as a Special Recreation Management Area. The Enchanted Forest unit was not found to possess any wilderness characteristics.

259. Comment: The EIS should be revised to address all eligible and suitable Wild and Scenic Rivers, including considering potential additions and how the rivers would be protected.

Response: The eligibility determinations and suitability studies for all potential Wild and Scenic Rivers in the planning area were completed as part of each BLM's 1995 district resource management plans. New eligibility determinations and suitability studies would only occur if the BLM were to acquire additional acreage along potentially eligible rivers that warrant further study.

260. Comment: The EIS should be revised to include the Wild Rogue Additions for wilderness recommendation because the BLM itself noted the value of the large roadless areas for aesthetics, solitude, undeveloped recreational opportunities, wildlife, fisheries, water quality, and the intrinsic value of having wild, undeveloped places (see Version 2.0 of this analysis, issued in December 1999 and available online: http://www.blm.gov/or/districts/medford/plans/files/wild_rogue_north_wa_acc.pdf).

Response: The BLM completed the wilderness review of public land in Oregon as required by the Federal Land Policy and Management Act (FLPMA) on October 7, 1991. Much of the Oregon and California Railroad Company lands (O&C Lands) within the Wild Rogue Additions proposal were exempted from the wilderness review by the provision in Section 701 (b) of FLPMA that directs that the management of timber resources shall prevail on lands administered under the O&C Act when a conflict or inconsistency arises between the two Acts. The designation of wilderness study areas (WSAs), and the subsequent management of O&C lands under the non-impairment standard required by FLPMA, was determined to be inconsistent with management of these areas for timber resources. Currently, it is not possible for the BLM to designate additional lands as Wilderness Study Areas nor to recommend lands for designation as wilderness since the BLM's authority to designate WSAs expired on October 21, 1993, as affirmed in the agreement that BLM settled in *Utah v. Norton*.

The BLM may accord management protection for special values, including wilderness characteristics, through the land use planning process by the designation of Areas of Critical Environmental Concern and Special Recreation Management Areas, to the extent such designations are consistent with laws, regulations, and the resource management plan. The areas cited in the comment were evaluated by the Medford District to determine if they contained wilderness characteristics. Dakubetebe and Whiskey Creek were found to contain wilderness characteristics that included naturalness and were selected for ACEC designation in the PRMP Alternative in the FEIS. Wellington Mountain/Long Gulch was found to have outstanding opportunities for primitive and unconfined recreation, but did not warrant designation as a Special Recreation Management Area. The Enchanted Forest unit was not found to possess any wilderness characteristics.

261. Comment: The EIS should consider and disclose the effects of the action alternatives on State Scenic Rivers, including the area of O&C lands within state scenic river corridors and the effects of the proposed action on these rivers, and whether or not BLM would need a permit to comply with requirements related to these rivers.

Response: The EIS analyzed the effects of the action alternatives on all river segment corridors that are designated, suitable, or eligible for inclusion in the National Wild and Scenic Rivers System on the lands administered by the Bureau of Land Management within the planning area. The analysis examined the effects of the alternatives on 78 river corridors that were a 0.25-mile wide on each side of each river segment. These river corridors overlap with the eight State Scenic Waterways that have been designated within the planning area.

262. Comment: The EIS should be revised to address the enforcement and management challenges, such as the need to increase police funds and staff, which are likely to arise due to the planned increase in OHV emphasis areas with the implementation of any of the action alternatives.

Response: Operations and maintenance issues are implementation level concerns that are addressed by recreation area plans rather than at the resource management plan level. The EIS includes an overall estimate of the BLM staffing and budgets that would occur under the alternatives.

263. Comment: The DEIS analysis of the Anderson Butte OHV Emphasis Area is flawed because it does not consider effects on the complex mosaic of ecosystems on the south slopes of Anderson Butte and because it ignores the fact that 11,094 acres of designated Deer Habitat Management Area, also known as critical deer winter range are within the 11,742-acre Anderson Butte OHV Emphasis area.

Response: The Anderson Butte area has been designated for only limited motorized vehicle use on designated routes and trails in order to limit environmental impacts from OHV use. The routes and trails that will be open to motorized vehicle use will be determined through development of a Comprehensive Travel Management Plan and associated environmental analysis, as appropriate, which will be completed after the Western Oregon Plan Revision Record of Decision.

The designation of these routes and trails will be consistent with the criteria outlined under BLM's regulatory requirements in 43 CFR 8342.1. These designation criteria require that trails be located so as to:

(a) Minimize damage to soil, watershed, vegetation, air or other resources of the public lands.
(b) Minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats.
(c) Minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

264. Comment: The EIS should be revised to explain why it predicts a 27 percent increase in non-motorized recreation and a 5 percent increase in motorized recreation, but does not focus on how the action alternatives would foster providing quality areas for non-motorized recreation.

Response: Most of the potential recreation trails and potential recreation sites in the 1995 resource management plans would be carried forward under the action alternatives, and 26 new potential recreation sites and 29 new potential recreation trails would be identified. Most of these sites and trails would provide benefits to support non-motorized recreation in recognition of the growing demand for these opportunities throughout the planning area.

265. Comment: Appendix K of the EIS should be revised to clarify the criteria used to define wilderness characteristics. Appendix K currently specifies that the wilderness characteristics must be in a roadless area of 5,000 acres, or a smaller roadless area of sufficient size to make its preservation practical, or adjacent to a U.S. Forest Service roadless area such that the combined acreage is a minimum of 5,000 acres (K-1257). Appendix K goes on to assert that the "size of the roadless area is a critical factor in the determination of the presence or absence of individual wilderness characteristics, since such characteristics are dependent on the sufficient size of the roadless areas (K-1258)." This latter statement is entirely circular and inconsistent with BLM's current guidance.

Response: The BLM's current policy outlined in Instruction Memorandum No. 2003-275, Consideration of Wilderness Characteristics in Land Use Plans, makes no mention of minimum size criteria as a precursor to determining if an area possesses the wilderness characteristics of naturalness; outstanding opportunities for primitive and unconfined recreation; and outstanding opportunities for solitude. For the purposes of establishing objective scale, roadless areas of at least 5,000 acres are generally considered large enough to support the wilderness characteristics of naturalness, outstanding opportunities for primitive and unconfined recreation, and solitude. However, there are four exceptions in which smaller areas can be considered to meet the minimum size criteria:

(1) Roadless areas that represent an unusual situation when they are less than 5,000 acres, but because of their topography, vegetative screening, or other features are considered large enough to provide for preservation and use in an unimpaired condition.

(2) Roadless islands of any size.
(3) Roadless areas that are contiguous with a Wilderness Area managed by BLM or another agency.
(4) Roadless areas that overlap the boundary of another agency when the BLM portion is less than 5,000 acres, and the other agency has authority to manage components of the National Wilderness Preservation System (Forest Service, National Park Service, U.S. Fish and Wildlife Service).

The *Wilderness Appendix* has been revised to clarify this distinction in the evaluation criteria.

Soil

266. Comment: The EIS should include an analysis that quantifies the magnitude of road-related sediment sources. The EIS should identify sites for road upgrades and/or restoration treatment in order to mitigate these effects. These predictable and definable sediment sources are found all along the 14,000 miles of existing forest roads in the Plan area and the EIS fails to address these ongoing threats.

Response: The analysis identifies the potential delivery of fine sediment by existing and proposed roads, and the magnitude of the effects are described in terms of tons/square mile/year. These estimates are based on the road surface type for each fifth-field watershed and summed for the planning area.

The identification of specific road upgrades and restoration treatment of 14,000 miles of roads within the planning unit is not practicable in the large scale analysis of the Western Oregon Plan Revision effort. Specific road upgrades or restoration treatments will be addressed through the site-specific analysis and planning associated with implementing the approved RMP.

267. Comment: The EIS should be revised to identify the cumulative impacts of all sources of sediment and not adopt the reasoning that one sediment source will mask other sources.

Response: The risks of sedimentation are described in the EIS. The EIS does not assert that one source of sediment will “mask” the effects of another. However, based on a review of the literature, the EIS states that it appears road runoff and landslides in the planning area are the primary sources of sediment in terms of the volume of material moved. The EIS has estimated the potential delivery of fine sediment by road runoff in terms of tons/square mile/year for the planning area in the Water section of *Chapter 4*. This estimate is based on a reasonable assumption of the soils and geology the roads will be built on. The analysis in the EIS estimated the impacts of sedimentation from all sources that would occur in the event no revision of the plans are made. The analysis then compared that to the sedimentation that would occur for each of the action alternatives under detailed consideration. The difference in sedimentation impacts between the No Action Alternative and each of the action alternatives is the incremental effect (i.e., the cumulative effect of each of those alternatives).

Grazing

268. Comment: Grazing reduces the density and vigor of grasses that usually outcompete tree seedlings, leading to dense stands of fire-prone small trees. Cows also decrease the abundance of fine fuels that are necessary to carry periodic, low intensity fires. This reduces the frequency of fires, but increases their severity (Belsky and Blumenthal 1997, Wuethner 2003). The EIS should be revised to further analyze these livestock grazing effects on forest health, as well as outline possible mitigation measures to avoid these negative effects.

Response: All alternatives provide for the control of tree density through thinning to prevent the development of over-dense forest stands and to reduce fire hazard.

The commenter cites references that suggest grazing reduces the density and vigor of grasses leading to dense stands of fire-prone small trees. The conclusions in those studies are not applicable, because they are based on circumstances that do not currently exist on BLM-administered lands in the planning area and practices that would not occur under any of the alternatives. In addition, recent studies (Hosten 2007) in southwest Oregon suggest that native perennial grasses have increased in response to improved management of livestock and, therefore, livestock grazing is not playing a major role in altering forests (grazing on BLM-administered lands only occurs in southwest Oregon).

Areas of Critical Environmental Concern

269. Comment: The EIS should be revised to provide justification and analysis for removal of the existing Baker Cypress Area of Critical Environmental Concern (ACEC). The Baker Cypress meets the importance and relevance criteria for an ACEC, yet it's being removed under all action alternatives.

Response: The BLM would manage ACECs where their management would not conflict with sustained yield forest management in areas allocated to timber production on O&C lands. The Baker Cypress ACEC continues to meet the relevance and importance criteria; however, it occurs within the Timber Management Area land use allocation under all action alternatives, and the special management attention required to maintain the relevant and important values conflicts with the purpose and need described in *Chapter 1* of the EIS for managing the O&C timberlands.

270. Comment: The EIS should be revised to provide justification and analysis for removal of the existing Sterling Mine Ditch ACEC. This area includes an important trail, historic mining trail and special status plants, yet no justification is provided from removing the ACEC.

Response: The Sterling Mine Ditch was incorrectly included on Table 285 in the DEIS appendices. The Sterling Mine Ditch is protected under the National Historic Preservation Act as eligible for listing and, therefore, does not require special management attention through designation as an ACEC.

271. Comment: The EIS should be revised to clarify how the Crabtree Valley ACEC will be managed under Alternative 2. The Alternative 2 map shows the entire ACEC/Research Natural Area (RNA) as administratively withdrawn, but Appendix M in the DEIS says the ACEC without O&C lands will be managed as an ACEC. This means everything outside of section 16 (which is public domain), would be part of the timber base and not specially managed to maintain or enhance R&I values. In addition, the DEIS (page 807) states that all RNAs would be retained.

Response: The Crabtree Complex Research Natural Area (RNA)/Outstanding Natural Area (ONA) encompasses two existing RNAs (Shafer Creek and Carolyn's Crown) and the existing Crabtree Lake ONA. Appendix M includes these three areas under the Crabtree Complex RNA/ONA. The two RNAs would continue to be retained under all alternatives in their entirety. The Crabtree Lake ONA includes Timber Management Areas that are on O&C lands under Alternatives 2 and 3; only the areas outside of the Timber Management Area within the O&C lands area would be designated under these alternatives.

272. Comment: The EIS should be revised to include the Jimbo Mountain and Marten Creek ACEC under Alternative 2 because the area has been found to meet ACEC eligibility criteria, and it requires special management attention to protect its important and relevant values. This status is needed to protect the area's late-seral and old-growth habitat from inappropriate logging practices (allowed in the AMA designation under the NWFP] that would degrade or destroy these special values.

Response: Jimbo Mountain and Marten Creek are included within the boundaries of the proposed Lower Elevation Headwaters of the McKenzie River ACEC. Jimbo Mountain and Marten Creek were not analyzed as a separate ACEC. The Lower Elevation Headwaters of the McKenzie River occur within the Timber Management Area on O&C lands under all action alternatives, and the special management attention required to maintain the relevant and important values conflicts with O&C timber management.

273. Comment: The EIS should be revised to provide justification why proposed ACECs did not meet the relevance and importance criteria and subsequently were not included in the EIS.

Response: The proposed ACECs in each BLM district were reviewed by district staff against the eligibility criteria. The reason that proposed ACECs were not given ACEC status under the action alternatives is because they did not met criteria for importance and relevance; did not need special management attention; or conflicted with sustained yield timber management on O&C lands. The documentation of the reviews by district staff is part of the administrative record.

274. Comment: The EIS should be revised to include an analysis of the impacts associated with removing ACEC designations in the Eugene District (specifically Coburg Hills and Dorena Lake Relic Forest Islands, Cougar Mountain Yew Grove, and Cottage Grove Old-Growth Environmental Education Area) under Alternative 2, because removing designations is contrary to the1995 ROD. The ROD states, "Preserve, protect or restore native species composition and ecological processes of biological communities in ACEC. ACEC, especially RNA, will be available for short or long term scientific study, research and education and will serve as a baseline against which human impacts on natural systems can be measured."

Response: The 1995 record of decision is being revised in this decision, and subsequent revisions of plans are not required to comply with the plan they are revising. Such a rule would prevent any plan from ever being changed once adopted.

The BLM would manage ACECs on O&C lands where management of the ACEC would not conflict with sustained yield forest management in areas dedicated to timber production. All RNAs, regardless of land status, are retained in all action alternatives since their scientific value is relevant to sustained yield forest management. Several Areas of Critical Environmental Concern that are on O&C lands (including Coburg Hills and Dorena Lake Relic Forest Islands, and Cougar Mountain Yew Grove) and that are not also Research Natural Areas occur within the Timber Management Area under one or more action alternatives. Special management attention required to maintain the relevant and important values of these areas conflicts with the purpose and need described in *Chapter 1* of the EIS for managing the O&C timberlands.

The Cottage Grove Old Growth Environmental Education Area (EEA) was incorrectly included on the ACEC table in Appendix M of the DEIS. This area will continue to be managed as an EEA and is included in the Recreation section in the Final EIS.

275. Comment: The proposed Waldo-Takilma ACEC boundary should be revised to include sections 26 & 36 (T4OS, RO5E) on the slopes of Hope Mountain; in Section 3 (T4IS, RO5E) on the saddle between Scotch and Cedar Gulches; and in Section 10 (T41 S: RO5E) on the east side of Takilma Road across from Long Gulch, because they do not appear to be included. These areas are as worthy as the recommended ones and their inclusion will strengthen the ACEC in retaining its outstandingly remarkable ecological and historical attributes.

Response: The DEIS maps did not show the entire proposed Waldo-Takilma ACEC boundary. This has been corrected in the Final EIS. It is likely that the commenter mistakenly listed the wrong range for these areas since Range 5 East is in California. The disjunct parcels included in the proposed Waldo-Takilma ACEC are located in Township 40 South, Range 8 East, Sections 26 and 35 (Section 36 is privately owned) and Township 41 South, Range 8 East, Sections 3 and 10.

276. Comment: The EIS should designate the "Low Elevation Headwaters of the McKenzie River" ACEC for recreational, scenic, and wildlife values.

Response: The proposed Lower Elevation Headwaters of the McKenzie River ACEC occurs within the Timber Management Area on O&C lands under all action alternatives. The special management attention required to maintain the relevant and important values conflicts with the purpose and need described in *Chapter 1* of the EIS for managing the O&C timberlands.

Cultural

277. Comment: The EIS should be revised to state that any land transfers/disposals within the original boundaries of the Siletz (Coast) Reservation should be initially offered to the Confederated Tribes of the Siletz Indians, because it is the tribe's position that the intent of the 1855 Executive Order was to create as permanent the Siletz (Coast) Reservation.

In addition, the EIS should be revised to recognize the Confederated Tribes of the Siletz Indians in the following ways:

1. Since several of the parcels identified for disposal are within one of the four areas in which the Siletz Tribe has an interest in acquiring land, it is suggested that the language be revised to read, "Suitability of the land for management by another Federal agency or Federally Recognized Indian Tribe" instead of "Suitability of the land for management by another Federal agency."
2. Add a criterion to this section that reads "Disposal assists a Federally Recognized Tribe in restoring its land base pursuant to the Indian Reorganization Ac4 25 Usc 465."
3. Add a fifth criterion for disposal: "Disposal would be beneficial to the Federally Recognized Indian Tribe with the strongest ancestral and legal successorship ties to the parcels in question."

Response: The BLM will follow the land disposal process as set forth in 43 USC 1713 (Federal Land Policy and Management Act of 1976), Title 2, Sec. 203 – 214. The Secretary does have authority, under 25 USC §450j(f), to donate real property found to be in excess of the needs of the Federal government.

Comment Letters From Congressional Representatives, Indian Tribes, and Government Agencies

On the following pages are the comment letters that the BLM received from congressional representatives; federal, state and local governments; and Indian Tribes.

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SUBCOMMITTEE ON PUBLIC LANDS AND FORESTS
SPECIAL COMMITTEE ON AGING
SELECT COMMITTEE ON INTELLIGENCE
COMMITTEE ON FINANCE

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September 25, 2007

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State Director's Office

Ed Shepard
State Director
Bureau of Land Management
333 S.W. 1st Avenue
Portland, Oregon 97204

Dear Mr. Shepard:

I have heard from County Commissioners and other constituents from several Oregon O&C counties regarding their concerns about the limited opportunity for meaningful public review and comment for the Western Oregon Plan Revisions (WOPR). Due to their concerns, and the breadth, complexity and importance of this proposal, I am writing to support their requests for a 120 day extension of the review period.

The WOPR is a voluminous document with huge implications for Oregon and the Pacific Northwest. Over 1,600 pages are included in the Draft Environmental Impact Statement, including 310 tables, 348 figures and 35 maps. Not only is this a massive document that is complex for the public to read, assess and analyze, the conclusions in the WOPR DEIS rely on additional maps, models and related GIS files. The substantial amount of material and data makes it challenging for both elected officials and the public-at-large to provide a thoughtful review within the 90-day comment period. In addition, it has come to my attention that several public outreach sessions were moved with limited notice, resulting in interested parties being denied the opportunity to participate. This underscores the need for additional time for further review and participation in the public process.

I know that a great deal of work has gone into the preparation of the WOPR and that the Bureau of Land Management has invested significantly in preparation of the materials and the accompanying public outreach. As merits such a significant and important effort, I would urge that requests to extend the public comment period be granted.

Sincerely,

Ron Wyden

Ron Wyden
United States Senate

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COQUILLE INDIAN TRIBE

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RECEIVED
JAN 11 2008

January 9, 2008

Ed Shepard, State Director OR/WA.
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Re: Western Oregon Plan Revision EIS comments

Mr. Shepard,

The Coquille Indian Tribe (the "Tribe") appreciates the opportunity to participate in the Western Oregon Plan Revision (WOPR) process. This is truly the most intensive environmental analysis that has been undertaken by a federal agency in the Pacific Northwest; we applaud the BLM's efforts. We have reviewed the WOPR draft EIS and provide the following comments:

BACKGROUND:

The Tribe manages 5,410 acres of forest land, the "Coquille Forest", within the WOPR planning area. Congress transferred the Coquille Forest to the Tribe to be held in trust by the Assistant Secretary of the Interior (P.L. 101-42) (The "Coquille Forest Act"). In the Coquille Forest Act, Congress requires the Secretary of the Interior to manage these forest lands subject to the standards and guidelines of plans of nearby or adjacent federal lands. The most "nearby" and adjacent Federal forest lands are Coos Bay District BLM O&C lands subject to this WOPR process. Therefore, federal law places the BLM in a position to establish the minimum standards and guidelines for management of the Coquille Forest. Because the management of the Coquille Forest has great bearing on the Tribe's Self-Sufficiency, the WOPR process, by definition involves a great degree of control over the use and management of this trust asset and the welfare of Coquille Tribal members.

It is well-established that the Department of Interior must act in the best interest of tribes when developing or administering management plans that effect trust assets. This U.S. Supreme Court has indisputably established this trust obligation, specifically in the context of the management of Indian forest lands. United States v. Mitchell, 463 U.S. 206, 224 (1983) (commonly referred to as "Mitchell II"). This forestland trust obligation extends to the WOPR process and its resulting management plan. Establishment of a Tribal Cooperative Management Area (TCMA) as proposed by the Tribe is the means by which BLM may satisfy this obligation in this context.

CHAPTER 1—PURPOSE AND NEED

PP. 3-7—The purpose and need for the plan revisions should be revised to include a brief discussion about the Department of the Interior's trust obligation to Tribal forestlands as well as a background on the unique management requirements for the Coquille Forest Lands. The discussion described here is necessary to establish the "need" for analyzing the TCMA management direction on federal lands in this DEIS. The discussion on the top of page 20 could be re-worded slightly to include this necessary legal background.

CHAPTER 2—ALTERNATIVES

Although none of the alternatives completely meet all of the needs of the Tribe, the Alternative 2, most closely fits the Tribal forest management goals, while providing the economic benefits to the Counties, and protections for the environment.

In light of the Supreme Court's decision in Natl. Ass'n of Homebuilders v. Defenders of Wildlife, 127 S. Ct. 2518, 168 L.Ed.2d 467 (June 25, 2007), we believe that BLM must first establish and define the non-discretionary duties mandated by the O&C Act. Only after completion of that process should the document determine what discretion is permissible under Federal environmental laws. This evaluation is imperative because the O&C Act itself constitutes the very motivation for this WOPR planning process. The document must expressly state what the requirements of the O&C Act are, whether the selected alternative(s) comply with that Act, and why or why not the alternative deviates from the O&C Act requirements. We assert that, if the O&C Act is the dominant use act, the alternative must yield to it. If you determine that the O&C Act is not the dominate use act, the document should include your analysis to reach this conclusion, including citations to relevant legal sources.

PP. 84 — The TCMA area should be better defined. The number of acres is not arbitrary, the proposed 15,000 acres represent those BLM lands that are both within 1/2 mile of tribal lands and within shared watersheds.

CHAPTER 3— AFFECTED ENVIRONMENT

Map 16 (pg. 165) — This map is hard to read; this should be a colored map that shows the TCMA area (BLM lands), the Tribal lands, and shared watershed boundaries.

CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

Spotted Owls and Marbled Murrelets

The use of suitable habitat to assess affects on Northern Spotted Owls (NSO) and Marbled Murrelets (MAMU) is confusing to the reader. There are no clear definitions of suitable habitat for these species in the document. The definition on page 868 is vague, and needs refinement. We suggest defining suitable habitat based on individual species needs.

Although page 637 states: "*[e]ffects to populations were not analyzed because population size is affected by numerous factors other than habitat*", the way that the analysis is written makes the reader assume that changes in habitat are synonymous with changes in population. This statement needs clarification.

The differences between suitable habitat and critical habitat should be made clearer. In addition, further clarification as to why suitable habitat was used to analyze effects to NSO and MAMU as opposed to population is needed. Is there population data that can be assessed? This document never addresses current occupancy by NSO and MAMU on BLM lands.

Does the establishment of LSMA's for maintaining MAMU and NSO habitat, conflict with the O&C Act?

If LSMAs are created in areas where occupancy has not been determined, then the establishment of these areas would be arbitrary and capricious. These areas would not meet the O&C act, nor would these areas fall under the BLM's mandate under Section 7 of the ESA..

> *"insure that any action authorized, funded, or carried out" by the agency "is not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of habitat of such species." 16 U.S.C. § 1536(a)(2).*

Without appropriate surveys to verify occupancy, there is not enough scientific evidence to support the development of LSMAs. According to the 9th Circuit Court of Appeals case Oregon Natural Resources v. Allen, No. 05-8350 (July 28, 2006), habitat cannot be used as a surrogate for Jeopardy; there must be a numerical measurement for take.

ADDITIONAL COMMENTS

In order to meet the O&C act in LSMA areas, the BLM might want to consider a more intensive management strategy in these areas.

Although the NEPA process requires a federal agency to analyze the worse case scenario, it might be important for the BLM to point out that the economic and environmental effects in this analysis have been overstated to reflect the worse case, and that it would take some period before these effects would be seen, if at all.

Under the current Northwest Forest Plan, the BLM and other agencies managing federal lands with the range of the Northern Spotted Owl are required to conduct monitoring of the effects of implementation of the Plan's Standards and Guidelines. One element of monitoring identified in the Record of Decision for the Plan is "American Indians and Their Culture" (ROD Implementation E-9). Effectiveness monitoring under the Plan is to take place at 10-year intervals. The results of the tribal monitoring component for the first 10-year period were completed in 2003 and published as: "Northwest Forest Plan – The First Ten Years (1994-2003) Effectiveness of the Federal-Tribal Relationship" (R6-RPM-TP-02-2006). This important tribal monitoring component needs to be incorporated into the monitoring strategy of the WOPR and subsequent management plans.

Thank you for the opportunity to provide comments to the BLM regarding the Western Oregon Plan Revision Draft Environmental Impact Statement.

Sincerely,

Edward L. Metcalf

Edward L. Metcalf, Tribal Council Chairman
Coquille Indian Tribe

CC: Dick Prather
Western Oregon Plan Revisions
P.O. Box 2965, Portland, OR 97208

CONFEDERATED TRIBES OF SILETZ INDIANS

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Confederated Tribes of Siletz Indians
P.O. Box 549 Siletz, Oregon 97380
(541) 444-2532 • 1-800-922-1399 • FAX: (541) 444-2307

December 14, 2007

Team Leader
Western Oregon Plan Revisions Office
P.O. Box 2965
Portland, OR 97208

Dear Team Leader:

On behalf of the Confederated Tribes of Siletz Indians, I offer the following comments regarding the Bureau of Land Management's Western Oregon Plan Revisions. I am writing this letter in support of the Lands Actions as described in Appendix O, and I am suggesting modifications in those actions that would support the Siletz Tribe's efforts at increasing its land base.

The Confederated Tribes of Siletz Indians is a federally recognized tribe, headquartered in Siletz, Oregon. Our tribe has over 4,000 enrolled members. Most live in the area covered by the Western Oregon Plan Revisions.

One goal of the Siletz Tribe is to consolidate and diversify its land base to support sustainable economic growth. The Tribal economy is reliant on a sovereign land base, its resource stewardship, and its economic commodities to provide a cornerstone for sustainable economic growth and stability. The Tribal economy, in turn, supports tribal services including health care, housing, and educational and employment opportunities. As a self-governance tribe, the Siletz Tribe is steadily building its capacity to operate such programs sufficient to serve the growing memberships' needs. The Western Oregon Plan Revisions offer your agency a unique opportunity to help the Siletz Tribe achieve economic growth and meet the needs of tribal members by targeting land disposal actions to benefit federally recognized Indian tribes.

There are four geographic scales for which we are interested in the proposed Lands Actions. The first is our ancestral lands. In pre-contact times, the ancestors of the Confederated Tribes of Siletz Indians belonged to over 25 diverse tribes from western Oregon and Northern California. Because of the diversity of the bands that comprise our ancestors, our ancestral land in Oregon stretches from the Oregon coast to the crest of the Cascade Mountains, from the Columbia River to the California state line. Any land disposal action within this area, including exchanges or sales, would be of inherent interest to our tribe. Land exchanges or disposals to non-Tribal entities could have adverse affects on areas important to our culture. Additionally, we would be interested in any land acquisition opportunities that may arise throughout the Western Oregon Plan Revision affected area, so we may manage and protect resources important to our culture.

The second scale of interest to the Siletz Tribe is land within the original boundaries of the Coast (Siletz) Reservation. Our Siletz Reservation was established by an Executive Order, signed by President Franklin Pierce on November 9th, 1855, and originally contained over 1.1 million acres. The establishment of a permanent reservation was called for by several treaties signed with our western Oregon Tribes as early as 1853, which had been ratified and proclaimed law by the President prior to the 1855 Executive Order. In particular, the Rogue River Treaty of September 10, 1853, established a "temporary reservation" in the Rogue Valley (Table Rock) "until a suitable selection shall be made by the direction of the President of the United States for their ***permanent*** residence, and buildings erected thereon, and provision made for their removal" (emphasis added). The original Coast Reservation boundary included all the lands from Cape Lookout to the divide between the Siuslaw and Smith Rivers, including all that drained into Siltcoos Lake and Siltcoos River and eastward to the western boundary of the 8th Range of Townships West of the Willamette Meridian. The map that accompanied the Executive Order confirms this description. Under the language of the Rogue River Treaty, the President only had power to create a permanent reservation in discontinuing the temporary Table Rock Reservation and others like it in Western Oregon. He did not have the discretion to make the Coast Reservation "temporary" under the language of the treaty. In spite of this, our reservation was systematically dismantled by having large chunks opened to settlement without our consent. Our position is that the intent of the 1855 Executive Order was to create as permanent the Siletz (Coast) Reservation. Therefore, any land transfers/disposals within the original boundaries of the Siletz (Coast) Reservation should be initially offered to the Confederated Tribes of Siletz Indians.

The third scale of interest to the Siletz Tribe is our 11-county "service area." The Siletz Tribe was terminated by the Western Oregon Indians Termination Act of 1954, 25 U.S.C. § 691 *et seq.* In 1977, Congress restored the Siletz Tribe to federally recognized status (25 U.S.C. § 711, et seq.), but a land base for the Tribe was not restored at the same time. The Siletz Reservation Act of 1980 created a 3,600-acre permanent reservation, but it consisted only of small scattered parcels around Siletz. Since restoration, we have been able to add to our land base through the Bureau of Indian Affairs' "fee to trust" process, but our land base is still inadequate to meet the needs of our members. Because many federal programs for which Indians and Indian tribes are eligible require residence on or near an Indian reservation, Congress created a Siletz "Service Area" that was deemed equivalent to an Indian reservation for purposes of qualification for federal services and programs. The Siletz Service Area includes the counties of Lincoln, Benton, Linn, Lane, Multnomah, Polk, Washington, Yamhill, Marion, Clackamas, and Tillamook. Land acquisition opportunities in these 11 counties where we could provide housing, economic opportunities, or services to tribal members would directly benefit the Siletz Tribe. In fact, some years ago, BLM and CTSI were working together with the Oregon Congressional delegation to transfer the public domain land in Lincoln County to the Siletz Tribe. Unfortunately, there was not enough support among Oregon's Congressional delegation to make it happen. Regardless, we remain interested in acquiring the public domain land in Lincoln County. We would like an opportunity to revisit this issue in the near future.

The fourth and smallest scale of interest to the Siletz Tribe is our Tribal Land Consolidation Area. The Indian Reorganization Act of 1934 (IRA), 25 U.S.C. § 465, allows the Secretary of Interior, at his or her discretion, to take land into trust for the benefit of an Indian tribe or of individual Indians. The Bureau of Indian Affairs adopted regulations to implement the provisions of the IRA (see 25 CFR 151.3(a)(1)). These regulations allow for acquisition of land into trust when the land lies within the exterior boundaries of an established reservation, or when the land is within a tribal consolidation area. In 1980, the Bureau of Indian Affairs Northwest Regional Director adopted a consolidation area for the Siletz Tribe. Acquisition of land within the Consolidation Area is important to the Siletz Tribe because these lands are centered around the community of Siletz, which is the historic, cultural, and social center of the tribe. The consolidation area consists of the following area:

Township 9 South, Range 11 West;
Township 9 South, Range 10 West;
Township 9 South, Range 9 West;
Township 10 South, Range 11 West;
Township 10 South, Range 10 West;
Township 10 South, Range 9 West; and
Portion of Township 10 South, Range 8 West,
Willamette Meridian, Lincoln County, Oregon.

I have three suggested modifications in Appendix O that would recognize our tribe's historic and cultural ties to the land. First, on page O-1361, one of the "General Land Tenure Adjustment Evaluation Factors" reads, "Suitability of the land for management by another Federal agency." You allocate many parcels of land for Land Tenure Zone 3 (disposal). Several of those parcels are within one of the four aforementioned areas in which the Siletz Tribe has an interest in acquiring land. I suggest an amendment to that factor, so that it reads "Suitability of the land for management by another Federal agency ***or Federally Recognized Indian Tribe***." Second, I proposed that another criterion in this section should be "***Disposal assists a Federally Recognized Tribe in restoring its land base pursuant to the Indian Reorganization Act, 25 USC § 465.***"

Third, on page O-1362, you list four criteria for disposal. I suggest adding a fifth criterion: "***Disposal would be beneficial to the Federally Recognized Indian Tribe with the strongest ancestral and legal successorship ties to the parcels in question.***"

With this amended language, if the Siletz Tribe and the Bureau ever entered into a planning process for transferring ownership to the Bureau of Indian Affairs or the Siletz Tribe directly, the actions would clearly be in conformance with your land use plan, which will be important when you consider specific proposals.

Thank you for the opportunity to provide comments on the plan revisions. My hope is that your agency and the Tribe can develop a mutually beneficial relationship in achieving our goals.

Sincerely,

Delores Pigsley
Tribal Chairman

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

1962

January 11, 2008

Mr. Edward W. Shepard
Bureau of Land Management State Director
Oregon State Office
P.O. Box 2965
Portland, Oregon 97208

Re: Review of Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts

Dear Mr. ~~Shepard~~ Ed:

The National Oceanic and Atmospheric Administration (NOAA) is pleased to provide comments on the draft environmental impact statement (DEIS) for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management (BLM) Districts of Salem, Eugene, Coos Bay, Roseburg, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District, dated August, 2007. According to the DEIS, the BLM proposes to revise the resource management plans for each of the districts, and provide guidance for future management of approximately 2.6 million acres of public and tribal land in the coastal mountains and on the west slope of the Cascade Mountains in Oregon.

In August, 2007, a team from the Northwest Region of NOAA's National Marine Fisheries Service (NMFS) met with a team of your staff to discuss potential issues with the DEIS analyses, provide a list of preliminary comments, and request additional information on various aspects of the analyses. The comments provided at the August meeting should be considered and incorporated into the final environmental impact statement (FEIS), as appropriate.

In addition to those previously provided comments, NMFS has enclosed additional comments that have arisen following a thorough review of the DEIS. The comments are based on a review by my Habitat Conservation Division staff, as well as by staff of NMFS' Northwest Fisheries Science Center (NWFSC). The NMFS is providing these comments due to our responsibilities to manage, conserve, and protect marine and coastal living resources as provided under the Endangered Species Act (ESA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and the Fish and Wildlife Coordination Act. In all cases, the comments are relevant, either directly or indirectly, to NMFS' responsibilities under the aforementioned statutes, and are consistent with the agency's regulatory obligation to its trust resources.

These comments do not satisfy the obligation of the BLM to consult under the ESA or MSA on the selected alternative. The following species of Pacific salmon and steelhead that are listed or proposed for listing under the ESA occur within the planning area for the proposed action: Lower Columbia River and Upper Willamette River Chinook salmon; Southern Oregon/Northern California Coast, Oregon Coast, and Lower Columbia River coho salmon; Columbia River chum salmon; and Upper Willamette River and Lower Columbia River steelhead. All of the above species are listed as threatened, except for Oregon Coast coho salmon, which are proposed for listing as threatened. NMFS has also designated critical habitat for all of the above listed species except Lower Columbia River coho salmon. Essential fish habitat also has been designated under the MSA for Chinook salmon and coho salmon within the planning area.

The following is a summary of the major issues with the DEIS and with the preferred alternative that NMFS found in its review of the DEIS:

1. The DEIS does not contain a coherent and cohesive conservation strategy for anadromous fish and their habitat in any of the action alternatives. A clearly defined, scientifically-robust strategy is essential to conserving these resources.
2. The riparian management scenario proposed in the preferred alternative would not adequately maintain and restore the riparian and aquatic habitat conditions and processes that are critical to the conservation of anadromous fish.
3. The action alternatives do not include well-defined management objectives for fish habitat or firm standards and guidelines, both of which are needed to ensure adequate conservation of anadromous fish.
4. The action alternatives rely on reach-scale analysis and management, and thus do not accommodate the watershed-scale analysis and conservation that are the underpinnings of conservation biology for anadromous fish.
5. Several of the critically important analyses (i.e., fish productivity, large wood, shade, peak flow) rely heavily on models that in some cases have not been fully documented, and in other cases have not been adequately validated for the entire plan area. This introduces considerable uncertainty into the analyses.
6. There are a number of assumptions or methods associated with the modeling exercises listed in number 5 above that do not comport with the findings of published scientific literature. These assumptions and methods cascade through the analyses, leading to some conclusions that likely are erroneous.

A substantial amount of work must be completed to ensure that the FEIS adequately describes the existing environment and adequately analyzes and discloses impacts to the environment that would arise from the proposed action. We expect that many of these issues, which are discussed in greater detail in the enclosure associated with this letter, will be important for the eventual consultations under the ESA and the MSA on the selected alternative.

NMFS staff has begun to formulate a framework that would help to address some of the issues that are listed above and described more fully in the enclosure. Although we are severely limited in staff resources, we would welcome the opportunity to work closely with your staff to incorporate this framework into the proposed action before release of the FEIS. The key

- 2 -

elements of this comprehensive conservation strategy for anadromous fish, which are described in detail at the beginning of the enclosure, are listed below:

1. Identification and differential management of a network of aquatic-emphasis watersheds for fish recovery, public water supply, and water quality.
2. Use of watershed-scale assessment and planning to guide land management actions.
3. Protection of current high-quality fish habitat, in addition to restoration of habitat with high intrinsic geomorphic potential as is planned.
4. Adjusted riparian management areas (RMAs) with more conservative management in aquatic-emphasis watersheds.
5. Increased specificity of objectives for conservation of anadromous fish habitat.
6. Standards and guidelines that are mandatory, but are selected based on type of management action and site conditions.
7. Clearer pathways for plan implementation, monitoring, and adaptive management.

NMFS appreciates the opportunity to comment on this DEIS and looks forward to continuing to provide BLM with assistance on development of the FEIS. Please direct questions regarding this letter to Dr. Kim Kratz of my staff in the Habitat Conservation Division of NMFS Northwest Region at 503.231.2155.

Sincerely,

Michael Tehan

for D. Robert Lohn
Regional Administrator

Enclosure Comments on Draft Environmental Impact Statement for the Western Oregon Plan Revisions

cc: Linda Goodman, USFS
Elin Miller, EPA
Kemper McMaster, USFWS

- 3 -

Comments of National Marine Fisheries Service, Northwest Region
Draft Environmental Impact Statement (DEIS) for the Western Oregon Plan Revisions (WOPR)
January 11, 2008

The below comments begin with an overview of how well the preferred alternative (Alternative 2) in the August, 2007, draft environmental impact statement (DEIS) for the Western Oregon Plan Revisions (WOPR) of the Bureau of Land Management (BLM) meets the conservation needs of anadromous fish at the landscape scale. This analysis is followed by a list of key elements needed for a successful conservation strategy for anadromous fish. The list is followed by comments organized according to the chapters of the DEIS, and by references.

GENERAL COMMENTS ON CONSERVATION OF ANADROMOUS FISH

The following species of Pacific salmon and steelhead that NMFS has listed or proposed for listing under the ESA occur within the planning area for the proposed action: Lower Columbia River and Upper Willamette River Chinook salmon; Southern Oregon/Northern California Coast, Oregon Coast, and Lower Columbia River coho salmon; Columbia River chum salmon; and Upper Willamette River and Lower Columbia River steelhead. All of the above species are listed as threatened, except for Oregon Coast coho salmon, which are proposed for listing as threatened. NMFS has also designated critical habitat for all of the above listed species except Lower Columbia River coho salmon. Essential fish habitat also has been designated under the MSA for Chinook salmon and coho salmon within the planning area.

The preferred alternative (Alternative 2) does not include a coherent and cohesive conservation strategy for anadromous fish, including those that are listed or proposed for listing as threatened in the WOPR area. BLM's Land Use Planning Handbook (H-1601-1) includes the following statement under Special Status Species, Land Use Plan Decisions (Appendix C, p. 4) that indicates the need to develop a conservation strategy for threatened and endangered species:

> Given the legal mandate to conserve threatened or endangered species and BLM's policy to conserve all special status species, land use planning strategies, desired outcomes, and decisions should result in a reasonable conservation strategy for these species. Land use plan decisions should be clear and sufficiently detailed to enhance habitat or prevent avoidable loss of habitat pending the development and implementation of implementation-level plans. This may include identifying stipulations or criteria that would be applied to implementation actions. Land use plan decisions should be consistent with BLM's mandate to recover listed species and should be consistent with objectives and recommended actions in approved recovery plans, conservation agreements and strategies, MOUs, and applicable biological opinions for threatened and endangered species.

The Purpose and Need statement on p. XLIV states that "In accord with the Endangered Species Act, the plans will use the BLM's authorities for managing the lands it administers in the planning area to conserve habitat needed from these lands for the survival and recovery of species listed as threatened or endangered under the Endangered Species Act." The section does not explain how the WOPR will "conserve" this habitat.

Other sections of the DEIS include some information that pertains to conservation strategy – such as ecological objectives – but the information is not tied together as a cohesive strategy to accomplish this end. Below is a list of objectives for Alternative 2 related to fish conservation, which we compiled from the Fish section on p. 34, the Water Quality section on p. 57, and the Riparian Management Area section on p. 81:

- Restore stream complexity.
- Restore access to stream channels for all life stages of fish species.
- Prevent livestock from causing trampling disturbances to spawning beds where federally-listed salmonid fish species occur.
- Maintain and restore water quality.
- Maintain and restore the proper functioning condition of riparian and wetland areas to provide shade, sediment filtering, and surface and streambank stabilization.
- Maintain or promote the development of mature or structurally complex forests.
- Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize streambanks.
- Maintain and restore water quality.

There are some additional objectives for particular BLM districts or areas subject to special management, such as the Klamath and Coquille Resource Areas. These are special cases NMFS is not analyzing in this part of its review due to the need to focus on core issues because of insufficient time and staff resources.

Other sections of the DEIS include information about a restoration strategy based on areas with high IP for rearing. Taken together, these components do not comprise a suitable conservation strategy for the following reasons:

- There is no centralized description of a conservation strategy for anadromous fish that would include all of the relevant ecological objectives, management actions to protect and restore fish habitat at the watershed scale, and provisions for: (1) Implementation, effectiveness, and validation monitoring; and (2) adaptive management.

- There is no analysis of the status of fish populations in plan area lands, such as abundance, distribution, diversity or productivity; location of particularly important spawning or rearing areas; or connectivity between populations and population segments.

- With the arguable exception of the objective for mature and structurally complex forests in riparian areas, the objectives listed above do not include descriptions of what constitutes desired conditions or levels of functional processes (*i.e.*, desired future conditions or DFCs). The objective for mature and structurally complex forests in riparian areas, if pursued aggressively, is likely to sharply reduce recruitment of wood pieces from non-mature trees that are able to form pools and trap sediment in the small streams that are most numerous on plan area lands. Please see an extensive discussion of this issue under Chapter 4 – Environmental Consequences/Fish/Large Wood-Fish Productivity.

- There is no consideration of how management and restoration actions would affect factors limiting anadromous fish populations in their freshwater life-history stages.
- "Proper functioning condition" for riparian areas is not defined.
- There is an objective for stream complexity, but the variable is not defined, and there is no DFC. There are no objectives for other aspects of stream and watershed conditions and processes that may limit populations of anadromous fish.
- The livestock objective is clear, but too narrow, as it implies the only negative effect of livestock grazing is trampling of redds. This objective should also consider streambank stability, the composition, vigor and structure of riparian vegetation, sediment generation, and other factors affected by livestock grazing.
- There are no objectives or DFCs for hydrologic function, sediment generation and routing, stream substrate, stream channel conditions, or nutrients.
- Most land management activities are not constrained by whether or not they would contribute to, delay, or prevent attainment of the objectives listed above.
- There are no provisions for analyzing and understanding watershed-scale conditions and processes that create and maintain fish habitat, or for using this information in planning actions. This is likely to result in uncoordinated actions, planned at the scale of the stream reach, that are unlikely to maintain and restore fish habitat at larger scales.
- There is no strategy for identifying and protecting the functionality of areas of existing high-quality fish habitat at either the reach or the river-basin scale. Due to the patchwork configuration of BLM ownership, and the different management histories of BLM vs. non-Federal lands, many streams on BLM lands likely are functioning as habitat refugia supporting remnant populations of salmon and steelhead due to higher stream channel complexity, lower fine sediment loads, and higher amounts of stream shade.
- Land management actions at the site scale are not constrained by mandatory standards and guidelines that would ensure that actions meet aquatic habitat objectives, but by best management practices (BMPs), the selection of which is optional for individual actions. The DEIS states on p. 1135 that the BMPs are intended to "reduce nonpoint source pollution to the maximum extent practicable" and "to meet water quality objectives when implementing management actions." Meeting water quality objectives (which in this case are Oregon water quality standards) would, in some cases, support the conservation of anadromous fish, but may not be sufficient to achieve levels of habitat protection and

restoration needed to recover threatened species. Besides improving water quality, conserving anadromous fish will require standards and guidelines supporting the maintenance and restoration of landscape, watershed, hydrologic, riparian, and instream habitat conditions and processes. Without adequate aquatic management objectives and firm standards and guidelines to establish sideboards, there is no assurance that individual actions completed under the WOPR will maintain and restores anadromous fish populations.

- The proposed stream restoration strategy focuses on stream reaches with high IP for rearing, but does not address larger scales (*i.e.*, river basin or landscape), other than including a description of a general action to give priority to high-priority fish populations that have been defined in recovery plans (p. 34). There is no strategy for areas where recovery plans have not been completed.

NMFS expects that many of the above issues will surface in the eventual ESA and MSA consultations on the selected alternative, and recommends that the FEIS address all of the issues in the above bullet list. Regarding the scale issue, the river basin is the scale most relevant to the metapopulation structure of Pacific salmon (National Research Council 1996). Healthy populations of salmonid fishes use habitats throughout watersheds (Naiman *et al.* 1992), and riverine conditions reflect biological, geological and hydrological processes operating at the watershed level (Nehlsen *et al.* 1997, Bisson *et al.* 1997). Most land management effects on streams and rivers are carried downstream readily, and some can travel upstream as well (*e.g.*, channel head cutting). Also, watershed divides provide clear boundaries for analyzing the combined effects of multiple activities (National Research Council 1996).

A watershed perspective is needed to identify and assess biological habitat refugia and highly productive habitat patches, and to assess connectivity between these areas and between fish population segments (Sedell *et al.* 1990, Naiman *et al.* 1992, Li *et al.* 1995, Bisson *et al.* 1997). For these reasons, habitat conservation and restoration strategies are most likely to be effective if carried out at the scale of the watershed (or composites of multiple watersheds in a specie's range; Reeves *et al.* 1995, Frissell and Bayles 1996), not the stream reach (Reeves and Sedell 1992, Botkin *et al.* 1995, National Research Council 1996, Nehlsen *et al.* 1997).

As described in previous meetings, NMFS would like to work with BLM to develop the following components of a comprehensive conservation strategy for anadromous fish. According to EPA Region 10, such a strategy would also help meet the requirements of the Clean Water Act:

1. Network of aquatic-emphasis watersheds for fish recovery, public water supply, and water quality.

   NMFS would like to work with the BLM to develop a network of aquatic-emphasis watersheds, that would be managed in a more biologically conservative manner, to provide an adequate level of confidence that habitat essential for recovery will be maintained and improve over time at the watershed scale. This could be done using available information, such as data on: (1) Status of fish populations in plan area lands, including available information about abundance, distribution, diversity or productivity; and (2) location of particularly important spawning or rearing areas; and connectivity between populations and population segments. The work done by NMFS' technical recovery teams (TRTs) and critical habitat review teams would be highly valuable in this effort.

2. Watershed-scale assessment and planning to guide recovery and other land management actions.

   The selected alternative in the FEIS should commit to continued use of existing Federal watershed analyses, source water protection plans, and local watershed analyses for planning and implementing land management actions, particularly in aquatic emphasis watersheds. The selected alternative should require use of watershed-scale information when planning actions at the reach scale, and updating existing watershed analyses with new information, as it becomes available.

3. Ecological objectives to support aquatic habitat.

   The selected alternative in the FEIS should include a set of objectives specific to aquatic habitats that pertain to watersheds, riparian areas, and instream habitat, and are adequate to maintain and restore anadromous fish populations. The objectives should include descriptions of what constitutes desired conditions or levels of functional processes (*et al.*, DFCs) for hydrologic function, sediment generation and routing, stream substrate, stream channel conditions, or nutrients.

4. Standards and guidelines to aid project development and implementation.

   The selected alternative in the FEIS should include mandatory standards and guidelines to set sidebars for individual actions. Management activities should be constrained under the standards and guidelines depending on whether they would contribute to or delay attainment of the aquatic habitat objectives listed above.

5. Provisions to protect and restore high-quality fish habitats.

   Successful conservation of anadromous fish will require the protection of currently functioning high quality or highly productive fish habitat, at the watershed scale, in addition to restoring habitat with high intrinsic geomorphic potential (IP). Information used to prioritize restoration actions in aquatic-emphasis watersheds should include Federal and local watershed analyses, source water protection plans, and targets in total maximum daily loads (TMDLs) prepared under the Clean Water Act.

6. Adjusted riparian management areas (RMAs).

   NMFS would like to work with BLM to develop a RMA strategy that provides adequate protection and recovery potential for anadromous fish habitats and water quality. Aquatic-emphasis watersheds should have more protective RMAs than other watersheds.

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01-11-2008

Rather than simple default values, RMA widths should be based on factors relevant to factors forming and maintaining aquatic habitat functions, *et al.*, floodplains, channel migration zones, unstable slopes, site-potential tree heights, shade, bank stability, etc. RMA widths, and the constraints that apply within RMAs, should balance the need to maintain or protect existing aquatic habitat conditions and processes with the need for active restoration in some situations. RMAs should include zones of different management intensity including a zone of total protection to protect bank stability; a zone for protection of shade and litterfall; a zone accommodating both protection of existing values and active management, where needed, to improve aquatic habitat conditions; and a zone for transitioning into upland management strategies.

7. Expanded provisions for plan implementation, monitoring, and adaptive management.

The selected alternative needs to describe a clear framework for linking individual resource management plans (RMPs) to regional-scale conservation efforts, including recovery plans for listed fish species. The selected alternative should also explain how the plans will be implemented in each BLM district, and how the districts will contribute to meeting aquatic habitat objectives at the watershed scale. The BLM should fill in needed details about how implementation, effectiveness, and validation monitoring will be carried out as the plans are implemented, and how it will use adaptive management to respond to new information about plan effectiveness. The BLM should commit to participating in the regional framework for federal land management aquatic effectiveness monitoring. NMFS would like to work with BLM to better define how the individual RMPs would link to other adjacent land management plans (*e.g.*, those of the U.S. Forest Service and affected Indian tribes), and how they tier to project planning and implementation.

CHAPTER 1 – PURPOSE AND NEED

This section provides a rationale for the proposed plan revisions; identifies cooperators, affected laws and guidance; and defines the planning area, issues identified, and the planning process.

The section discusses coordinating plan revisions with draft recovery plans for anadromous fish species listed under the Endangered Species Act (ESA) on p. 5, but the alternatives do not appear to incorporate key elements of draft recovery plans or related recovery planning products (*et al.*, documents from TRTs). The FEIS should explain how BLM will integrate recovery planning for ESA-listed anadromous fish into the plan revision.

The DEIS (p. 23) acknowledges the requirement to consult under section 7 of the ESA on amendments to the individual resource management plans under the proposed action, but does not propose a framework for completing these consultations. Due to past litigation on adoption of Federal forest management plans, it is essential that BLM work closely with NMFS on such a consultation framework.

The DEIS says on p. 24 that draft recovery plans will be incorporated into BLM plan revisions if they are completed before WOPR implementation. NMFS expects that recovery plans for the

Comments on DEIS for the WOPR - 6 –
01-11-2008

Upper Willamette River and Lower Columbia River species of ESA-listed anadromous fish will be proposed in 2008. The FEIS should explain how recovery plans that are completed after WOPR implementation begins would be incorporated into land management actions.

CHAPTER 2 – ALTERNATIVES

Management Common to All Alternatives

Fish

This section (p. 34) consists of a list of three objectives and four management actions that apply to all alternatives. The stated objectives are:

- Restore stream complexity.
- Restore access to stream channels for all life stages of fish species.
- Prevent livestock from causing trampling disturbances to spawning beds where federally listed salmonid fish species occur.

The following management actions are listed:

- Priority for restoration activities would be given to projects in streams with a high intrinsic potential for fish and to high-priority fish populations that have been defined in recovery plans.
- Stream complexity would be restored through the placement of large wood and boulders.
- New and replacement stream-crossing structures on fish-bearing streams would be designed to provide access within stream channels for fish.
- For streams with salmonid species listed under the Endangered Species Act, livestock would not be released into riparian areas until 30 days following the emergence of salmonids from spawning beds.

Considering the complexity of interactions between forest lands and the habitat of anadromous fish, the numerous problems with fish habitat in the plan area, and the range of actions needed to maintain and restore fish habitat, the lists of objectives and management actions seem to be overly simple and incomplete. The lists are not supplemented by additional objectives and management actions for fish or stream habitat in any of the action alternatives, although the alternatives do have short lists of objectives and management actions for riparian areas.

The list of objectives for fish and fish habitat does not include many of the habitat factors limiting populations of anadromous fish that are listed or proposed for listing in the plan area that could be affected by how BLM lands are managed, such as water quality, flow, and substrate conditions. The list of management actions seems to assume that restoration by itself can restore habitat, and misses the importance of not degrading existing habitat quality, and the role of other factors affecting complexity of stream habitat (*et al.*, flow regime, sediment regime, disturbance regime). Adding these features to the FEIS is critical to demonstrating a conservation strategy for anadromous fish. A commitment to address the limiting factors in recovery plans as they are developed, through habitat protection and restoration, would be a reasonable step for BLM to take pending completion of recovery plans.

Regarding the list of management actions for all alternatives, the FEIS should specify which fish passage standards for new and replacement culverts the BLM will use (NMFS and Oregon Department of Fish and Wildlife each have their own standards; we recommend that BLM commit to meeting NMFS' standards in streams with anadromous fish). Regarding the last management action in the above list, it is unclear how the BLM will know when complete fry emergence has occurred in order to define the 30-day period before release of livestock into areas near streams. NMFS recommends that BLM include a commitment in the FEIS to implement recovery plan actions that are appropriate for Federal lands.

Riparian Areas

The action alternatives (alternatives 1, 2 and 3) include the following two objectives for riparian areas:

- Maintain or promote the development of mature or structurally complex forests.
- Provide for the riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize streambanks.

NMFS commented on the aquatic habitat objectives above under "General Comments on Conservation of Anadromous Fish."

The alternatives share the following management actions for riparian areas:

- Thinning and other silvicultural treatments would be applied along smaller-order streams (generally, first-, second-, and third-order streams) to promote the development of mature forests.
- Thinning and other silvicultural treatments would be applied along larger-order streams (generally, fourth-order and larger streams) to promote the development of structurally complex forests.
- Snags and coarse woody debris would be retained in thinning operations, except for safety or operational reasons (*et al.*, maintaining access to roads and facilities).
- Salvage would not occur in stands that are disturbed by a fire, windstorm, disease, or insect infestations, except to reduce hazards in wildland urban interface areas.
- Timber from thinning and salvage operations would be available for sale, with different amount of emphasis on active management in riparian areas.

The above actions emphasize thinning in riparian areas for all stream sizes, but this will only benefit the habitat of anadromous fish under certain conditions (*et al.*, where there is sufficient instream wood already present to provide habitat functions during the lag between thinning a forest and recruitment of logs from the thinned forest to the stream, and where existing trees are too small to form pools when they fall into streams). Available research (*et al.*, Beechie and Sibley 1997, Bilby and Ward 1989) indicates that trees as small as 5-6 inches in diameter can form pools in small streams. Thinning along along small streams with wood deficits can significantly reduce recruitment of wood to streams (Beechie *et al.* 2000), and the risks of this happening appear to be significantly increased by the above management actions. NMFS provides additional information about this issue in its review of the DEIS's large wood analyses in later sections of this document.

NMFS recommends that BLM develop criteria for when to thin riparian forests, and additional non-timber management actions to maintain and restore riparian areas – such as correcting damage to riparian vegetation and streambanks due to livestock grazing, invasive plants, recreational activities, and roads.

The Alternatives

Alternative 2

The DEIS provides information about proposed RMAs for Alternative 2 in Table 31 (p. 79-80). Some needed definitions are lacking. What scientific information was used to define the "streambank zone," "water influence zone," and "intermittent, non-fish bearing streams," and how would these zones be delineated in the field?

The only difference we could discern among the action alternatives with respect to objectives and management actions is that Alternative 3 includes a management action not found in the other action alternatives:

- Prescribed burns would be used in areas of high fuel loadings to reduce the potential for uncharacteristic wildfires.

The FEIS should include a discussion of whether or not this action would be useful in the preferred alternative.

CHAPTER 3 – AFFECTED ENVIRONMENT

General Comment

It is confusing to have subchapters on sediment, temperature and stream flow in both the Fish and Water sections of this chapter, especially since the subchapters are only rarely cross-referenced. It is unclear why most of the details are in the Water sections, and the Fish sections are relatively brief. NMFS recommends that the BLM use cross-referencing to minimize duplication between the sections.

Fish

Large Wood

This section, which begins on p. 340, provides a more extensive historical background, literature review, and baseline assessment than any of the other sections within the "Fish" chapter. It would helpful if the other sections with the Fish chapter provided a similar amount of background information.

The DEIS analysis of large wood examines only five out of 176 fifth-field watersheds within the plan area that contain BLM ownership. Three of the five "representative" watersheds were selected from the Klamath Province, which probably is not representative of BLM lands in other provinces. It is not clear how effective these five watersheds are in characterizing wood delivery or potential impacts of management activities to the 10 listed fish species described in this section. Wood delivery to streams by debris flows is influenced by forest condition, topography and other factors that would vary dramatically between the provinces. The FEIS needs to include a larger sample size of watersheds, well distributed across the plan area and stratified by physiographic province, BLM ownership, and other meaningful geomorphic and watershed variables, that would more accurately model wood recruitment to streams.

The conclusion that only wood >20 inches diameter at breast height is 'functional' is contrary to published relationships between wood size and pool formation (*et al.*, Beechie and Sibley 1997, Bilby and Ward 1989), leading to the erroneous conclusion that significant timber harvest in riparian zones under alternatives 2 and 3 has little effect on habitat for anadromous fish. Other issues with the methodology used for the wood recruitment model that NMFS' staff has previously discussed with BLM's staff include assumptions of site-potential tree heights that seem too low for parts of the WOPR area, and the distances from debris-flow prone streams over which trees can be incorporated into debris flows. NMFS understands that BLM is working on new model runs with different assumptions and input variables, and we encourage BLM to include model runs with smaller minimum tree diameters, and to report the results of these investigations in the FEIS.

Large wood contribution is used as a surrogate for productivity of salmonid fish populations in this analysis. The DEIS states that "improved habitat complexity correlates to improved fish survival and production" (p. 343). This assumption ignores the concept of limiting factors for species' productivity (Wilson and Bossert 1971). Observations where augmenting wood densities did not lead to increases in smolt production (p. 343) substantiate that habitat complexity is not the only limiting factor for anadromous fish. The fish analysis should consider effects of the alternatives on other factors limiting fish populations, such as water temperature, substrate sediment, and passage. Information about limiting factors often is available in proposed recovery plans, TRT products, and Federal or local watershed analyses.

Sediment

This section (p. 355-357) begins with a paragraph about provision of organic matter to streams from vegetation that appears to be out of place. It continues with a brief (<2 pages) summary of various effects of fine sediment and turbidity on salmonid fish and their habitat. NMFS provides some comments on this summary below.

The DEIS states (p. 356) that "The timing of the sediment inputs relative to the biological vulnerability of each fish species is more important than the absolute quantity of sediment." This statement is true only where habitat effects of sediment are transient and very short term (days to weeks), which is only the case for turbidity effects. In the case of turbidity, it may be reasonable to assume that timing is critical, because sediment delivered and evacuated during non-critical periods is unlikely to kill large numbers of fish. However, the statement seems to assume that sediment deposition in streambeds is short term, and is not coincident in time with incubation of salmonid eggs in spawning gravels. In fact, sediment usually is not so transient in the gravel, and salmonid eggs are incubating during most periods of erosion and fine sediment delivery. Introduction of fine sediments (*et al.*, sand and smaller particles < 2mm in diameter) alters channel morphology and habitat by several mechanisms. The smallest particles travel downstream as wash load, while larger particles may travel as bed load (Richards 1982). Suspended particles and fine bed load can accumulate in spaces between gravel particles (Beschta and Jackson 1979, Lisle 1989), restricting the subsurface movement of water through the gravel and reducing survival of eggs and fry. Fine sediments can also fill pools and interstitial rearing spaces, and can increase turbidity during high flows. This assumption also does not consider indirect effects of increased fine sediment, such as reduced production of invertebrate food organisms (Suttle *et al.* 2004).

The DEIS does not explicitly consider these non-transient sediment effects and bases its analysis only on the proposed increases in road length, rather than total road length. Moreover, the method underestimates surface erosion by at least a factor of two (see discussion under Water, Sediment below). Thus, it remains unclear what the overall effect of forest roads will be under any of the alternatives.

Effects of changes in coarse sediment supply are not considered in the alternatives because all alternatives assume no increase in landslide rates, and therefore no increase in mixed-grain-size sediment supply. This assumption may not be well-supported (see comments about how BLM uses the “timber productivity capability classification” (TPCC) to screen for landslide-prone areas, and withdraws them from general forest management, that pertain to Chapter 3, Water, Sediment on p. 378 of the DEIS). If the possibility of increased landslides due to increased intensity of land management were considered, it would be clear that sediment quantity is of greater importance than timing of erosion for coarse sediments. This is because there is a time lag of years to decades between a change in sediment supply and a change in morphology of a downstream reach (*et al.*, Kelsey 1982b, Madej and Ozaki 1996, Beechie 2001, Beechie *et al.* 2005b), and the amount of sediment determines channel and habitat response. The time lag is due to the time required for sediment to travel from its source to the reach of concern (Kelsey 1982a). Once sediment enters a stream reach, its persistence is partly a function of the sediment transport capacity of the reach (Benda and Dunne 1997b), and both the timing and persistence of changes in the morphology of downstream reaches are related to the rate at which sediment moves through a channel network (Madej and Ozaki 1996). Therefore, timing of erosion is rarely equal to timing of impact on salmonid fish, and erosion timing cannot be considered a reasonable criterion for concluding that erosion has little effect on these fish.

The effects of coarse sediments on fish habitat quality vary, depending on the amount of sediment delivered. In general, increased supply of sediments to lower-gradient reaches increases the amount of fine sediment on streambed surfaces (Dietrich *et al.* 1989), reduces pool depth (Lisle 1982, Madej and Ozaki 1996), and causes channel aggradation (Madej 1982, Lisle 1982) and channel widening (Kelsey 1982b, Madej 1982). Initial increases are accommodated by deposition of finer sediments into pools (*et al.*, Lisle and Madej 1992, Lisle and Hilton 1992, 1999). Larger increases cause aggradation of the channel bed and channel widening (*et al.*, Lisle 1982; Madej 1982, 1992; Harvey 1987; Pitlick and Thorne 1987; Harvey 1991), and channels may become laterally unstable (Bergstrom 1982, Church 1983). As sediment moves through a reach, the proportion of sediment stored in bars increases rapidly, and then decreases over a few years to a few decades (Lisle 1982, Madej 1987, Madej 1992). Depths of pools may begin to recover while sediment remains within the reach (Madej and Ozaki 1996), but typically do not fully recover until the sediment pulse passes through the reach (Lisle 1982, Collins *et al.* 1994). All of these effects persist for years to decades.

The final three paragraphs of this section (p. 356-7) downplay the effects of sediment on fish and their habitat, including a statement that "….no model can predict the exact mechanism of sediment delivery and instream routing. Therefore, it is not possible to quantify or accurately predict the affects that sediment delivery has on fish species." Yet the DEIS uses a sediment model in the "Water" section of the DEIS to predict routing mechanisms and quantify the amount of sediment transported to streams within the plan area.

NMFS recommends that the FEIS include a modified sediment analysis that avoids the assumption that the timing of sediment delivery is more important than the volume, that considers effects of both the existing road network and proposed roads, and that includes consideration of long-term sediment routing and effects.

Temperature

The effects of water temperature on fish, which are limiting factors for some of the anadromous fish populations in the plan area, are addressed with a striking lack of detail in the Fish section in less than half a page (p. 357). The section includes a table with most of Oregon's numeric water temperature criteria (it is not the complete standard, since the standard includes the beneficial use designations and the antidegradation policy, which the DEIS does not mention). Missing from the table is Oregon's "core cold water" criterion of 60.8 degrees F, which DEQ designated in the North Coast Basin (an upper portion of the Necanicum River, Ecola Creek and Plympton Creek) and Mid-Coast Basin (Siuslaw River) (Oregon Department of Environmental Quality 2003).

This section outlines very general effects of high temperatures on salmonid fish, and gives the total amount of stream miles on BLM lands that are listed by ODEQ water-quality impaired for temperature. NMFS assumes this is for the plan area, although that is not clear; BLM should clarify this in the FEIS. NMFS suggests that this section of the FEIS include a more extensive discussion of the extensive literature on effects of water temperature on listed salmonid fish found in the plan area, including inferences about effects of water temperatures in the plan area on salmonid fish. Suitable reviews that may be helpful include McCullough (1999), Dunham *et al.* (2001), Materna (2001), McCullough *et al.* (2001), and Sauter *et al.* (2001).

Stream Flow

The pattern of stream flow, including the timing and volume of peak and base flows, is another critical environmental attribute for salmonid fish (Spence *et al.* 1996). The Fish section of this chapter includes only one paragraph about stream flow. The single paragraph poorly describes the affected environment, as it does not describe any conditions within the plan area, does not describe factors that contribute to stream flow problems, and does not outline the BLM's role with respect to stream flows. NMFS recommends this section refer the reader to the more complete analysis in the Water Quantity section of the Water chapter, and that either this or the Water Quantity section describe conditions within the plan area, describe factors that contribute to stream flow problems, and outline the BLM's role with respect to stream flows.

Water

Stream Temperature

The bulk of this section (four of six pages beginning on p. 366) is devoted to building a case for the sizes of the RMAs and proposed management strategies within those RMAs under Alternative 2, as opposed to actually describing the affected environment (*et al.*, status and trends in water temperature in the plan area, and the reasons for those conditions), which is what is needed. This case as it relies heavily on dated literature and unpublished sources, and does not include a broad or representative treatment of the extensive literature on physical controls of stream temperature and how land management affects temperature. Neither does the section demonstrate that the studies and models used are valid and suitable for the diversity of ecoregions and conditions in the WOPR plan area (*et al.*, Lower Columbia River tributaries, Coast Range, Willamette River Basin, Umpqua River Basin, Klamath Mountains, and East and West Cascade Range). Because the BLM has not provided this information, NMFS has limited confidence in the proposed strategy as a tool to avoid increasing water temperature following timber management within riparian areas. NMFS elaborates on the reasons for this statement below.

The analysis in the DEIS relies on canopy closure as a surrogate for stream shade. On p. 367, the DEIS cites Brazier and Brown (1972) to explain how angular canopy density (a measure of vegetation canopy closure) varies with different buffer strip widths up to 100 feet (Fig. 98, p. 367). It is unclear whether the stream sizes, tree types and heights used in this study are applicable to the entire plan area. If they are, how was that determined, and if not, what other information is available?

Also on p. 367, the DEIS cites Park (1991) to demonstrate a relationship between angular canopy density and stream shade (as shown in Fig. 99 on p. 367). This citation is not in the References section of the DEIS; NMFS assumes this should be Park (1993), which the References section in the DEIS has as the SHADOW model. If the BLM is going to use the SHADOW model to support their assertions regarding angular canopy density, stream shade, and water temperature, then it needs to better describe the data set used to develop the model (*et al.*, what streams were used to develop the statistical relationships?); document model validation in the different ecoregions covered by the WOPR; and report confidence limits, assumptions and uncertainties in the FEIS. That will allow for a full evaluation by NMFS, decision-makers and the public.

The strategy for Alternative 2 is to maintain 80% effective or potential shade, whichever is less, in the "primary shade zone." The DEIS does not adequately demonstrate that this 80% shade is a valid target for the "mature, structurally complex" forests that are the objective for riparian areas, nor does it adequately demonstrate that this amount of shade will maintain and restore water temperatures. On p. 368, the DEIS asserts that shade levels over 80% do not produce measurable decreases in stream temperature. This information is based on Boyd (1996), which is an unpublished master's thesis that was based on limited sampling. NMFS is concerned that the DEIS is relying so heavily on one source for this information. The DEIS has provided no information on the data set used to develop the model, model validation for the different ecoregions covered by the WOPR, confidence limits, assumptions and uncertainties. Also, was Boyd (1996) considering only the 'primary shade zone' in the calculations used for this figure? Other available information suggests that the relationship explained in the DEIS may not be universally true. A recent master's thesis found differences in water temperature between 80% and 100% shade following harvest in riparian areas of Oregon Coast Range streams where retained shade ranged from 51% to 99%, with a mean of 79%, which is essentially the same as BLM's target of 80% (p. 31 and Fig. 3.9 in Fleuret (2006). Based on this information, the uncertainties around BLM's analysis, the requirement for site-potential shade in all total maximum daily loads completed by the Oregon Department of Environmental Quality under the Clean Water Act, a target of site-potential shade, at least in aquatic emphasis areas, would be a better strategy for the selected alternative.

The assertion in the DEIS that areas greater than 100 feet from streams cannot contribute shade to stream is not adequately demonstrated. On p. 368, the DEIS asserts that Fig. 100 demonstrates that "there is marginal improvement in shade for riparian areas wider than 100 feet, because the variables of total solar radiation reaching a stream is (sic) diminished by the blocking ability of a tree's canopy." This is a confusing statement. Fig. 100 does not include widths of riparian areas, and the last clause of the sentence does not have enough information to make sense. NMFS is not confident that riparian areas wider than 100 feet cannot contribute shade. Among other variables, this would depend on stem density and canopy density at various distances from the stream, tree heights, and topography. Water temperatures of three streams in British Columbia, Canada increased by 1.6° C relative to control streams when streamside areas were logged with buffers of 30 m (98 feet) (Kiffney *et al.* 2003). This suggests that buffers essentially the same as the 100 feet cited by the DEIS did not fully protect shade. The analysis in the FEIS needs to consider this additional information.

A discussion of riparian widths for primary and secondary shade zones begins on p. 369 the DEIS. This section relies on information presented in Table 113, which is based on tree heights of only 100 feet or less – considerably shorter than site-potential trees in much of the plan area. How would the sizes of the primary and secondary shade zones change for trees that were as tall as the site potential trees in the plan area (as shown in Fig. 102 on p. 370)? Also, we have not seen data explaining the effects of varying tree retention in the 'secondary shade zone' on effective shade. The BLM should provide this information (*et al.*, the rationale for why retaining 50% canopy in the secondary shade zone is adequate) in the FEIS. The FEIS also should assess the likelihood of blowdown of riparian trees under the various strategies, and analyze how this factor could affect stream shade and water temperatures. Overall, the DEIS has not provided sufficient justification for how its riparian management areas under Alternative 2 would protect stream shade and prevent heating of streams. The BLM should work with NMFS to amend its

RMA delineations and actions to provide a higher level of confidence that its management strategies will maintain and restore shade and stream temperatures.

In order to adequately describe the existing condition, NMFS recommends that this section of the FEIS provide more information about the status and trends of water temperature on BLM lands. Information that could be provided, if it is available to BLM, includes which streams are monitored, status of compliance with the Oregon temperature standard and trends over time, and summaries of results of TMDLs done in the plan area, particularly modeling of natural thermal potential and how this compares to current temperatures. This section in the FEIS should also discuss the status of stream shade on BLM lands, to the extent that information is available to BLM, and discuss how land management has contributed to current shade and water temperature levels. All information about how the proposed management strategies would affect stream shade and temperature should be moved to Chapter 4, Environmental Consequences, in the FEIS.

Sediment

The sediment section contains limited information about the status and trends of sediment in streams within the plan area. Table 115 includes information about potential fine sediment yield from existing roads, but the DEIS does not explain how this information was generated, nor does it explain whether any empirical data is available for lands in the plan area. Table 116 shows ratings of the Oregon Department of Environmental Quality (ODEQ) for sediment in four physiographic provinces occurring in the plan area for 1994 to 2001. On p. 382, the DEIS states that it is unclear how these results apply to BLM lands because of mixed land uses in the watersheds. Do ODEQ sampling stations occur on BLM lands? Additional information on substrate sediment is available from habitat surveys done by Oregon Department of Fish and Wildlife.

On p. 376, the DEIS begins a summary of the results of modeling of how the alternatives would affect delivery of fine sediment into streams. This information would fit better in Chapter 4, Environmental Consequences.

Some of the assumptions that went into the sediment modeling do not appear to be well-supported, including the following:

- An assumption of moderate traffic under all alternatives, when the log traffic logically would vary with the different rates of tree cutting among alternatives.
- An assumption that fine sediment yield would not vary with the varying amounts of timber cutting and slash burning under the different alternatives.
- An assumption that sediment is not delivered to streams from portions of the road that are more than 200 feet from channels. This is problematic if the average cross-drain spacing is 500 feet, which is another assumption of the model (p. I-11106). This will underestimate the length of road connected to streams by a factor of two or more.[1] The

[1] This assumption is not part of the method that the DEIS follows. The Washington Department of Natural Resources' (DNR) watershed analysis methodology states, "If the road drains directly to a stream channel via a ditch or gully: assume 100% delivery from the parts of the road that drain directly to the stream."

DEIS assumes that sediment is not delivered to streams from portions of the road that are more than 200 feet from channels. It may also be appropriate to determine a correction factor that accounts for the percentage of cross-drain culverts that are not functioning at any given point in time, and apply this factor to the analysis.

- The section includes an implicit assumption that BLM's methods for identifying landslide-prone lands and their mitigation measures for these lands are 100% effective, which seems unlikely (see discussion below regarding p. 378).

There may be important ecological implications for the habitat of anadromous fish if the various sediment modeling assumptions are not met. What information does BLM have to support these assumptions? In order to support the results of its modeling exercise, the BLM should explain the basis for these assumptions in the FEIS. NMFS also recommends that BLM complete a sensitivity analysis by running the model with varying log truck traffic and sediment yield based on varying levels of timber harvests, and report the results in the FEIS.

There are other parts of the methodology used for the sediment modeling exercise that may be problematic, but it is difficult to tell due to insufficient information. These potential issues include:

- The method includes an assumption (p. I-1107) that roads not crossing a stream do not deliver sediment, yet also includes an assumption about delivery of sediment from drainage ditches. These ditches can deliver sediment to streams regardless of where the road segment crosses a stream. Also, the validity of the assumption about stream crossings depends heavily on the map resolution for streams used in the analysis. Even the smallest stream channels route fine sediments, and many of these tend not to show up on geographic information system hydrography layers (*et al.*, 1:24,000 blue lines of the U.S. Geological Survey miss a significant portion of the stream network). This means that the analysis likely underestimates the number of road segments hydrologically connected to streams.[2]
- Table 212, p. 760, indicates that Alternative 2, which has the greatest amount of timber cutting, has the lowest projected mileage of new roads. The FEIS should explain how this is possible.
- The DEIS does not explain the derivation of the "ground cover correction factor" (p. I-1107, also called "ground cover density factor" in Table 262 on p.-1107), which applies to cut and fill slopes. Without knowing where the vegetation cover data came from, it is not possible to evaluate the accuracy of the final vegetation correction factor layer. The FEIS should explain the derivation of this factor.

On p. 378, the DEIS describes how BLM uses the "timber productivity capability classification" (TPCC) to screen for landslide-prone areas, and withdraws them from general forest management. This classification is done by silviculture and soil specialists based on the interpretation of aerial photography and ground review. Over 89,937 acres of BLM-

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[2] In the DNR watershed analysis methodology, channel locations are determined in the field, with a channel defined as "any drainage depression with a defined bed and banks, extending continuously below the drainage site. The flow regime can be ephemeral, intermittent, or perennial."

administered lands (3.5% of BLM administered lands) are withdrawn due to forest capability or land stability concerns. NMFS would expect the amount of lands susceptible to shallow, rapid landslides alone to be larger than 3.5% of BLM lands in the plan area, considering the amount of steep lands and the stream density in much of the plan area. Since all of the NEPA alternatives rely on this system, and since it is relevant to both the analyses of the risk of sedimentation and of the recruitment of large wood to streams from landslides, the FEIS should provide any evidence BLM has about the effectiveness of the TPCC in identifying landslide-prone lands. The FEIS should also include information about the procedures, decision criteria, and effectiveness of site-specific reviews that can also be used to withdraw areas from harvest due to slope stability concerns.

Ideally, BLM would redo its sediment analysis using a computer-based model that predicts slope stability of potential landslide initiation sites based on slope, topography, rainfall, and other variables, such as SHALSTAB. Papers developing the SHALSTAB model and showing its application include Dietrich et al. 1992, 1993, 1995; Montgomery and Dietrich 1994; and Montgomery et al. 2000. This model works various topographic data sources such as digitized 7.5 minute USGS quadrangle maps with enhanced topographical contours at 10-m intervals. The model assigns to each 10-m topographic cell a relative hazard rating (low, medium, or high).[3] Other slope stability models using similar input variables are also available. If it is not possible to run such models for the entire plan area before the FEIS, then the FEIS should describe a plan to update its slope stability investigations to include computer modeling.

On p. 379-381, the DEIS discusses studies of landslides by the U.S. Forest Service and the Oregon Department of Forestry that occurred during winter storms in 1996, but includes no information about landslides on BLM lands. The FEIS should provide any available information about landslides on lands in the plan area in 1996 or other years.

Water Quantity

The DEIS cites studies done in the 1970s (DEIS, p. 388) by Rothacher (1973) and Harr (1976) to support analysis of management effects on peak flows with 5-year return intervals. Jones (2000) and Bowling and Lettenmaier (1998), which address road effects on peak flows, would also be appropriate references to discuss.

The DEIS concludes (p. 385) that one out of 635 subwatersheds in the rain hydroregion, and only three out of 471 subwatersheds in rain-on-snow hydroregion (p. 387), within the plan area are currently susceptible to peak flow increases. This is an underestimate, because it assumes that baseline peak flow conditions within the plan area are currently functioning naturally. These conclusions also seem difficult to accurately predict in any meaningful way without considering site-specific information regarding the spatial distribution of patch cuts with respect to current conditions. Peak flow analysis in the DEIS (p. 361) considers the largest spatial scale (sixth-field subwatersheds, 10-40 square miles, that is generally acceptable to recognize any change in

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[3] Some inner gorges (See Kelsey 1988 for a definition) may not be included in the model results and would need to be identified by field surveys for actual layouts of timber sales, since these features do not typically show up on topographic maps.

magnitude of peak flows, obscuring dispersed localized impacts that may be occurring at a finer scale. The temporal scale of peak flow analysis is relatively short (*et al.*, 5-year return).

The effects of roads are not modeled or considered, even though they often contribute to increased peak flow responses (Johnson 2000, Grant *et al.* in review). The FEIS should include a cumulative effects analysis that examines not only the cumulative decrease in peak flow response at large watershed scales (Grant *et al.* in review), but also the cumulative effects of many small watersheds (*et al.*, < 10 square kilometers) dispersed within target landscapes experiencing increases in peak flows. The gross geomorphic effects of these dispersed increases in magnitude might be small due to resilience of channels (Grant *et al.* in review); however, a variety of effects (*et al.*, fine sediment transport, reduced streambank stability, reduced large wood retention) may result in significant effects to anadromous fish habitat at the stream reach scale.

Peak flow analysis for the rain-dominated hydroregion (p. 384-385) was performed for the DEIS through comparisons to empirical results from paired watershed studies, using OPTIONS modeling and 1996 data from the Interagency Vegetation Mapping Project to estimate amount of disturbance (equivalent clearcut area or ECA). The DEIS compares anticipated ECAs to ECAs that caused peak flow response in small watershed studies (roughly 25 to 2,500 acres) to develop predicted responses in sixth-field watersheds. The DEIS used a 40% ECA threshold to classify sixth-field subwatersheds susceptible to peak flow increases. A regression analysis of twelve previously published Pacific Coast studies by Stednick (1996) suggested a harvest of 25% or more of a watershed can measurably increase annual water yield (although none of the studies examined areas where less than 25% of the watershed had been cut). The BLM should complete sensitivity analysis using a lower ECA threshold, and disclose results in the FEIS. Pending results of this analysis, NMFS recommends a more conservative ECA value (perhaps 20-25%) to be used as the threshold for classifying subwatersheds susceptible to peak flow increases.

Peak flow analysis for the rain-on-snow hydroregion used a process model derived from estimated winter snowpack (from empirical data) and forest cover data. Snow melt was simulated for "average environmental conditions" of a rain storm with a 2-year return interval. Water equivalents from this analysis were converted to rainfall and used to estimate stream flow. This stream flow value was compared to flows for storms with a 5-year return interval. Sixth-field watersheds that exceeded 5-year flows were considered susceptible to peak flow change. NMFS has concerns with the validity and practical application of this analysis, including the extent of the mapped intermittent snow zone, the applicability of gauged watershed data used for comparison, the response metric, and the use of an untested process model when other models and empirical results are available. NMFS recommends that BLM strengthen this analysis by validating this model with a comparison to either empirical evidence from the plan area or with another validated model that is applicable to the plan area.

The DEIS analysis of peak flow response in rain-on-snow hydroregion used a unique process model (Washington Department of Natural Resources 1997), although other more detailed process models (Lewis *et al.* 2001) and spatially distributed dataset models (Bowling and Lettenmaier 1998, Tague and Band 2001) have been developed, validated and published. It is difficult to assess the value of this modeling approach since it represents an untested hypothesis with a series of untested parameters. NMFS recommends that BLM strengthen this analysis by either applying those validated models in the DEIS or, at a minimum, comparing the WOPR's analytical model with these validated, peer-reviewed models.

The FEIS should provide any available empirical data from within the plan area that supports the validity of the Washington Department of Natural Resources' model for use in this area. As with the rain-dominated region, the effects of existing and new roads should be included in the analysis. Using generalized average environmental conditions (*et al.*, 15 mph wind speed during 2-year storms) does not seem to emulate actual conditions that would develop in such a storm; NMFS recommends using sensitivity analysis to explore responses under higher wind speeds.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

Fish

Large Wood

NMFS questions whether the large reduction in buffer widths along different stream types relative to the No-Action Alternative, particularly for Alternatives 2 and 3, would provide fully functioning riparian and stream ecosystems. The recommended 100-ft buffer for perennial and fish-bearing streams in Alternative 2 (the preferred alternative) is considerably less than the published studies the DEIS cites to justify this width on p. 730. In addition, this buffer does not account for wetlands or sensitive habitats that may require a wider buffer to ensure a fully functioning stream network. Along many streams in the Cascade and Coast Ranges, the 25-foot no-cut buffer consists of a scattered string of alders that may deliver little functional wood.

Fish Productivity

The DEIS fish productivity model makes several erroneous assumptions regarding the 'value' of channel or habitat types for salmon, and these assumptions lead to an erroneous conclusion that smaller streams have less value for salmonid fish than larger rivers. The DEIS fish productivity model incorrectly applied equations relating pool spacing to wood loading, contributing to an erroneous conclusion that the there is little difference in fish productivity across the alternatives.

The DEIS assumes that available habitat is proportional to available channel area (*et al.*, large channels can support more fish than small channels). This assumption is not warranted, because available habitat depends more on channel complexity than channel area. Large, simple (*et al.*, low wood density) channels may support lower densities of fish than small, complex channels. (*et al.*, Beechie *et al.* 2005 found very low densities in large mainstem pools, riffles and glides that had low wood densities).

The DEIS assumes that steelhead avoid unconstrained reaches. This assumption is simplistic as juvenile steelhead are typically observed rearing in unconstrained reaches with coho (*et al.*, Beechie *et al.* 2005a found steelhead rearing throughout the Skagit River mainstem, which is unconstrained). They may be at lower densities in low gradient sections, but this may be more a result of competition with coho than habitat selection.

The DEIS seems to assume that the quality and productivity of fish habitat are controlled solely by physical characteristics. This assumption is unwarranted, because a large amount of evidence supports the hypothesis that fish growth and survival are also dependent on aquatic productivity (*et al.*, prey availability). For example, unconstrained, low gradient channels that have a higher density of prey available will likely have a higher potential to support juvenile coho salmon than a similar stream with low prey density (*et al.*, Kiffney and Roni 2007). Furthermore, high gradient, confined reaches may be actually provide a high level of support for rearing coho and Chinook salmon if prey availability is high.

The DEIS assumes that channels with low geomorphic intrinsic potential (IP) for rearing habitat require less protection than channels with high intrinsic potential. This assumption is also unwarranted in that channels with low IP for juvenile salmonid fish may be important sources of water, sediment, organic matter or nutrients to channels with high intrinsic potential (Rice *et al.* 2001, Kiffney *et al.* 2006). In other words, the intrinsic potential of a river network is likely a result of habitat attributes as defined in the IP model, but also a result of important connections between habitat types and basal productivity. Therefore, conserving, restoring and protecting linkages among habitat and channel types may be a key action needed to increase populations of these fish species.

The DEIS definition of large wood is not the same as the definition of large wood used in the literature cited by the DEIS (Beechie and Sibley 1997) to estimate frequency of pool formation. For example, Beechie and Sibley determined that the minimum pool forming diameter of wood varies as a function of stream size and can be expressed by the equation:

Minimum pool forming wood diameter = 0.028*(Bankfull Width) + 0.0057,

and that pieces < 15 cm (6 in) diameter could form pools. However, the DEIS only considers wood > 50.8 cm (20 in) diameter at breast height (DBH) to be large wood. By excluding all pieces of wood < 20 inches DBH from their analyses, the DEIS grossly underestimates the importance of wood to the formation of pool habitat, and by extension the importance of riparian forests with trees < 20 inches DBH to instream habitat.

Another critical problem with the FPI (pp. H-1091-1092) is that it uses an incorrect equation (derived from Beechie and Sibley 1997) to estimate that:

The number of pools per channel width = 2.7 - 4.6(slope x LWD/m) + 1.6(slope).

Using this equation, one would erroneously conclude for example that a stream with no wood and a slope of 0.01 will have about 3 pools per channel width, which is extremely high. The equation should read:

number of channel widths per pool = 2.7 - 4.6(slope x LWD/m) + 1.6(slope),

which means that the distance between pools is three channel widths.

Using this inaccurate information, the DEIS erroneously concludes that the pool frequency ranges from a maximum frequency of 2 pools per channel width (with high wood loading) to a minimum frequency of 2.7 + 1.6*Slope (*et al.* about 3 pools per channel width for a stream gradient of 0.01). These results clearly contradict Beechie and Sibley (1997, Table 2 and Figure 3), which shows that fewer wood equals fewer pools, and that when there is no wood, estimate the distance between pools can be as great as 8 channel widths. The cause of this error is that the analysis confuses "pools per channel width" with the distance between pools, measured in channel widths. It is not clear how far this error permeates the DEIS.

Because the DEIS inappropriately applies the data from Beechie and Sibley (1997) to estimate pool frequency, and because these data are applied to estimate the FPI, the FPI appears to be inaccurate, and the conclusion that there is little difference (< 3%) in fish productivity among the four alternatives most likely is erroneous.

The DEIS states (p. 734) "relative proportion of the maximum potential watershed coho salmon productivity … would increase from the current level of 38% to 2106 levels of 49%...", yet presents no basis or source of these values, nor does it discuss the uncertainty associated with each. Assessing the scientific basis for these claims is virtually impossible without a clear identification of the analytical assumptions underlying each result, and evaluating the meaning of any change is truly impossible without a statement of the confidence intervals surrounding these numbers.

The DEIS assumes that standing stock of wood accumulates without consideration of the reduction of wood from decay, floods, and other processes. This contributes to the conclusion that "large wood contributions would increase over time under all four alternatives…" (p. 729). Proper modeling of wood balance would include balance of inputs vs. outputs, such as decomposition, recognition of (bedrock) bed characteristics making reaches more porous to wood (May and Gresswell 1996, Montgomery 1996), and shifts between hardwoods (fast decomposition) and conifers (slower decomposition), to quantify changes in standing crop of wood in comparison to natural abundances of wood in streams.

There are also problems in defining as important only those trees > 150 feet high and > 20 inches diameter at breast height, so that harvest of any trees smaller than these dimensions has no effect on model outputs (*et al.*, there will be no change in the FPI). This makes it appear that Alternatives 2 and 3 have little effect on recruitment of large wood, and therefore the FPI, relative to the No-Action Alternative or Alternative 1. Thus, for example, the DEIS (p. 113) concludes that the large wood contribution from all four alternatives "Increases to near maximum in long term", and that the large wood contribution from Alternatives 2 and 3 is "slightly less" (than the No-Action Alternative). Both of these statements are incorrect. Alternatives 2 and 3 will substantially decrease the large wood contribution to fish bearing streams relative to the No-Action Alternative, and the decreases will be long-term. This is because thinning will remove wood large enough to form pools from the riparian zone (if the term large wood is defined by its ability to form pools rather than the arbitrary value of >20 inches diameter) (Beechie *et al.* 2000). Alternative 1 will substantially decrease the large wood contribution to fish-bearing streams from non-fish bearing streams relative to the No-Action Alternative.

Also, there is a problem in assigning equal value to wood delivered to fish-bearing streams from debris flows as is wood delivered to streams from direct riparian recruitment or channel migration. Since large wood delivered to fish bearing streams from debris flows occurs infrequently and tends to deposit large piles of wood in and around streams, most of which contributes little to important functions such as pool formation, it may not be appropriate to consider a piece of debris-flow derived wood as functionally equivalent to wood entering streams from other sources. Because the DEIS treats all sources of large wood equally, and estimates long term annual averages, it exaggerates the average amount of functional large wood that will be in streams. For example, a stream could have very little functional wood most years, but a debris flow that deposited a large pile of wood to the stream in a single year would then boost the annual average and potentially make it appear that there was, on average, substantial amounts of functional wood in the stream, when in fact that was not the case.
NMFS recognizes that a considerable amount of work went into the fish productivity model, but for the reasons described above, additional work is needed using: (1) more valid assumptions about functional wood sizes, value of wood from different sources, and wood longevity; (2) the correct equation for the number of pools per channel width; (3) a more realistic view of the totality of factors that may limit fish productivity; and (4) better disclosure of assumptions and methods used to estimate fish response to stream channel changes.

Nutrient Input

This short section (three paragraphs on p. 741) asserts that all four alternatives will maintain a level of allocthonous nutrient input that is similar to current levels, which may not be justified. The DEIS says on p. 741 that "...along non-fish bearing intermittent streams, some localized shifts in vegetation would occur because the riparian management areas would not include all of the areas that provide organic matter inputs to streams." In fact, these streams receive very little protection under Alternative 2 or 3, and organic matter inputs would be reduced. The FEIS should provide a more realistic analysis of the effects of the alternatives on nutrient inputs to non-fish bearing intermittent streams, and discuss how these changes relate to productivity of fish-bearing streams.

Fine Sediment Delivery

The DEIS states on p. 741 that the fine sediment delivery analysis will focus on changes in sediment that would "overwhelm the ability of fish to cope with or avoid the stress" of sediment. This section describes a linear comparison to equate the increase in stream sediment (1%) to a decrease in fish survival (3.4%). Assuming that this relationship is linear and can be applied universally across the plan area tends to over-simplify the variety of conditions found within the plan area. There is no analysis described in this section.

The DEIS (p.741) contends that "...thresholds have not been established for the levels of sediment delivery that would cause impairment to fish." There is a wealth of literature on the effects of fine sediment and aquatic organisms including salmon (*et al.*, Suttle *et al.* 2004), and although true thresholds are difficult to identify, it is certainly possible to establish management targets that avoid most sediment impacts on salmonid fish, their forage organisms, and their habitat. Such an approach would require an analysis similar in depth to that completed for the in-stream wood issue in the DEIS.

The section concludes that there will be no effect to fish populations from increased sediment loads. This conclusion is based in part on an assumption of no additional landslides under increased intensity of land management due to use of the TPCC. Please see our comments about TPCC under Chapter 3, Fish, Sediment, above. The other basis for the conclusion appears to be reliance on the optional BMPs and the ability of fish to avoid turbidity. Relying on optional practices and potential avoidance behavior of fish does not provide a reasonable level of confidence that anadromous fish and their habitat will not be affected by this sediment.

The BLM should provide additional analysis and documentation for this section in the FEIS to address the issues described above.

Peak Flows

This short section (three paragraphs, p. 743) does not consider the potential effects of increased magnitude, duration, frequency, or timing of peak flows. This section should discuss how increased peak flows may affect the biological communities and primary constituent elements of critical habitat of listed salmonid fish within susceptible subwatersheds, as this is likely to be an issue during site-specific ESA consultations on timber harvest projects completed after WOPR is in effect.

Temperature

This one paragraph section on p. 743 primarily downplays the potential effects of increasing temperature in 31 miles of perennial streams within the Coquille Basin that are currently listed as water quality limited by the ODEQ for temperature. The reference to mitigation provides an optional suggestion to maintain additional canopy within the secondary shade zone, but the DEIS does not provide any meaningful assurance that the mitigation will be applied during project implementation. The FEIS should provide this assurance by modifying the strategy.

Considering that OC coho are proposed for listing as threatened under the ESA, the FEIS should provide a higher level of assurance that it will provide the necessary habitat conditions to maintain and recover their populations. It would be appropriate for the FEIS to make a commitment to complete mitigation, at the very least, that would restore temperatures on its lands within the Coquille Basin.

Based on the information presented above for Chapter 3, Water, Temperature, the preferred alternative (Alternative 2) is likely to increase water temperatures in some fish-bearing streams in the plan area. By increasing water temperatures in some areas, Alternative 2 is likely to increase risks to anadromous fish of: (1) increased adult mortality and reduced gamete survival during pre-spawn holding; (2) reduced growth of alevins or juveniles; (3) reduced competitive success relative to non-salmonid fish; (4) out-migration from unsuitable areas and truncation of spatial distribution; (5) increased disease virulence, and reduced disease resistance; (6) delay, prevention, or reversal of smoltification; and (7) potentially harmful interactions with other habitat stressors (Zaugg and McClain 1972, Adams *et al.* 1975, Zaugg and Wagner 1973, Zaugg 1981, Reeves et. al. 1987, Berman 1990, Marine 1992, 2004, McCullough 1999, Dunham *et al.* 2001, Materna 2001, McCullough *et al.* 2001, Sauter *et al.* 2001, Marine and Cech 2004). This is one of the reasons NMFS is recommending that BLM work with us and EPA to amend the RMA delineations and management strategies in the selected alternative.

Water

Peak Water Flow

Streams are most susceptible to change in peak flows at scales smaller than sixth field watersheds (Grant *et al.* in review). Thus, individual logged reaches within a sixth field watershed could have peak flow increases that are masked by uncut reaches sharing the same sixth field watershed. The cumulative effects of multiple small watersheds having increased peak flows may include limited stream geomorphic change, since most small watersheds are dominated by large particle size (Grant *et al.* in review), but could increase fine sediment transport, with downstream deposition. The DEIS uses the sixth field as the scale for its analysis and therefore does not acknowledge the potential compounding effects of increased peak flows from multiple smaller subwatersheds.

Empirical and modeling studies summarized in Grant *et al.* (in review) suggest that at a minimum road-related processes increase peak flows; modeling studies for Washington suggest an approximate doubling of harvest-only effects (Grant *et al.* in review, p. 15). Road effects are not included in the DEIS analyses for either hydroregion. The FEIS should include the effects of road-related changes in peak flows for both hydroregions.

The DEIS analyzes only the magnitude of peak flows. It would also be appropriate to also consider the frequency and duration of peak flows and their effects to stream processes and the biological community. Lewis *et al.* (2001) found that the return interval for the largest peak flows was halved following clearcutting. Thus the largest peak flows did not increase in size, but doubled in frequency, "roughly doubling the geomorphic work on the channel."

Timing of peak flow changes should also be considered in the analysis. Lewis *et al.* (2001) found that peak flows increased after clearcut logging, but the increase was only significant at the beginning of the rainy season, when the soil is driest. These potential changes may have considerable effects on salmonid fish due to adults spawning at this time. Many of the changes in peak flow measured following harvest are within the yearly range of flows in studied watersheds (Grant *et al.* in review), complicating the ability to detect changes. However, the full range of flow responses should be considered to determine whether substantive changes in flow regime would occur following logging.

There are a number of reasons that the results of both paired small watershed studies and process models, such as those used in the DEIS, should be interpreted cautiously. The sample size described in the meta-analysis by Grant *et al.* (in review) relevant to the plan area is small (*et al.*, n=3 for 40-80% ECA rain-dominated systems), with a large amount of variability. Grant et al (in review) state that peak flow responses can be highly variable due to management factors including roads, types and arrangements of harvest (*et al.*, clearcut vs. thinning, clumped vs. dispersed), as well as landscape pattern (Grant *et al.* in review, p. 53). Hydrologic process models (Lewis *et al.* 2001) and spatially distributed dataset models (Bowling and Lettenmaier 1998, Tague and Band 2001) have been developed and used in the Pacific Northwest and can incorporate some of these parameters. Rain-on-snow modeling used in the DEIS analysis apparently did not incorporate these parameters.

The FEIS should provide a validation or accuracy assessment for the peak flow models used in the analysis. The variability across the plan area and the fact that both analyses are untested within the plan area create low confidence that the results are reliable and accurate. Coupling these factors with the use of the largest spatial scale suitable to detect changes in peak flows further reduces confidence in the analysis.

Water Quality – Shade

Based on the information presented above for Chapter 3, Water, Temperature, NMFS disagrees with the assertion on p. 754 that under Alternatives 2 and 3, the riparian management areas along permanently flowing non-fish-bearing and fish-bearing streams would fully retain the shade that is necessary to block sunlight from reaching the streams and increasing their temperature.

Water Quality – Sediment

The DEIS asserts on p. 758 that sediment generation by overland flows (the mechanism for sediment from cutting and yarding timber) is not an issue because of high water infiltration in forest soils. The DEIS should provide references for this assertion in the FEIS. Log yarding and subsequent site preparation (*et al.*, prescribed burning, scarification prior to planting) can increase soil exposure, runoff, and surface erosion (Chamberlin *et al.* 1991). The magnitude of effects depends on the type of equipment used; the location (*et al.* proximity to stream channels), extent, and type of disturbance; slope; soil types; the time required for revegetation; and whether runoff can be concentrated by roads or other features. Under Alternative 2, ground disturbing activities will occur as close as 25 feet to perennial (including fish-bearing) streams, or up to the bank of intermittent streams not subject to debris flows. Because buffer widths needed for sediment filtration vary from 100 to 300 feet or more depending on slope, parent rock type, and other factors (Spence *et al.* 1996 p. 219, FEMAT 1993 p. V-38), NMFS predicts that Alternative 2 will increase fine sediment yield to streams in the plan area. Stream-side buffers are not effective in removing sediment carried in channelized flows (including intermittent streams) that originate outside of the buffer and continue through it (Belt *et al.* 1992).

The DEIS also asserts (p. 763) that shallow landslides will not increase over the next 10 years under any alternative because of the TPCC, and because of site-specific review of proposed activities. However, the DEIS has not provided information about the effectiveness of the TPCC withdrawals, or about the procedures, decision criteria, and effectiveness of the site-specific reviews. Because of the increased amount of timber harvesting under Alternative 2, NMFS assumes the risks of sedimentation from landslides will also increase.

Probable increases in sedimentation under Alternative 2 would increase risks that egg to fry survival of anadromous fish will be reduced, that pool volume and interstitial habitat that support rearing juveniles will be degraded, and that production of invertebrate forage organisms will decrease in affected stream reaches (Chapman and McLeod 1987, Gregory *et al.* 1987, Bjornn and Reiser 1991, Hicks *et al.* 1991).

NMFS recommends that the FEIS disclose the potential effects described above. Adjustments to the preferred alternative likely are needed to ensure that fine sediment yields are not increased in watersheds that are important to anadromous fish. As stated earlier, NMFS is willing to work with BLM to develop these adjustments.

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United States Department of the Interior

NATIONAL PARK SERVICE
Oregon Caves National Monument
19000 Caves Highway
Cave Junction, Oregon 97523

NATIONAL PARK SERVICE

IN REPLY REFER TO:
A76(ORCA)

January 11, 2008

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Grants Pass Interagency Office

Tim Reuwsaat , District Manager
Bureau of Land Management
Medford District
3040 Biddle Road
Medford, OR 97504-4119

Dear Tim,

Thank you for providing the opportunity to comment on the BLM's Western Oregon Plan Revision. In general, this planning document is one of the most comprehensive and well-written ones we have seen. However, as required under NEPA, Oregon Caves National Monument should have been directly consulted as an "affected federal agency" before the final draft. Absent that consultation, we have some specific comments and questions prior to the end of the public comment period.

The No Action Alternative would have the least adverse impacts to species on the Monument in terms of air quality (smoke & CO_2), fire hazard and resiliency, soil disturbance (grazing & harvest), streams (large-wood, sedimentation & temperatures, non-native invasions, forest fragmentation, forest recovery from salvage logging, road and ORV trail density, edge effects, and global warming. Alternative 3 would be most detrimental to the Monument, for most of the same reasons, including the fact that it would result in the least acreage of ACECs (p. 809).

Under the section dealing with mineral extraction, there is no mention of the marble quarry adjacent to Monument. We assume that the quarry will continue to be withdrawn from mineral extraction under all alternatives.

Off Road Vehicles

Your planning document states that all alternatives would reduce the amount of area open to off-highway vehicle use. However, the document also states that under all alternatives, the off-highway vehicle opportunities would increase (page 777). Does this apparent contradiction mean that in the action alternatives, ORV areas would be better marked, publicized, or otherwise developed? The document suggests this but does not directly address the apparent contradiction.

Effects on Species

Extirpations of species on BLM administered lands from some of the listed impacts may lengthen stochastic extirpations on and in the Monument as a result of reduced migration. Given past anthropogenic extinctions in southern Oregon, some species have such narrow or narrowed ranges (one or two counties) that extinctions are likely to occur as well over a hundred year span.

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There are some actual or likely lepidopteran endemics to the Klamath-Siskiyous. Most have ranges more restricted geographically, have higher taxonomic status or smaller populations than those species assessed on p. 714, such as:

Whulge (Taylor's) checkerspot butterfly (southern range limit in Williamette Valley);
Callophrys polios (hoary elfin) (boreal Pacific NW from NWT to Rockies, disjuncts in sOR coast, AK, sRockies);
Oregon silverspot butterfly (near coastal southern limit), Fender's blue butterfly (endemic to Williamette Valley);
Insular blue butterfly (Plebejus saepiolus insulanus) possibly in Lane Co. near or at southern limit in range);
Chloealtis aspasma at the southern limit in Jackson Co. of its Benton Co. to sOR range;
Littorina subrotundata (= *Algamorda s.; A. newcombiana*) at the southern end of its OR to WA range.

The high biodiversity and endemism of species in caves in Oregon Caves National Monument suggests that certain BLM-managed caves in the Siskiyous may have similar biologic values that would qualify them to be nominated as significant under the Federal Cave Resources Protection Act, an authority not referenced in your document. Therefore, some non-listed species need to be assessed under environmental consequences, consistent with page 719 in which "special status species would be managed to avoid contributing to the need to list as threatened or endangered under the Endangered Species Act."

As with about ten beetle taxa, some of the taxa listed below are presently known only from Siskiyou County in California. These species might soon have a major portion of their range identified on Oregon BLM lands once comprehensive databases for Oregon are completed. Further, many of these species are likely to move northward due to climate change. Some of these species have already been documented over the past few years as appearing at Oregon Caves National Monument for the first time. Comparison with just one genus from the more comprehensive (Oregon and California) snail databases suggests that more pebblesnails should be evaluated than what are listed on page 715 and that beetles and lepidopterans with narrow ranges are almost as common in Josephine or Jackson counties as in Siskiyou Co. Larger lists could have been generated for beetles, snails, macrofungi, and dipterans and smaller lists could be compiled for many other taxa, such as the stonefly *Hydatophylax schuhi* (endemic to Klamaths in Jackson Co., & westernmost Great Basin in Klamath Co., Oregon) and the caddisfly *Rhyacophila colonus* endemic to Josephine & Del Norte Cos.).

Species listings should be reviewed by your exceptional staff of botanists before final publication of the plan to correct some typographical or misspelling errors as indicated in the following examples:
Volume 1 p. 20
Gentener's fritillary is misspelled and should be Gentner's fritillary
Fritillary gentneri is misspelled and should be Fritillaria gentneri
Castelleja is misspelled and should be Castilleja levisecta

2

Astaragalus applegatei is misspelled and should be Astragalus applegatei

Some statements in the plan should be revised to enhance clarity. We believe that the following statement could cause confusion:

"State listed species where the BLM has not entered into a conservation agreement and species listed by the BLM as sensitive or assessment species will be managed on public domain land and on O & C lands where protection does not conflict with sustained yield forest management in areas dedicated to timber production. This is so that special status designation would no longer be warranted and so that actions will not contribute to the need to list the species under the Endangered Species Act. Where conflicts with sustained yield management occur, protections on O & C lands will only be applied to prevent extinction of a species even if it is not yet listed under the Endangered Species Act"

The statement as written gives the impression that sustained yield forest management will help remove special status designation and such actions will not contribute to the need to list the species. Yet there is no evidence given that this would be the case. Also, preventing extinction needs to be better defined. Does this mean, for example, the likely elimination of a species from greater than 50% of its range?

To better understand ways to avoid plant extinctions, it would be useful to analyze species that likely were once within or close to the management areas covered by this document but which are now apparently extinct, such as *Neothremma siskiyou, Fluminicola* undescribed sp. (Frest & Hohannes, 1999) (endemic in Shasta River valley, Siskiyou Co.), *Plagiobothrys lamprocarpus* and *Calochortus indecorus*. The latter should be included even if it was considered a hybrid and not a true species.

Appendix G-1068 – Why is *Vespericola sierranus* listed as a species of concern? It is abundant in northern California. Does this document assume that species at the limit of their geographic range are of concern because they are more likely to be extirpated there than elsewhere? Several similar examples could be cited.

<u>Effects of Climate Change</u>

"The analysis assumes no change in climate conditions, because the specific nature of regional climate change over the next decades remains speculative". We believe that any analysis that assumes no change in climate conditions is itself speculative. Global climate change has been identified as one of the greatest potential impacts to our National Parks and their natural and cultural resources. An increase in the average annual regional temperature is not just likely; it has already occurred. Increased temperatures could also result in significant changes to hydrologic processes, including reduced snow pack, earlier snowmelt, and shifting of the rain-on-snow zones. Some of these changes have already occurred.

3

There is no mention of the likely effects of increased atmospheric carbon dioxide on changing the carbon versus nitrogen ratio in plant biomass and the resulting effect on decomposition rates as cited in a recent USFS contracted paper.

Forest Management and Effects from Timber Harvest Activities

p. 564 – The assumption here is that fertilization would speed up growth but there are no cited references supporting that assertion. Several published studies indicate that the effect may be negated by adverse affects on ectomycorrhizae and aquatic animals. The document does not adequately discuss potentially antagonistic effects between mycorrhizae and fertilization and how that interaction may be important in assuring the survival of planted trees and enhancing the growth of desirable trees in harvested or disturbed areas

The assumption that "improved genetics" would increase tree growth also has no cited references. Several published articles suggest that "improved genetics" for faster growth may also make trees more vulnerable to insect and fungal infestations.

P. 494 – It is unlikely under most definitions of what defines "old forest" that the "patch size of mature and structurally complex forests" would increase across all ownerships under Alternative 3 if 63% is harvested in a century. This is likely to be especially true when on the same page where it is asserted that "On the BLM-administered lands, the size and connectivity of the patches of the mature and structurally complex forests would decrease in all provinces under Alternative 3."

p. 510 – We recommend that you cite Daniel Sarr, NPS Klamath Network Inventory and Monitoring Coordinator, and others on the increase in salmonberry dominated areas in highly productive riparian areas in our region.

p. 557 - It would appear that the volume from thinning is highest under the No Action Alternative. If true then this alternative would be most likely to accelerate the attainment of a more natural mix of old growth and structurally complex forests.

Page 723 – We disagree with the assertion that none of the alternatives would result in increases in stream temperature that would affect fish habitat or populations, except under Alternatives 2 and 3. Federal key watershed analysis of the Sucker Creek drainage in Josephine County concluded that stream temperatures would increase due to Port Orford mortality in riparian areas as a result of Port Orford-Cedar rot. Further into the document, (p. 756) stream temperatures are analyzed to some extent, although Port Orford mortality was not taken into account.

Page 745 – We disagree with excluding dissolved oxygen "because their effects are site specific and have limited applicability to forest management" This needs to be reworded to say that there are only a few sites with such problems - if indeed this is the case (see comments on Port Orford mortality).

4

p. 749 – "This inconsequential stream lengthening would have no effect on the timing of runoff…" We believe this statement would be more accurate written as "This inconsequential stream lengthening would have no *measurable* effect on the timing of runoff"

p. 775 – We disagree that sightseeing does not require recreation developments. Increased activity of this nature generally leads to requested or constructed improvements on roads and trails including but not limited to roadway enhancement, pullouts and overlooks.

p. 865 – The definition of sustained yield includes "without impairment of the productivity of the land". In conjunction with other BLM goals and objectives, something should be said of biodiversity, as often the two are incompatible. We believe, biodiversity should be a goal, as well as the fish productivity stated on page 738, even if both goals cannot be maximized.

p. 866 – The term "recover potential mortality" is unclear and may not be understood by other agencies, cooperators or the public.

If you have any specific questions or desire clarification of these comments, please contact me or Natural Resource Specialist John E. Roth at 541-592-2100. The National Park Service looks forward to working with you on implementation of the final, selected alternative in a manner that will protect Monument resources and benefit our shared stakeholders and owner public.

Sincerely,

Craig W. Ackerman
Superintendent

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United States Department of the Interior

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In Reply Refer to:
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Memorandum

To: Project Manager, Western Oregon Plan Revisions
Bureau of Land Management

From: Assistant Regional Director, Ecological Services, Region 1 Theresa E Rabot
Portland, Oregon

Subject: Comments on the Western Oregon Plan Revisions

The Fish and Wildlife Service (Service) has reviewed the August 2007 Draft Environmental Impact Statement (DEIS) for the Western Oregon Plan Revisions (WOPR). Our review has focused on important trust resources including species listed under the Endangered Species Act (ESA). In our role as a cooperating agency on the WOPR, we have been involved for the last 3 years in discussing and advising Bureau of Land Management (BLM) on the development of the DEIS. We have continued to work with the BLM following release of the DEIS and have made progress in offering recommendations for a final action. We have focused our attention on identifying important conservation needs of listed species and possible management actions to address those needs.

We recognize that BLM must balance a number of goals and objectives as they move forward with revised land management plans. Our comments reflect our mandate to comment on concerns with fish and wildlife resources as addressed in the DEIS, especially those associated with the Late-successional Reserve (LSR) network established via the Northwest Forest Plan.

The LSR network provided a conservation strategy for many old grow dependent species, including marbled murrelets and northern spotted owls (spotted owls), federally listed species under the ESA. The Service's Draft Recovery Plan for the northern spotted owl relies on a smaller footprint of management areas than is currently provided for with LSR, although management of the areas would be similar. The Service received a number of comments from scientists and the public on the draft recovery plan. Based on the concerns raised, we have requested a science panel to review the scientific basis of the plan in addition to the science relevant to the ecology of the owl. We recognize that the BLM relied on the same science relevant to the owl, including the draft recovery plan, and will keep BLM informed as to the results of the science panel.

General Comments:

1. We believe Alternative 1 provides a protected network of large blocks of late-successional forest habitat that contains the greatest level of conservation among the action alternatives.

2. The landscape management outcomes produced from Alternative 3 do not appear favorable for achieving a viable conservation strategy for spotted owls, marbled murrelets and fisher (a candidate species). The alternative does not provide large blocks of habitat, removes and degrades current habitat through partial harvests, increases fragmentation, thereby reducing overall habitat quality over the planning horizon, and only provides temporary protection to known sites of listed species. Additionally, Alternative 3 does not specifically provide any special management direction in designated critical habitat for listed species.

2. We believe the retention of structural legacies including green trees, snags, and down wood is a fundamental component of providing for wildlife and ecological diversity and should be incorporated as a strategy in the preferred/final alternative. Without a robust strategy to provide for structural legacies there is concern that these older forest characteristics will be lost in future stands produced from regeneration harvest. The incorporation of structural legacies in young stands provides those elements needed to more quickly accelerate the development of habitat for species associated with late-successional forest. We recommend that green tree and snag retention be representative of the average stand diameter or larger.

3. In August 2007, the Service, BLM, and Forest Service signed a Conservation Agreement for the Siskiyou Mountains salamander (*Plethodon stormi*). The agreement and associated Conservation Strategy are intended to promote the conservation of the species. We suggest acknowledging the implementation of this Agreement in the final EIS and RMP.

4. For the purposes of jeopardy analyses under section 7 of the ESA, the Service must address the effect of an action, in this case the BLM's selected alternative of the WOPR, on a species numbers, distribution, and reproduction. While we have commented on a broader scale, information needed to address these parameters is included in species specific comments.

Below are more specific comments on particular species or species groups.

Northern Spotted Owl

Population Issues

BLM has contributed to supporting the Northern Spotted Owl Effectiveness Monitoring Plan as part of the regional monitoring strategy developed under the NWFP. The purpose of this monitoring effort is to assess trends in spotted owl populations and habitat. Monitoring efforts have provided integral information on northern spotted owls since inception of the NWFP. We recommend that the DEIS state whether BLM will continue to participate in this monitoring effort in Western Oregon and whether any changes to that monitoring effort will be proposed under the selected alternative.

We recommend the DEIS contain an evaluation of the effect of the alternatives on known spotted owl sites. BLM has some of the best and most extensive spotted owl databases; apparently there is no use of this information in the DEIS beyond describing the 2001 to 2004 occupancy, including no analysis specific to the alternatives. In addition, the description of occupancy would be more useful if addressed by District and/or physiographic province.

With respect to the key points on page 282, the DEIS states that populations have been stable since 1985 on Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area. What is the basis for this conclusion on Coos Bay, Medford, and Klamath Falls? We are unaware of demographic studies addressing these Districts, and therefore assume that BLM extrapolated from data on other study areas, which carries uncertainties of comparability. The statement does not indicate the source of the information, nor does it seem to acknowledge the uncertainty potentially involved. We recommend that BLM cite the information used for this statement, including the basis for this extrapolation and indicate which demographic study areas are being used in this portion of the document.

Other Non-habitat Factors

The analysis of the effect of the alternatives on spotted owls is generally limited to habitat conditions and does not address non-habitat effects to populations that may operate on BLM lands. There appears to be an implicit assumption that habitat (at appropriate distribution and levels) will be occupied by spotted owls. However, this does not acknowledge the effect of non-habitat factors, in particular barred owls. The Service acknowledges that there are information gaps regarding the effects of barred owls on spotted owls and habitat usage, and that research is underway to address these information needs. The DEIS should acknowledge these uncertainties over barred owl effects on spotted owl populations and describe the manner in which BLM intends to respond to future changes in spotted owl numbers. A final Recovery Plan should assist BLM in developing an adaptive management response to an unacceptable decline in spotted owl numbers.

Habitat Issues

Page 634 states that both quantity and *quality* of habitat is analyzed. However, the rest of the section does not address quality, but simply shows the quantity for each alternative and the change over time. We recommend including a discussion of the quality of the various forest classes. This is particularly important given that the increase in younger forest habitat acres is used to offset the loss of "152,400 acres of existing old forest under Alternative 1 [sic]..." (should read Alt. 2 on page 507 assuming Table 151 is correct). Figure 201 also displays a reduction of old-growth forests on BLM lands and an increase of younger forest habitat over the 100 year analysis time frame (page 589). The impact of replacing existing old forest with younger habitat needs to be fully analyzed since not all spotted owl habitat provides equal benefits to spotted owls. Younger replacement habitat may not provide the full range of benefits to spotted owl survival and reproduction.

Dispersal habitat analysis

The current analysis addresses the total amount of dispersal habitat in general and by 6th field watershed, but is not as clear on how the distribution of the 6th field watersheds with lower amounts of habitat effects the potential dispersal. Furthermore, the maps in the DEIS (pages 664-665) demonstrate the current status and no harvest scenario, but lack a similar visual for the other alternatives, including the preferred alternative. Without a similar spatial representation of dispersal habitat for the preferred alternative, we have insufficient information to provide specific comments. Some type of landscape-level discussion of the pattern is important to the understanding of dispersal.

Stand Level Management Issues

Neither Alternative 1 nor Alternative 2 provides any leave trees in regeneration harvest units. This would likely, over time, reduce the quality of harvested units to provide for spotted owl dispersal across the landscape between the Late-successional Management Areas (LSMAs) by depleting the majority of the prey-base and structural cover in harvested units. The Service recommends adding green tree retention and snag creation/retention guidelines at levels that will increase the likelihood of spotted owl prey species persisting in harvested areas until habitat develops again.

Down wood is a critical component of spotted owl habitat, in particular for spotted owl prey. There are no down wood requirements for Alternative 1 and 2 in timber management areas other than leaving noncommercial wood. We recommend adding requirements that would establish a base level of retained wood, requiring larger wood be left to meet the target if noncommercial wood is insufficient.

Reserve Design – Size and Location

It is our understanding that Alternative 2 was developed based on the guidelines for Options 2 in the Draft Recovery Plan for the Northern Spotted Owl (USFWS 2007) As previously stated, peer review of the draft plan identified issues regarding the scientific foundation of the plan, particularly Option 2. The Service is undertaking an independent, scientific review to address these criticisms. The Service will continue to work with BLM as we identify ways to resolve the issues raised by the peer review.

Page 652 of the DEIS states that in Alternative 2 LSMAs "were allocated explicitly to create spacing of no more than 12 miles between blocks large enough to support 20 pairs (defined in Table 187), and to create spacing of no more than 7 miles between blocks large enough to support 10-19 pairs" with the support of Forest Service lands. We concur with the inclusion of Forest Service LSRs in your analysis of future habitat blocks, but question the size of some blocks. Some of the Alternative 2 LSMAs, as described in Table 190, appear to rely on the inclusion of adjacent non-federal acres to achieve the large block size needed to maintain 20 pairs. This is problematic because of the low likelihood that these lands will provide significant contributions of suitable habitat in the long-term. We agree with the assessment on page 639 that most non-federal lands are unlikely to provide suitable habitat and these lands should not be relied upon for significant contributions for long-term planning. We suggest this assessment be considered in the block size and spacing analysis of Alternative 2.

Reserve Management

The Service believes thinned stands in the LSMA allocation should follow a variable density thinning prescription in an effort to create stands with a greater diversity of canopy heights, tree size, species diversity and openings, among other characteristics. We recommend adding this specifically to the thinning management action for this allocation in Alternatives 1 and 2. Currently, there is not enough specificity for us to understand how thinning in LSMAs will allow or accelerate owl habitat development.

As described above, down wood is very important to northern spotted owl prey. The legacy snags and downed wood created by stand replacing events are important components of high-quality spotted owl habitat, and the landscape distribution of pockets with high quantities of snags and down wood are likely the most difficult to mimic through silvicultural actions. Retaining some percentage of these components in LSMAs would help meet BLM objectives for this allocation. If salvage is allowed in LSMAs, we recommend that the DEIS include standards specific to the minimum amount of leave trees (burned and not) to meet the ecological development needs, with the remainder available for harvest.

Marbled Murrelet

The marbled murrelet recovery plan (USFWS 1997) relies on the LSR network of the Northwest Forest Plan (USDA and USDI 1994) to achieve recovery and describes any suitable habitat in LSRs within Zone 1 as essential nesting habitat for the species (USFWS 1997, page 131). These areas are also currently designated and proposed critical habitat for murrelets (USFWS 1996 and 2006 Alternative 1 is consistent with the murrelet recovery plan in providing a network of well distributed, large blocks of protected habitat. Alternative 1 projects a gradual increase in murrelet habitat in Zone 1 (0-35 miles inland) during the first 50 years and additional increases out to 100 years. In addition, Alternative 1 would maintain and improve habitat quality and possibly reduce nest predation

We believe the strategy for Alternative 2 overlooks key recommendations of the marbled murrelet recovery plan and its guidance for achieving the recovery needs of the species. Alternative 2 projects a continual decrease in the amount of murrelet habitat for the first 50 years, and excludes important areas from habitat protection in LSMAs. Although the Alternative projects habitat will increase from 50-100 years, this has uncertain value to the species if the preceding 50 years of habitat declines produces population impacts that result in fewer murrelets occupying BLM administered lands. Alternative 2 holds the potential to decrease habitat quality and increase nest predation. Nest predation is a major threat to the species and increased predation resulting in reduced reproductive success of murrelets could forestall recovery. The Service believes the LSMA network of Alternative 2 and projected loss of habitat during the first 50 years does not provide an effective strategy to address the conservation and recovery needs of the marbled murrelet.

In our role as a Cooperator, the Service has worked with the BLM to review the murrelet recovery plan actions along with BLM's most recent survey and habitat information to develop a potential strategy that recognizes BLM's timber management needs as well as the recovery needs of the murrelet. The outcome of the team was a mapped LSMA network that focused on conservation in Zone 1. We recommend this work be further refined and considered as a basis for a final strategy in the WOPR.

Currently, BLM management under the RMPs implements murrelet surveys prior to timber harvest in suitable habitat. When surveys identify murrelet occupied sites, those areas are protected from harvest. This is an important management action in determining where occupied murrelet sites occur on the landscape and is emphasized in the recovery plan under recovery action 4.1.6. The plan states, "all aspects of marbled murrelet recovery in the terrestrial environment depend on identification of nesting habitat". Surveys are the only practical means of identifying marbled murrelet nesting areas (i.e. occupied sites). Alternative 1 proposes to maintain surveys prior to habitat-disturbing activities and the DEIS projects that surveys would lead to the discovery of 601 new occupied marbled murrelet sites. Alternative 2 does not propose to maintain surveys prior to habitat-disturbing activities, and using the same projection from Alternative 1, approximately 600 occupied murrelet sites would be available to timber harvest impacts. Furthermore, the number of murrelet sites that could be impacted would likely be higher under Alternative 2 because of its smaller LSMA network compared to Alternative 1. The DEIS does not contain an analysis of the population effects from the loss of occupied murrelet sites due to discontinuing surveys and protection of additional sites under Alternative 2. The Service believes that surveys prior to removal of suitable habitat that result in protection of occupied nest sites are a critical component in providing for adequate conservation of nesting habitat and breeding sites. We recommend the final EIS/RMPs include direction to continue surveys prior to timber harvest and protect areas where occupied behaviors are observed.

Aquatic Species and Riparian Habitat

The designation of Riparian Management Areas relies heavily on the information contained in the document "Northwest Forest Plan Temperature TMDL Implementation Strategies" dated September 9th 2005. The Service was asked by the BLM and Forest Service to comment on the TMDL Implementation Strategies and did so in a letter addressed to Kathyrn J. Silverman and Michael J. Haske dated July 24, 2007 (attached). In the letter, the Service comments on several items in the TMDL Implementation Strategy that could benefit from further description or explanation. Given the significant role of the TMDL Implementation Strategies document/ SHADOW model in regard to the designation of riparian buffer widths/management areas, clarity in the DEIS could be provided by addressing our previous set of comments.

The information provided in the DEIS chapter 3, affected environment, stream temperature section, heavily cites the Northwest Forest Plan Temperature TMDL Implementation Strategies document in regard to describing solar physics and relationships between shade zones and temperature changes. The TMDL Implementation Strategies document is specific in regard to a narrow/focused evaluation of solar radiation delivery to water bodies and the resultant temperature change. The TMDL Implementation Strategy document acknowledges that the strategy only pertains to temperature related issues and does not address other important riparian functions such as hydrologic, geomorphic, and ecologic processes that affect riparian condition. The DEIS relies on shade zones to set Riparian Management Area widths, but the DEIS does not resolve issues associated with reduced riparian area widths as it pertains to hydrologic, geomorphic, and ecologic processes that affect riparian condition and ultimately fish resources (listed or not).

The TMDL Implementation Strategy document acknowledges that stream orientation, sinuosity, aspect, bank and channel stability, channel migration, and the potential for sediment loading must also be considered in determining the width of the primary shade zone. The DEIS needs to explain how these factors are accounted for in delineating the width of the Riparian Management Areas across the broad landscape of the WOPR area.

Aquatic species of high interest to the Service include bull trout, shortnose and Lost River suckers, coastal cutthroat trout, and Pacific lamprey, in addition to anadromous salmonids. These species would benefit from management that provides for recovery or conservation measures that would preclude the need to list under the ESA. In addition to fish-bearing streams, the riparian buffers for non fish-bearing streams are equally important for the needs of sensitive species, including amphibians such as the tailed frog and torrent salamanders (BLM sensitive or assessment species). These amphibians rely on cold, clear water and adjacent riparian areas with late-successional forest characteristics. The buffers in Alternative 2 provide little forest retention that maintains these characteristics, and in the case of small streams, no conifer forest buffer is retained. On page 345 the DEIS states, "a small portion of the headwater stream network is important in producing landslides and debris flows that can provide large wood to streams", however, this rational does not recognize that the majority of watershed area is adjacent to intermittent and low order headwater streams, so cumulatively, these areas may be disproportionately important in creating and maintaining aquatic habitats. We recommend the DEIS include more clarity and specificity on how the reduced buffer widths in the action alternatives adequately address the conservation and recovery needs of listed and sensitive aquatic and riparian species.

<u>Botany</u>

Federally Listed Plants

The DEIS on page 594 describes all alternatives as having no loss of occupied habitat, individual plants, or populations as a result of management activities because species recovery measures would be applied. We understand that Appendix E provides an abbreviated summary of recovery plan actions, but we are unclear how these actions relate to management commitments in WOPR that lead to protecting plants as intended. For example, if plant surveys were a key action to ensuring no loss of plants or populations prior to management, they should be identified as a management action. It would be helpful to provide more specificity on which recovery actions would be implemented. This is particularly important for listed plants that do not have completed recovery plans.

On page 46, Table 19, we note an error in the inclusion of Kincaid's lupine as a species with a completed recovery plan. The Service anticipates a draft recovery plan available for review in the summer of 2008.

BLM Sensitive and Assessment Species

There are 134 species identified as BLM special status species that occur in the planning area. Under BLM's Special Status Species Policy conservation measures would be applied for many of these species. According to the DEIS, conservation measures would not be applied to special status species in the conifer habitat group that occur on O&C lands unless 20 or fewer populations were known to exist. On page 46, it states that where species conflict with sustained yield management, protections on O&C lands will only be applied to prevent extinction. The Service is concerned that managing species populations to only prevent extinction could reduce species numbers or populations to a point where conservation measures are applied too late to be effective. This could present a high risk of local extirpation and contribute to the need to list species under the ESA. Page 604, states, "Any population losses from management activities to species with 20 or fewer populations would contribute to the trend toward local extirpation or extinction of the species within the planning area (Ellstrand and Elam 1993, USFWS 2003, Kaye pers, com. 2007, Friedman, pers com, 2007)." The total number of populations needed for species persistence may depend on many factors including the health or robustness of the individual populations, distribution, rate of decline, and the degree of threats affecting those populations. For example, eight plant species in Oregon were listed under the ESA with greater than 20 populations. We recommend the DEIS acknowledge that the health of individual populations, the threats to those populations as well as the total number of populations need to be examined when considering whether to provide conservation measures. There may be concern for species persistence when greater than 20 populations exist.

We recommend the final EIS provide more clarity as to whether BLM management presents a risk of extirpation or extinction of any sensitive and assessment species in the conifer habitat group, and whether certain species may need additional conservation measures. In the interest of complete information, we suggest a table of the Special Status Species in the conifer forest habitat group that would be provided with conservation measures and those species that would not be protected. The table should include number of populations, the population size in areas, and respective number of individuals in the populations. The final EIS should also acknowledge the Conservation Agreement for the Wayside Aster (*Euchephalis vialis*) recently completed in 2006 between the Service, BLM, and Forest Service.

Land Birds

Appendix A of the DEIS lists various major legal authorities relevant to the proposed plan revisions, but does not include the Migratory Bird Treaty Act (MBTA)(1918). The MBTA makes it unlawful, "by any means or manner, to pursue, hunt, take, capture [or] kill" any migratory bird except as permitted by regulation (16 U.S.C. 703-704). On July 18, 2000, the United States Court of Appeals for the District of Columbia held in Humane Society v. Glickman, 217 F. 3d 882 (D.C. Cir. 2000), that the MBTA applies to Federal agencies. As all Federal agencies are subject to the jurisdiction of the D.C. Circuit, the Service implements the MBTA consistent with this decision. Therefore, take of migratory birds by Federal agencies is prohibited unless authorized pursuant to regulations promulgated under the MBTA. The DEIS analyzes effects on land birds (i.e. migratory birds), but it is not clear how those effects comport with the BLM's obligations under the MBTA. We suggest adding the MBTA to the list of major legal authorities that are relevant to the planning process.

In concert with the MBTA and other relevant legal authorities, we recommend adding Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), which states that each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement a Memorandum of Understanding with the Fish and Wildlife Service that shall promote the conservation of migratory bird populations, with special emphasis on management for Birds of Conservation

Concern. We suggest some analysis on whether such an MOU is necessary to address any negative effects to migratory bird populations, especially in eastside conifer forests where the analysis predicts significant negative trends in habitat.

In the DEIS, we support the use of the Partners in Flight (PIF) bird conservation plans, structural features of the habitat classes, and focal species that indicate those desired conditions. In particular, we emphasize support for retention of legacy components of green trees and snags (in clumps) in regeneration harvest units. We note that none of the focal habitats in Altman's Lowlands and Valleys bird conservation plan is incorporated (see Table 103) despite the overlap with BLM lands, and your reference to this bird conservation plan (Altman 2000b on p. 327). This could be addressed by including plant groups called Riparian, Oak, & Chaparral, and choose focal species that represent habitat conditions as with the other analytical groups adopted in the DEIS from the other PIF plans.

On page 328, the habitat objectives are general, but no link is provided to the Focal Species in Table 103. Focal species are responsive to the habitat conditions listed in Table 103, and their abundances indicate success in achieving desired habitat conditions. Monitoring abundance of focal species should be mentioned here, as the path to evaluating the effectiveness of management. Since they are 'analytical groups' of land birds, the DEIS should explain how they will be analyzed. It should be noted that several species in Table 100 should occur in more than one group. For example, Purple Martin and Lewis's Woodpecker under the 'snag-dependent' group, Yellow-breasted Chat under the 'riparian' associates, and White-headed Woodpecker and Flammulated Owl should be under the 'older forest' associates.

The analysis of effects on land birds from the alternatives concludes that all alternatives meet objectives for mature and structurally complex forests. While this may be the case at 100-year projections, the analysis does not evaluate the effects to species in the near term (10-50 years) where some alternatives exhibit a decline of structurally complex forests prior to later increases (50-100 years out). The consequences for some birds of concern would be improved with retention of structural legacies including green trees, snags, and down wood well distributed in regeneration harvest units. Lacking a strategy for retention of structural legacies is likely to add to the declining status of some Birds of Conservation Concern.

Summary

In closing, these comments are intended to assist the BLM in developing a final management plan that addresses late-successional and old-growth forest resources and complies with the ESA. We have significant concerns that the preferred alternative would undermine current efforts to provide conservation and recovery of currently listed species, in particular the northern spotted owl and marbled murrelet. However, we believe the DEIS has analyzed the building blocks for a strategy that would fully meet the BLM's obligations. We are currently working with your agency to address these issues and value our role as a cooperator in the development of the final Resource Management Plans. We appreciate the opportunity to review the DEIS and look forward to continued collaboration. If you have questions regarding these comments, please contact Lee Folliard or Miel Corbett at (503) 231-6179.

References:

USDA (U.S. Department of Agriculture) and USDI (U.S. Department of Interior). 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl; standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. USDA Forest Service and USDI Bureau of Land Management. Portland, Oregon.

USFWS (U.S. Fish and Wildlife Service). 1996. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Marbled Murrelet; Final Rule. Fed. Reg. Vol. 61. 102:26256-26320. May 24, 1996.

USFWS (U.S. Fish and Wildlife Service). 1997. Final recovery plan for the marbled murrelet. U.S. Fish and Wildlife Service. Portland, Oregon.

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USFWS (U.S. Fish and Wildlife Service). 2007. 2007 Draft Recovery Plan for the Northern Spotted Owl, *Strix occidentalis caurina*: Merged Options 1 and 2. Portland, Oregon. 170 pp.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

January 9, 2008

Reply to
Attn Of: ETPA-088

EPA Ref: 91-0079-BLM

Edward W. Shepard, State Director
USDI Bureau of Land Management
Western Oregon Plan Revisions
P.O. Box 2965
Portland, OR 97208

Dear Mr. Shepard:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Revision of the Resource Management Plans of the Western Oregon Bureau of land Management (BLM) Districts of Salem, Eugene, Roseburg, Coos Bay, and Medford, and the Klamath Falls Resource Area of the Lakeview District (CEQ No. 20070332). Our review has been conducted in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

The Western Oregon Plan Revision (WOPR) will establish management guidelines for approximately 2.6 million acres of BLM-managed land in Western Oregon. The DEIS considers a "no action" alternative (current management under the Northwest Forest Plan) and three additional action alternatives. The current annual timber harvest level is 268 million board feet and riparian management area (RMA) widths range from 180 feet to 360 feet depending on stream type. Alternative 1 proposes an annual timber harvest level of 456 million board feet and proposes RMA widths of 90 feet to 180 feet depending on stream type. The preferred alternative, Alternative 2, proposes an annual timber harvest level of 727 million board feet, proposes RMA widths of 25 feet to 100 feet depending on stream type, and increases timber harvest levels within RMAs. Alternative 3 sets annual timber harvest at 471 million board feet and employs a riparian strategy similar to Alternative 2.

EPA recognizes the management challenges created by the mixed private/federal ownership of the WOPR landscape, the diverse resource needs, and multiple statutory requirements. The BLM EIS interdisciplinary team is to be commended for their effort in this ambitious and difficult undertaking. We also want to recognize BLM's efforts to engage and inform the public in new and innovative ways and trust this will help inform BLM's selection and development of the proposed action in the final EIS.

EPA has served as a cooperating agency on this project for over two years. In that capacity, EPA has consistently raised concerns about the sufficiency of the aquatic/riparian strategy in Alternatives 2 and 3 in meetings, during WOPR planning criteria and alternatives development, and in writing. EPA's concerns have not been addressed in the DEIS. These concerns are heightened by what EPA believes to be the lack of a sound scientific basis for the aquatic/riparian strategy proposed in Alternatives 2 and 3.

EPA is concerned that Alternatives 2 and 3 would result in substantial, long-term impacts to water quality and exacerbate current exceedances of water quality standards in streams listed as impaired under Section 303(d) of the Clean Water Act (impaired waters). EPA is also concerned about significant impacts to drinking water and aquatic species that could be corrected by project modification or choosing

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another feasible alternative. Direct, indirect and cumulative impacts would affect waters on both BLM and non-BLM lands. Therefore we have assigned this draft EIS a rating of EO-2 (Environmental Objections - Insufficient Information). A copy of the rating system used in conducting our review is enclosed for your reference.

Watersheds covering approximately one million acres of the BLM planning area include streams that do not meet water quality standards (WQS) designed to protect drinking water, aquatic life, and other beneficial uses. Over 900 stream miles on BLM lands in the planning area are listed as impaired due to management-related temperature, sediment, and other pollutant loadings. Over one million Oregonians receive their drinking water from source water originating in watersheds on BLM lands in western Oregon. Salmon and trout species listed under the Endangered Species Act (ESA) and numerous at-risk fish stocks are dependent on cold water refugia on BLM lands within a fragmented western Oregon landscape where degraded conditions exist on non-BLM lands. To ensure that management of BLM lands protects and restores water quality, drinking water, and aquatic life, EPA recommends inclusion of a demonstrated, conservative aquatic protection strategy in the proposed action alternative in the final EIS.

On streams listed as impaired for failing to meet WQS, the Oregon Department of Environmental Quality and EPA are required to develop total maximum daily loads (TMDLs) that address water quality impairments. The Aquatic Conservation Strategy (ACS) under the Northwest Forest Plan (NWFP) has been a cornerstone of the federal land contribution to water quality improvement for BLM lands and for developing and implementing TMDLs. Monitoring and assessment efforts have demonstrated the success of the ACS in improving watershed health on federal lands. EPA considers these improvements to be an important achievement and we are deeply concerned that alternatives 2 and 3 would reverse positive trends achieved under the ACS. Extensive research and assessment efforts support continued application of the ACS as necessary to protect riparian functions critical to maintenance and restoration of water quality and beneficial uses.

For example, there are 710 stream miles in the WOPR planning area that do not meet the State WQS for temperature. The RMAs currently in place under the ACS will provide the system potential shade as well as the full complement of large wood inputs and sediment filtering necessary for improved stream conditions and reduced stream temperatures. In addition to the broad body of science related to water quality and riparian function (please see our enclosed detailed comments), modeling conducted by EPA indicates that application of WOPR Alternatives 2 and 3 would increase stream temperatures substantially more than predicted in the DEIS.

Additional water quality concerns identified in our review include impacts to sediment loading and peak flow from increased harvest levels and decreased riparian protection. Our analysis, also detailed in the enclosure, indicates that the modeling approach taken in the DEIS likely underestimates the contribution of sediment from the road network, land management activities, and debris flow events. It appears that the DEIS underestimates the number of watersheds susceptible to peak flow increases and related water quality impacts, due to the nature of data and assumptions that were used in the peak flow analysis.

Finally, we are concerned that the action alternatives in the DEIS do not afford additional protection for BLM lands in the WOPR planning area that provide drinking water to over one million Oregonians through 113 community water systems. Given the importance of BLM lands to drinking water in Oregon, the potential direct water quality impacts under the action alternatives, and the cumulative effects to water quality from harvest on BLM and adjacent private lands, EPA believes that a more protective approach should be pursued in source water areas on BLM lands.

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In order to address the issues we have identified in our review, we recommend that the final EIS consider the adoption of a more conservative approach to RMAs as follows:

- In those watersheds currently meeting water quality standards, and which are not designated for fish recovery or public water supply, EPA recommends adoption of RMAs as described in the no action alternative or as described in Alternative 1.
- In watersheds with impaired waters, and watersheds designated for fish recovery or public water supply, we recommend adoption of RMAs as described in the no action alternative.
- Where Key Watersheds have been identified, EPA recommends that they be maintained, and managed consistent with direction obtained from watershed analysis and source water protection plans.
- We also recommend that the final EIS consider the adoption of a requirement for continued watershed analysis and a monitoring and adaptive management program.

Our detailed comments and recommendations are enclosed. EPA appreciates the opportunity to engage with BLM as a cooperating agency and recognizes the challenges posed by adhering to the rigorous schedule assigned to this EIS. EPA remains committed to working with BLM to address these issues . If you have any questions regarding EPA's comments, please contact me at 206-553-1272, or Christine Reichgott, Manager, NEPA Review Unit at (206) 553-1601.

Sincerely,

/s/
Michelle Pirzadeh, Director
Office of Ecosystems, Tribal and Public Affairs

cc: ODEQ, Neil Mulane
NOAA, Mike Tehan
USFWS, Kemper McMaster
EPA, Dave Powers

Enclosures: 1) EPA Region 10 Detailed Comments
2) EPA Rating System for Draft EISs

Western Oregon Plan Revision
Draft Environmental Impact Statement
EPA Detailed Comments

1.0 WATER QUALITY

EPA is concerned that Alternatives 2 and 3 would result in substantial, long-term impacts to water quality and exacerbate continued exceedances of water quality standards in streams listed as impaired under Section 303(d) of the Clean Water Act (CWA). EPA's concerns are based on a broad body of science related to riparian buffer effectiveness and water quality, information provided in the DEIS, and EPA water quality temperature modeling of the DEIS riparian protection strategy. EPA's analysis of the alternatives' potential impacts related to temperature, sediment and peak flow is provided below. We also provide input on the analytical assumptions underlying the DEIS modeling effort that relate to shade and buffer width.

1.1 SCOPE AND CONTEXT

BLM lands in Western Oregon provide drinking water to over one million Oregonians through 113 community water systems (USDI/USDA, 1996). In addition, there are many Oregonians not served by community water systems that rely on BLM lands for drinking water. There are currently over 900 stream segments on the 303(d) list in the BLM planning area which are impaired by excess temperature, sediment, and other pollutants. These streams do not meet the water quality standards which are deemed to be protective of beneficial uses such as fish and aquatic life and drinking water.

The aquatic conservation strategy (ACS) currently in place on BLM lands is recognized by EPA and the Oregon Department of Environmental Quality (DEQ) as key to the implementation of TMDLs and meeting water quality standards. The ACS is also a critical element of DEQ's conditional approval of BLM's temperature total maximum daily load (TMDL) implementation strategy.

When the Northwest Forest Plan (NWFP) was adopted, studies showed 70 percent of streams on lands administered by the BLM to be out of compliance with CWA standards (FEMAT Report, Chapter V). After 10 years of NWFP implementation, watershed conditions for 57% of the watersheds across the NWFP area have improved and only 3% of the watersheds, primarily in areas that have experienced large scale fires, are on a declining trend (Gallo, et. al., 2005). In an analysis of several hundred research, assessment, and monitoring efforts, investigators found that the level of management in the NWFP is appropriate, stating that there is "no scientific evidence that either the default prescriptions [riparian reserves] or the options for watershed analysis in the Northwest Forest Plan…provide more protection than necessary to meet stated riparian management goals." (Everest et. al., 2006). The overwhelming body of science and the

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importance of aquatic resources to drinking water and aquatic species strongly support continued application of aquatic protection measures currently in place on BLM lands.

1.2 TEMPERATURE ANALYSIS

EPA has examined the science and assumptions in the DEIS supporting the proposed stream shade target and the proposed riparian management area (RMA) widths for perennial streams. We have concerns about how the information was used to support conclusions in the DEIS. In addition, we have concerns about relying on "natural variability" as a management concept in the analyses. Based on our review and our own modeling efforts, we are concerned that Alternatives 2 and 3 would result in impacts to water temperature and exacerbate continued exceedances of temperature standards in impaired waters.

1.2.1 Shade Target

The DEIS states that 80% effective stream shade "…corresponds to less than a 0.2°F change in stream temperature per mile of stream, which is considered to be within the range of natural variability." (p. 750). This conclusion is based on an interpretation of figure 311 in the DEIS (p. I-1116). Figure 311 was developed as part of the 2005 Northwest Forest Plan Temperature TMDL Implementation Strategy (TMDL Strategy). EPA worked closely with DEQ, the Forest Service and BLM as the TMDL Strategy was developed. We are concerned that individual components of the TMDL Strategy (such as figure 311) have been excised and incorporated into the DEIS in ways that are inconsistent with agreed upon criteria and caveats associated with TMDL Strategy implementation.

The TMDL Strategy was developed to demonstrate the adequacy of existing direction (i.e. the NWFP ACS) to protect and maintain stream shade, and to demonstrate how riparian thinning could benefit long-term achievement of higher shade levels and other riparian functions in site specific cases. It was not intended that an 80% stream shade target would be adopted as a landscape target. Nor was it intended that the site-specific management provisions within the TMDL strategy would be implemented independent of the Northwest Forest Plan and its attendant standards and guidelines.

Under the TMDL Strategy, riparian thinning is limited to projects in dense stands that would benefit from thinning. The Strategy also limits thinning within the RMAs and calls for continued application of the NW Forest Plan ACS. The need to implement the ACS was reiterated by DEQ in their 2005 approval of the temperature TMDL Strategy for use on federal lands within the NWFP area. In addition, DEQ's approval letter calls for continued monitoring, and additional analysis for shade, sediment, and cumulative effects. EPA believes that WOPR alternatives 2 and 3 are not consistent with the TMDL Strategy and do not meet the terms of the DEQ conditional approval.

1.2.2 Riparian Management Area Determination

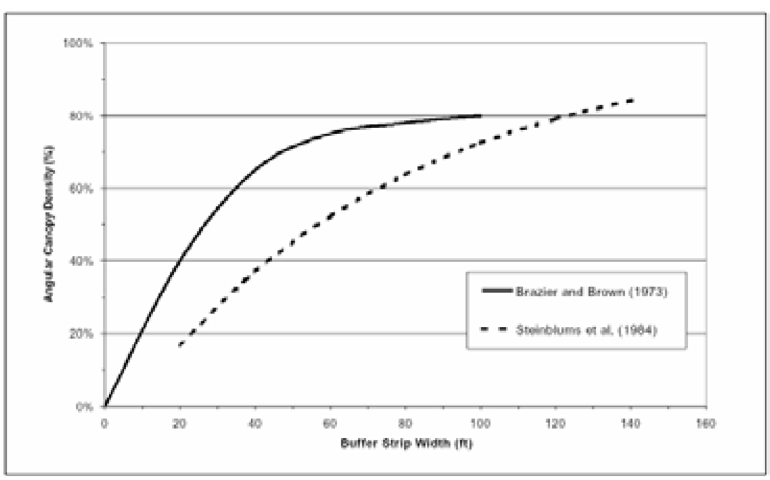
Alternatives 2 and 3 apply a 100-foot Riparian Management Area to perennial streams. The justification for this prescription relies on Figure 5 in Brazier and Brown (1972), which is represented as Figure 98 in the DEIS (p. 367). This figure relates angular canopy density (ACD) to buffer width. There are a number of limitations to the use of the Brazier and Brown study which are not acknowledged in the DEIS. First, this study was done on a small non-random sample of 13 reaches along nine small mountain streams in Oregon bringing into question the extrapolation of the study to a broad scale. Secondly, the relationships identified in the Brazier and Brown study may be subject to artificially high R^2 values.

For example, Figure 3 in Brazier and Brown illustrates the observed relation between buffer strip width and heat blocked. While the calculation behind this figure includes a regression with a high R^2 (0.8749), that high R^2 is achieved by excluding 4 data points and forcing the regression calculation through 0. Recalculating that regression with all 13 data points and without forcing the regression through 0 leads to an R^2 of less than 0.2. This key relationship on which the analysis of buffer width is largely based is much more complex than portrayed in the DEIS.

It is also important to acknowledge that the Brazier and Brown shade study did not account for the likelihood of riparian corridor blow-down, disease, or other factors that reduce angular canopy density. Research has found that in the 1 to 3 years after harvest, windthrow affects, on average, 33% of buffer trees with blowdown exceeding 90% at the high end of the range (Grizzel and Wolff 1998). Other analysis from the west Cascades of Oregon indicates that about 75% of riparian buffers less than 80 feet wide experience greater than 20% blowdown (Pollock et. al. 1998). In 2007, the Washington Department of Ecology compared the Brazier and Brown shade curve with a shade curve derived from a study done by Steinblumes et al. (1984) that accounted for blowdown in the riparian buffer. (WADOE, 2007). The results of that comparison are captured in

Figure 1:

Figure 1. Shade Curve Comparison



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As can be seen in Figure 1, the buffer widths needed to achieve a given shade level are wider under the Steinblums curve than are those under the Brazier and Brown curve. For example, to achieve an angular canopy density of 80%, the Steinblums curve suggests that a buffer of at least 120 feet is needed. We also note that the Steinblums curve shows ACD to be still increasing beyond 120 feet. Brosofske et al. (1997) analyzed the relationship between solar radiation received by streams and buffer widths for streams in western Washington. The Brosofske study measured solar radiation directly (using a LI-COR silican pyranometer) as opposed to visually estimating solar radiation (ACD measurement). This study found that 100% of natural shade levels are provided by riparian areas approaching 250 feet wide. These findings are in contrast with the DEIS which states, "There is little shade gained from trees that are more than 100 feet away from a stream's edge" (p. 366).

Based on the information presented above, EPA believes that there are flaws with the analytical assumptions associated with the buffer width model, and that the model therefore significantly underestimates shade levels and the potential temperature responses of alternatives 2 and 3.

1.2.3 Managing to "Natural Variability"

As noted above, the DEIS concludes that maintaining 80% effective shade corresponds roughly to a 0.2°F increase over 1 mile, and that this is "within the range of natural variability" (DEIS, p. 750). EPA is concerned that a 0.2° F increase would be in conflict with TMDL load allocations established for some basins. DEQ's TMDLs generally call for system potential shade (which may be greater or less than 80% shade) and some TMDLs in the planning area have load allocations less than 0.2° F for nonpoint sources (Umpqua basin and Willamette TMDLs). The TMDLs within the planning area include load allocations that represent a threshold protective of both aquatic life and water quality. We recommend that the DEIS use TMDL allocations or other scientifically supported targets at least as protective of stream temperature conditions as TMDLs. Another sound approach would be for the DEIS to commit to and analyze no net increase in stream temperature loading, and propose a system of modeling (and monitoring) at smaller spatial scales.

1.2.4 Temperature Modeling

As noted above, the DEIS bases its conclusion that 80% effective stream shade "…corresponds to less than a 0.2°F change in stream temperature per mile of stream…" (p. 750) largely on figure 311. This approach relies on ***a non reach-specific*** temperature model sensitivity analysis conducted in 1999 as part of the Upper Sucker Creek Temperature TMDL analysis. In this analysis, the model sensitivity analysis was not used to evaluate stream temperature response. The DEIS, however, uses these modeling results to predict temperature response to timber harvest across the plan area. Because this model is not reach-specific and does not consider site specific conditions or seasonal temperature variation, EPA believes this approach does not predict or evaluate stream temperature response to the proposed alternatives in a meaningful way.

Recent modeling efforts and field studies indicate that stream temperature response to buffer width can be highly variable, and sensitive to site-specific conditions. The Washington Department of Ecology (2007) modeled the effects of several riparian buffer widths on stream temperature. Over 1,000 feet of harvest, they documented increases of 1.5, 1.2, and 1.1°F for buffer widths of 30, 50, and 75 feet, respectively. In 2005, Moore considered field studies looking at 30 meter buffers. That publication described temperature responses ranging from 0.5° F (in British Columbia) to 3.6° F in Oregon (Moore 2005, Table 1).

This observed variability and sensitivity to small changes in the riparian zone suggests that application of heat budget models, such as Heat Source[1], should be used to diagnose temperature variations in response to riparian stand treatments and as a tool for confident extrapolation to new management situations. To this end, EPA conducted several temperature model runs for Canton Creek. Canton Creek is a temperature-impaired waterbody located in the Umpqua Basin for which a TMDL was recently completed. We employed the Heat Source model used in development of the Umpqua TMDL to evaluate the temperature change resulting from the application of alternatives 2 and 3. This modeling (included as attachment A) demonstrates that the application of Alternatives 2 and 3 would increase the 7-day average daily maximum (ADM) stream temperatures on Canton Creek over 0.7° F. This is substantially greater than the 0.2° F per mile temperature increase predicted by the DEIS (p. 750). Further, the EPA modeling results indicate that management on BLM lands under Alternatives 2 and 3 would increase instream temperatures on downstream “private” lands along Canton Creek.

In addition, because it can be expected that the narrower riparian buffers under Alternatives 2 and 3 would result in significant blowdown (see blowdown discussion in section 1.2.2), EPA adjusted the Canton Creek model to evaluate the effects of blowdown on stream temperature consistent with appropriate blowdown research. Results showed that the 7-day ADM temperature increases would exceed over 2 degrees F on Canton Creek (see Attachment A).

These modeling results lead us to conclude that the riparian management scenario under Alternatives 2 and 3 would significantly compromise BLM’s ability to meet water quality standards for temperature and TMDL load allocations. The impacts would be direct, cumulative and have long-term effects both on and off of BLM lands.

[1] Heat Source is the temperature model used by Oregon Department of Environmental Quality to quantify temperature response to prescribed TMDL allocations. The Heat Source model was review by the Independent Multidisciplinary Science Team (IMST) and they concluded that it is a scientifically sound model and incorporates the major physical factors that determine stream temperature - http://www.fsl.orst.edu/imst/reports/summaries/2004-01es.pdf.

1.3 SEDIMENTATION ANALYSIS

The DEIS states that the increase in the amount of fine sediment delivered to streams from new permanent roads would be less than 1% under each of the alternatives (p. LXI). This appears to be the primary source of management-related sediment considered to impact water quality in the DEIS. EPA is concerned that this conclusion appears to understate the contribution of sediment from the larger road network, land management activities, and management-related debris flow events. EPA recommends that the FEIS further consider the following issues as they relate to Alternatives 2 and 3.

1.3.1 Road Related Sediment

In the DEIS, the analysis of sediment delivery to streams is limited to the portion of BLM roads "within 200' of a stream channel where ditch flow carrying fine sediment could enter streams" (p. 377). DEIS Table 115 projects that approximately 36% of the BLM road miles would likely deliver sediment. This stream-connectivity value is lower than values established by previous research. A 1997 study of channel network extension by forest roads in the western Cascades of Oregon found 57% of roads are hydrologically connected to streams (Wemple et al. 1996). Reid and Dunne (1984) reported 75% road-stream connectivity in the Clearwater basin of Washington. Waterbars, midslope road segments, and cross-drain culverts not associated with stream crossings can also deliver sediment to streams (Skaugset and Allen, 1998). EPA believes the contribution of sediment from a larger portion of the road network is likely and should be considered in analyzing potential sediment impacts.

1.3.2 Harvest Related Sediment

The sediment modeling approach in the DEIS does not account for forestry related activities such as yarding, skidding, site preparation, and canopy removal which have been demonstrated to contribute to surface, gully and large-mass soil movements (Megahan 1972, Karwan et al. 2007). Alternatives 2 and 3 are of particular concern, as they have narrower RMAs on both perennial and intermittent streams and allow extensive timber harvest within and outside of RMAs.

Under Alternatives 2 and 3, harvest of trees within and adjacent to RMAs would decrease both bank stability and canopy-related protection of soils with attendant increases of sediment delivery to streams. Vegetation strongly influences the mode and timing of erosion processes through modifications to soil strength, surface materials, and hydrology. Roots are effective at avoiding progressive bank failure (Thorne 1990) and root networks in forests can lend cohesion to soils of low inherent strength (Schmidt et al. 2001). Shallow landslides in some areas are characteristically located at some distance from the nearest trees (Roering et al. 2003). Forest canopy intercepts precipitation and contributes periodic inputs of organic material to the forest floor reducing the displacement of soils near streams. Sediment inputs from bank disruption tend to be relatively fine-grained, and can increase turbidity during low-flow periods when natural turbidity levels tend to be low. Low-flow inputs can stress aquatic organisms already impacted by low flows or high stream temperatures (Reid 2005).

Alternatives 2 and 3 would allow harvesting of all but 10 - 15 trees per acre (leaving approximately one tree every 115 feet) within the 25-foot RMAs along non-debris flow intermittent streams. These streams constitute a major portion of the stream network, particularly in western Oregon, and have a high probability of excessive erosion from ground disturbing activities where a moderate to high erosion hazard is present. In some watersheds (e.g., Scappoose Bay Watershed) the majority of the intermittent stream network on forested lands has a moderate to high erosion hazard rating (David Evans and Associates, 2000). In addition to extensive harvest next to intermittent streams, removal of 50% of the canopy over a substantial portion of the RMAs within 100 feet of perennial streams would be permitted under alternatives 2 and 3. Clearcutting with no green tree retention would occur directly adjacent to the 25-foot and 100-foot buffers, respectively.

1.3.3 Stream Channel Sediment

The significant reduction of trees within harvested riparian buffers and clearcutting adjacent to RMAs would result in near term and long term reductions of inputs of large wood, particularly for intermittent stream channels. Wood, in both intermittent and perennial streams, serves to route, store, and attenuate the downstream delivery of sediments. Montgomery et.al. (2003) showed that the sediment retained on site behind large downed wood can be fifteen times greater than sediment transported downstream. Large wood also plays an important role in forming and providing habitat for aquatic species.

The ecological impact of reduced large wood inputs has been documented in watersheds with a high proportion of private lands in western Oregon. Oregon Department of Fish and Wildlife surveys on 2,000 miles of streams on private industrial forest lands found that 60% of the surveyed streams were rated as poor for large wood, and large conifer stocking levels on 94% of these streams were rated as poor. The surveys also found elevated sediment levels in smaller streams on private industrial forest lands (Thom et al. 1999). From 1995 - 2004 over $30 million was spent by the Oregon Plan partnership for riparian and instream enhancement projects to address degraded riparian and stream conditions on private lands. Forest Service and BLM lands are frequently the only source of large wood within mixed ownership watersheds for projects on private lands. BLM's proposed RMAs and harvest requirements under Alternatives 2 and 3 have the potential for significant direct and cumulative impacts related to large wood inputs and associated sediment effects, and EPA believes these issues warrant consideration in the FEIS.

1.3.4 Debris Flow Events

"Landsliding, mass failures, and debris torrents" are discussed as potential results of harvest (DEIS, p. 378). However, sediment and large wood delivery related to these processes are marginalized in the DEIS analysis, which assumes "the rate of susceptibility to shallow landsliding from timber harvests…would not increase…because fragile soils that are susceptible to landsliding…would be withdrawn" (DEIS, p. 763). This assumption conflicts with observed landslides on BLM lands not withdrawn from

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timber harvest. The Timber Production Capability Condition (TPCC) approach BLM used to identify "fragile soils" in the DEIS was developed to identify the land base suitable or unsuitable for harvest, not specifically to predict potential landslide sites. The DEIS indicates that 71% of the 1996 landslides measured on BLM lands were from clearcut harvest units that are still in the land base suitable for harvest (p. 379). Based on the DEIS soils analysis, some areas judged to be of lower risk have failed in the past (p. 797). The DEIS indicates that 89,937 acres of the 2,600,000 acre WOPR area (less than 4% of the land base) are withdrawn from timber harvest via TPCC. Given the observed landslides on BLM harvest units and research demonstrating that clearcut logging on unstable landforms increases landslide frequency (Sidle 1985, Swanston 1991, Robison 1999), we believe that a more conservative approach to classifying and managing landslide prone areas is warranted.

1.3.5 Sediment Modeling

In modeling sediment impacts, the DEIS caps the sediment delivery buffer at 200 feet, and assumes that 25-100 feet of filtering duff and vegetation will prevent most diffuse sources of sediment from reaching streams (p. I-1108). EPA believes that a more conservative transport estimate should be used. Belt and O'Laughlin (1994) conclude that an effective buffer width is 91m (300ft) unless the runoff forms a channel. They also note that sediment-laden runoff in channels can travel through buffers up to 1370m (4500ft). While narrower buffers can be effective at filtering sediment, buffer effectiveness is largely dependent on site specific factors such as soil roughness and structure, hillslope, existing vegetation, and the extent of disturbance. Much of the Oregon Coast Range and many other areas in Western Oregon on BLM lands include steep topography and erosive soils. In the absence of site specific analysis, EPA believes the EIS should employ more conservative assumptions about sediment travel distance.

1.4 PEAK FLOW ANALYSIS

An examination of available literature and the assumptions guiding the modeling approach undertaken in the DEIS indicates that the DEIS underestimates the number of subwatersheds susceptible to peak flow increases; specifically, the DEIS states that only one out of 635 subwatersheds in the rain hydroregion and only three out of 471 subwatersheds in rain-on-snow hydroregion within the Plan Area are currently susceptible to peak flow increases.

1.4.1 Peak Flow Literature and Assumptions

The DEIS cites Grant et. al., 2007 (in review) to conclude there would be no detection of changes in peak flows until the area cut in a drainage basin exceeds 40%. Applying this assumption, the DEIS finds that none of the alternatives would result in increases in peak flows in fifth-field watersheds to a level that would affect fish habitat. Because the Grant et al. article has not yet been published, EPA has not had an opportunity to review it. If this study was designed to determine a threshold cut level, above which peak flow alterations are virtually certain, EPA recommends that the EIS analysis acknowledge this and reassess peak flow impacts using different threshold assumptions. Hypothesis tests designed to minimize Type I errors (false assertion of adverse impacts) are standard and acceptable procedures in scientific research, but they are often inappropriate for assessing alternatives designed to minimize adverse water quality and natural resource impacts. A primary objective in impact analysis is to prevent type II errors in interpretation of data (false assertion of no adverse impact) (McGarvey 2007). Application of this type of statistical equivalence test may require re-analysis or re-interpretation of the cited Grant et al. information to specify a level of cut below which absence of hydrologic alteration is reasonably assured.

In addition, the DEIS relies heavily on this one unpublished citation, while discounting the findings from other published studies on the same topic. For example, Jones and Grant (1996) reported that road construction combined with patch clear-cutting of 10 to 25% of the basin area produced significant, long-term increases in peak discharges. Lewis et al. (2001) found that clearcutting can double the return interval frequency for the largest peak flow. And a study conducted within the planning area (South Umpqua Experimental Forest) found that watersheds treated with partial harvest may be subject to significant peak flow increases (Jones 2000). EPA recommends that the FEIS reanalyze the potential impacts of harvest on erosion rates and stream turbidity levels assuming higher and more frequent peak flow events.

1.4.2 Peak Flow Modeling Approach

On BLM lands, stand establishment structural stage was used as a surrogate for the removal of basal area. For adjacent non-BLM lands areas of less than 10%, crown closure were used as a surrogate for the removal of basal area (DEIS p. 384). Data underlying the peakflow analysis on BLM lands was derived from the OPTIONS model, and data for "other lands" was derived from the 1996 Interagency Vegetation Mapping Project (IVMP). These methods raise a number of issues: 1) the rationale for establishing surrogate measures for the removal of basal area is not provided; 2) the methods employed to evaluate surrogate measures use two different time frames (BLM lands used modeled outputs and non-BLM lands used a 1996 dataset); and 3) the use of 10% crown closure as a surrogate for the removal of basal area may underestimate the actual area which should be included as part of the "surrogate measure".

The 1996 Interagency Vegetation Mapping Project (IVMP) produced several high quality datasets. EPA identified four IVMP datasets that could be used to estimate the canopy cover conditions on non-BLM lands: 1) "Vegetation Canopy Cover" 2) "Conifer Canopy Cover" 3) Harvest History (1972 through 2002) and 4) Size Class (Quadratic Mean Diameter). EPA analyzed each of these IVMP datasets as potential "surrogate measures" for "basal area removal". Our analysis found that the number of 6^{th} field HUCs shown to exceed 40% cut varied depending on the dataset considered (between 0 and 19%). This discrepancy calls into question the DEIS conclusion that only 1 out of 635 subwatersheds in the rain hydroregion (DEIS, p. 385) and only 3 out of 471 subwatersheds in rain-on-snow hydroregion (DEIS, p. 387) within the Plan Area are currently susceptible to peak flow increases. We recommend that the FEIS address this discrepancy, clarify which datasets were used, and provide the rationale for dataset and "surrogate measure" selection (i.e., 10% crown closure).

2.0 SOURCE WATER

EPA is concerned that management within the 5th or 4th hydrologic unit codes (HUCs) upstream from water system intakes do not receive a more protective harvest approach under the proposed action alternatives. In particular, we are concerned that implementation of Alternatives 2 or 3 could result in impacts to drinking water supplies due to increased sediment and harvest related chemical use.

2.1 Management in Source Water Watersheds

As noted above, over 1 million Oregonians in the planning area receive their drinking water from source water watersheds located on BLM land. Under the NWFP a number of these source water watersheds were designated as Tier 2 Key Watersheds in response to concerns over water quality. Within Key Watersheds, management is guided by watershed analysis, road building in inventoried roadless areas is restricted, and priority is given to restoration. These measures have resulted in a higher level of improved watershed conditions than in non-Key watersheds (Gallo et al. 2005). Under the proposed action alternatives, key watershed designations would be removed, riparian protection would be reduced, and a larger proportion of source water watersheds would be managed as part of the timber base.

Given potential water quality impacts from management activities associated with proposed increased harvest, EPA is concerned that source water watersheds would receive insufficient management consideration. Of key concern is increased sediment and harvest related chemical use. Sediment can affect drinking water supplies by causing taste and odor problems, blocking water supply intakes, fouling treatment systems, and filling reservoirs. In addition, higher turbidity levels are often associated with higher levels of disease-causing organisms, such as viruses, parasites and some bacteria. Higher turbidity and associated health problems can result in an acute health threat to the drinking water system users. Many treatment facilities are not designed to deal with turbidity spikes, nor to remove the full spectrum of chemicals from drinking water. The use of fertilizers, herbicides, and other chemicals associated with silvicultural activities is a major concern to many municipalities. Even the best state-of-the-art drinking water treatment facilities cannot fully remove many of the commonly used pesticides and fire retardants (Blomquist, J.D. et al, 2001).

Several Oregon municipalities are currently working to address high turbidity levels in their source water resulting from forest practices on private lands upstream of public water intakes. These turbidity levels can be largely attributed to roads and harvest levels, especially in areas where protection is limited on steep slopes and along intermittent and smaller perennial streams. The RMA boundaries and no cut zones along perennial streams under Alternatives 2 and 3 are similar to prescriptions in place on private lands which EPA, NMFS and USFWS have found are not sufficient to protect water quality and restore salmonid fisheries. (Multi-agency comment letter on 2000 draft report titled *DEQ/ODF Sufficiency Analysis,* dated February 28, 2001). We also note that harvest within RMAs around a large percentage of intermittent streams under alternatives 2 and 3 would allow harvest right up to the streams edge. This is particularly significant because over half of the streams within a watershed may be intermittent.

EPA believes that providing the highest quality water possible to source intakes at the least cost to downstream users should be the management objective on BLM lands within watersheds providing public water supply (see section 6.0 – Socioeconomics). We recommend the proposed action in the FEIS maintain the network of key watersheds as mapped under the no action alternative, and continue to manage those areas consistent with direction obtained from watershed analyses and source water protection plans. Further, we recommend that a more protective harvest approach be adopted for riparian areas within the 5th or 4th code HUCs upstream from water system intakes (see section 3.0 – Recommendations).

3.0 RECOMMENDATIONS TO ADDRESS SOURCE WATER AND WATER QUALITY CONCERNS

In discussions with BLM to date, EPA has identified the need for additional protection measures for aquatic resources within the planning area. We recommend that the following elements be given consideration in the FEIS and be included in the proposed action alternative ultimately selected by BLM in the Record of Decision. EPA's recommendations are strongly supported by research, monitoring, and assessment efforts relevant to protection of water quality, drinking water, and aquatic resources.

- In those watersheds currently meeting water quality standards, and which are not designated for fish recovery or water supply, EPA recommends adoption of RMAs as described in the no action alternative or as described in Alternative 1.
- In watersheds with impaired waters, and watersheds designated for fish recovery or public water supply, we recommend adoption of RMAs as described in the no action alternative.
- Where Key Watersheds have been identified, EPA recommends that they be maintained, and managed consistent with standards and guidelines under the no action alternative or information obtained from watershed analysis and source water protection plans.
- We also recommend that adoption of a requirement for continued watershed analysis and a monitoring and adaptive management program be considered in the final EIS.

4.0 CUMULATIVE EFFECTS

The DEIS repeatedly notes that in western Oregon, BLM is rarely the predominant landowner within a fifth-field watershed, and that the management of the intermingled private lands differs from that of the BLM-administered lands. This creates implications for the management of BLM lands (DEIS p. 184, 189, 196, 233). It remains unclear, however, to what degree conditions on lands outside of BLM ownership were considered in the analysis. This is of particular concern in the context of stream temperature, stream complexity (sediment and large wood), fish and wildlife habitats, source water impacts, and watershed restoration.

4.1 TEMPERATURE

In determining that none of the alternatives would contribute to an increase in temperature, the DEIS shade analysis on page I-1118 only considers shade zones on BLM-managed lands. BLM's analysis does not consider effects from the mixed ownership present in most of the planning area. EPA recommends that reduced shade levels from BLM alternatives be considered at the watershed scale. Given the importance of shade in regulating stream temperature, EPA conducted an analysis of shade at the 5th field watershed scale on four watersheds in the planning area (Scappoose, Upper Alsea, Upper Siuslaw, and Rock Creek) using the RAPID shade model developed by BLM and the Forest Service. Results of this modeling (included as attachment B) demonstrate that in each of the watersheds considered, shading levels on private land are significantly lower than shade levels on BLM land. Stream shade on private land ranged between 41% and 54%, whereas shade levels on BLM land approached 80%. Streams flowing through mixed ownerships will be affected by lower shading levels on private lands. We therefore recommend that this variability be considered within the context of cumulative impacts.

4.2 SEDIMENT AND LARGE WOOD

Thom and Jones (1999) found that private non-industrial lands in western Oregon are characterized by higher fine sediment levels, lower wood volumes and number of key (large) wood pieces, lower densities of deep pools, and lower levels of shading. They also found that on the private lands surveyed, very few stream reaches had high quality habitat largely due to sediment loading. Within this context, federal lands play a key role in terms of providing areas of high quality refugia. Without high quality refugia, moderate quality areas cannot support a large abundance of salmonids through periods of frequent disturbance (Thom and Jones 1999). We recommend that the FEIS fully discuss the ecological role of BLM lands within areas of mixed ownership. This would include an examination of all potential sediment sources, including (as noted above) roads currently excluded from analysis, harvest activity and debris flow. This analysis should also consider the potential for blowdown. As noted previously, riparian buffers experience an average of 33% blowdown in the 2 years following harvest. This has implications for future large wood recruitment, bank stability, sediment delivery, and temperature.

4.3 DRINKING WATER

Many of the source water watersheds in the planning area are also in mixed (checkerboard) ownership. Within these watersheds, land in private ownership is often managed more intensively than is federal land. In these instances, it is often the federal lands which have the large intact blocks able to provide the ecosystem services (temperature regulation, nutrient cycling, filtration, flow attenuation, and storage) necessary to maintain high quality drinking water (see Attachment C – Example Source Water Watershed). Cumulative impacts to drinking water systems should be considered within this context, and EPA believes BLM should consider guidelines directing federal land managers to work closely with drinking water system operators and local watershed groups to ensure that management on federal land will not adversely impact water systems and drinking water quality.

4.4 WATERSHED RESTORATION

EPA believes that the importance of BLM lands to water quality, drinking water, and fish and wildlife habitat is significant from a cumulative impacts perspective where a substantial portion of watersheds consist of private lands. There are approximately 90 local watershed groups in Oregon that have spent tens of millions of dollars to protect and restore watersheds in Western Oregon. Many of the watershed groups have completed watershed assessments outlining science based conservation and restoration strategies that apply watershed wide, to both federal and private lands. EPA believes that proposed reductions of riparian and upland habitat protection under Alternatives 2 and 3, and to a lesser extent Alternative 1, run counter to many of those strategies. For example, the Scappoose Bay Watershed Assessment (David Evans and Associates, 2000) identifies intact habitat areas and potential salmonid refugia within the watershed. While BLM lands make up only about 15% of the total watershed, a disproportionately high amount of intact habitat and refugia areas are found on BLM lands, including intact riparian areas and all of the remaining old growth in the watershed. The Scappoose Bay Watershed Council has worked with BLM spending almost two million dollars to restore habitat and remove barriers to ESA listed steelhead and coho to allow access to salmonid refugia on BLM lands. BLM lands also provide the highest quality habitat in the Scappoose Bay Watershed's municipal water supply catchments. Alternatives 2 and 3 would allow intensive timber harvest that could adversely impact drinking water and salmon recovery efforts in 3 of the 4 highest priority drainages in Scappoose Bay Watershed.

5.0 ECOSYSTEM BASED MANAGEMENT

In developing the NWFP, scientists and managers from NOAA Fisheries, and the U.S. Fish and Wildlife Service Services, land management agencies, and EPA incorporated knowledge about species needs and aquatic systems functions into an ecosystem management framework designed to conserve both terrestrial and aquatic ecosystems. This integrated approach resulted in significant overlap between areas managed for late successional species (late successional reserves or LSRs) and areas managed for other ecosystem functions, such as providing high quality water and refugia for at-risk fish species (Key Watersheds and Riparian Reserves).

Monitoring and assessment efforts indicate that this integrated approach is delivering environmental benefits in areas of key concern to EPA, such as water quality protection, watershed restoration, and protection of public water supply. Assessment of 10 years of NWFP implementation found that 97% of the watersheds where the NWFP has been implemented are on a stable or improving trend, and that 74% of the "key" watersheds targeted for restoration showed improvement (PNW-GTR-647, Gallo et al. 2005). Late Successional Reserves (LSRs) also had higher watershed condition scores than Matrix lands designated for timber harvest. Considering these results, we are concerned that the reductions in LSRs and riparian reserves, and elimination of key watersheds proposed in Alternatives 2 and 3 should be considered within an ecosystem-based context.

5.1 LATE SUCCESSIONAL RESERVES

Beyond providing habitat for late successional and old-growth (LSOG) dependent species, LSRs play an important role protecting and restoring water quality, providing refugia for salmonids, and supplying large wood (NWFP 1994). Monitoring and assessment results indicate that these are performing well with respect to improved LSOG and watershed conditions. In spite of these positive terrestrial and aquatic habitat gains, Alternative 2 reduces the amount of area managed for late successional characteristics by 17%. We recommend that consideration be given to the role played by these areas in terms of providing key ecosystem services beyond LSOG habitat.

5.2 RIPARIAN RESERVES

Riparian protection zones are the primary mechanism for protecting water quality on forest lands. However, in taking an ecosystem approach, the NWFP anticipated that the various land use allocations under the NWFP, including riparian reserves, would serve multiple ecological functions. This assumption has been reinforced by research. Numerous studies have demonstrated the importance of riparian habitats as refugia (Olson et al. 2007), in support of biological and process diversity (Richardson 2000), and as a mediator/corridor for processes and species (Olson et al. 2007).

The DEIS departs from this ecosystem-based approach by looking at one parameter (wood delivery) in establishing buffers around intermittent streams under Alternatives 2 and 3. EPA believes that this approach is inconsistent with current research indicating that navigable waters are significantly influenced by headwater streams through hydrological and ecological connectivity (Wipfli et al. 2007). Although the DEIS provides an analysis of management related impacts to large wood delivery under alternatives 2 and 3, it is not clear what other riparian functions or processes might be lost. Considering that headwaters can comprise 60-80% of drainage networks (Benda et al. 2006), and the recognized importance of these systems (Olson et al. 2007, Johnson and O'Neil 2001), we recommend that the FEIS take a more holistic view of the role played by headwater streams. Specifically, the FEIS should analyze the effects of the

Alternatives on riparian fauna, microclimate, and processes such as flow, nutrient, and sediment regimes.

5.3 KEY WATERSHEDS

A cornerstone of the NWFP strategy was the designation of key watersheds. These watersheds, widely distributed across the landscape, were determined to provide, or expected to provide high quality fish habitat, and high quality water. These watersheds were selected not only for their habitat and water production value, but also for their restoration potential. And as noted above, investment in these areas has proven successful, with 74% of the key watersheds targeted for restoration showing improvement (Gallo et al. 2005). In spite of these successes, the DEIS moves away from the key watershed approach. Instead, areas are prioritized for restoration based on "intrinsic potential." EPA understands that intrinsic potential is an important concept. However, we are concerned that relying solely on intrinsic potential significantly limits the potential for effective BLM restoration efforts, ignores critical salmonid life histories, and does not recognize other key watershed values. As noted on page 339, the percentage of high intrinsic stream miles on BLM land is less than 10% for each of the listed fish stocks. We encourage the BLM to continue to recognize and manage key watersheds according to NWFP standards and guidelines and established watershed analyses. As noted in the FEMAT report (1993), past attempts to recover fish populations were unsuccessful because the problem was not approached from a watershed perspective.

6.0 SOCIOECONOMICS

In our review of the socioeconomic issues in the DEIS, we considered the methodology used to estimate impacts, and sought to review the underlying assumptions and input parameters. As a result of our review, we have concerns about the use of input/output models without complete descriptions of assumptions and limitations, and the treatment of non-market values (such as water quality).

6.1 INPUT/OUTPUT MODELS

Input-Output (I/O) models can be useful tools for estimating economic impacts. As with any model, however, there are limitations that should be acknowledged. Two assumptions of an I/O model are that prices and technology are fixed for the time period being modeled. As a result, I/O models are not able to address flexible supply-demand relationships, and are not able to address consumer and producer surplus and resulting substitutions. We recommend that these limitations be discussed in the FEIS.

In addition, the DEIS uses county level input/output models designed specifically for analysis of this project but does not provide the reviewer with information regarding each county's model assumptions and inputs. This is important since these models are unique to the DEIS. We recommend that the FEIS include specific information about assumptions and input parameters for each model.

6.2 NONMARKET VALUES

Changes in nonmarket values are not well described or quantified in the analysis. These values affect the economic well-being, health, and resiliency of local communities. As an example, clean drinking water is a valuable commodity produced by BLM forests. There are dozens of drinking water systems fed in part by BLM lands (p. I-1120). BLM management in these areas is of key economic importance because as forest cover decreases in a Source Water Protection Area, treatment costs generally increase (Trust for Public Land 2004). More intensive management in source water watersheds may therefore result in increased costs to the water users. This could be due to increased operations and maintenance costs (filtration, monitoring, chemical treatment, etc) or increased capital costs (plant or system upgrades). We recommend that the FEIS examine, and to the extent possible, quantify these costs so they are included in the economic cost/benefit analysis.

7.0 INVASIVE SPECIES

On page 269 the DEIS states that the condition of invasive plant infestations on BLM land in the planning area can be characterized by analyzing a few (11) representative invasive species. The analysis does a good job of discussing the mechanisms of dispersal and relationships to land management activity, light tolerance, and current distribution. We are concerned, however, that these descriptions address the consequences of the presence of these species in a very limited way. For three (Canada Thistle, False Brome, and Leafy Spurge) there is no discussion of the consequences. For six the consequences are limited to crowding out of native species. This absence of a real focus on economic and ecosystem consequences limits the usefulness of this analysis.

In addition, the analysis of the risk of introduction is limited to a 10-year period (p. 611). While this near-term focus is useful, it doesn't correspond to the temporal horizon of the plan analysis, and thus consequences over longer periods should be evaluated.

Finally, a limited set of mitigation measures is offered, but no evidence is offered of the observed potential cost or experienced effectiveness of these measures in either a relative or an absolute sense. In addition, these measures are all oriented towards reducing the risk of introduction – a necessary, but not sufficient emphasis. We recommend that the FEIS also discuss mitigation measures that could be used in the event of an introduction, as well as the ecosystem consequences of those measures.

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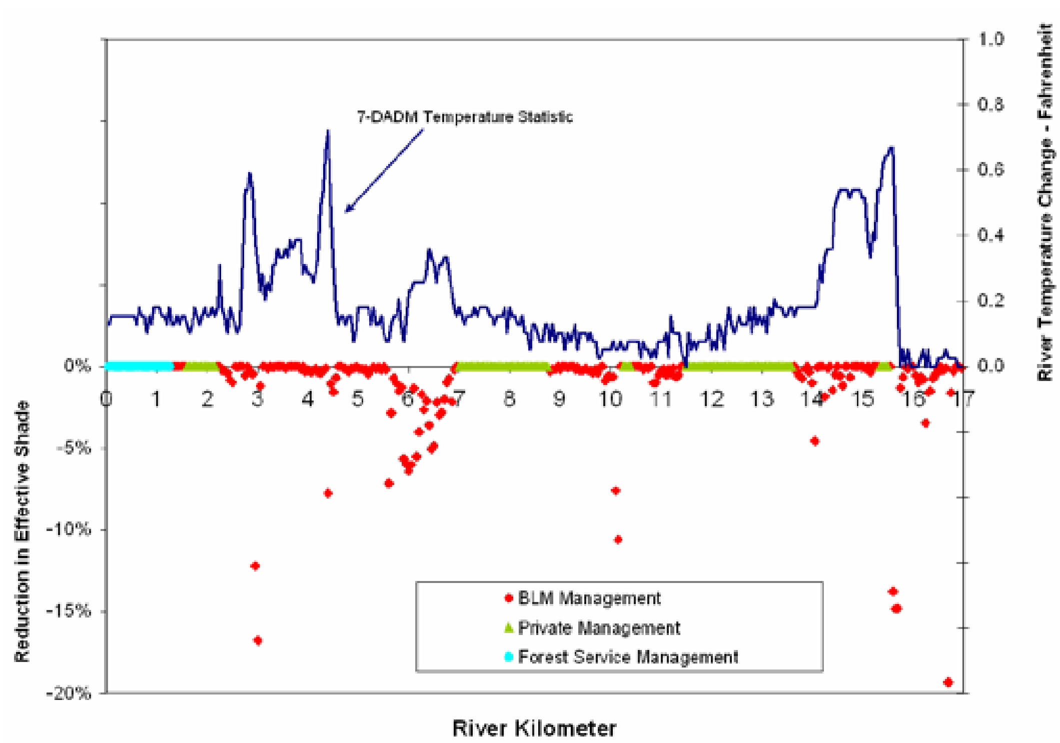
ATTACHMENT A – TEMPERATURE ANALYSIS

The calibrated Heat Source 7.0 model, from the recently completed Umpqua Basin TMDL, was used in this modeling effort. The Heat Source model has undergone extensive peer review and has been field calibrated for numerous EPA approved TMDLs in Oregon. Modeling for Canton Creek was calibrated using both field data and remote sensed data. Higher resolution was provided by changing the model distance step from 100 meters to 50 meters. Model Simulations for Canton Creek reflect the time period July 12-31, 2002 and cover 16.95 river kilometers, from the upstream reach of Pass Creek to the mouth of Canton Creek. The EPA modeling delineates three land management categories (Forest Service, Private, and BLM) and five Riparian Management Area (RMA) zones (i.e., 0 to 25 feet, 25 to 60 feet, 60 to 100 feet, 100 to 150 feet, and > 150 feet). Results of the analysis are presented in figures A-1 through A-3.

Figure A-1 - Partial application of the proposed alternatives in which it is assumed that current conditions will be maintained out to 60 feet.



20

Figure A-2 - Comprehensive application of the proposed alternatives in which the zone from 25-60 feet is assumed to provide 80% shade.

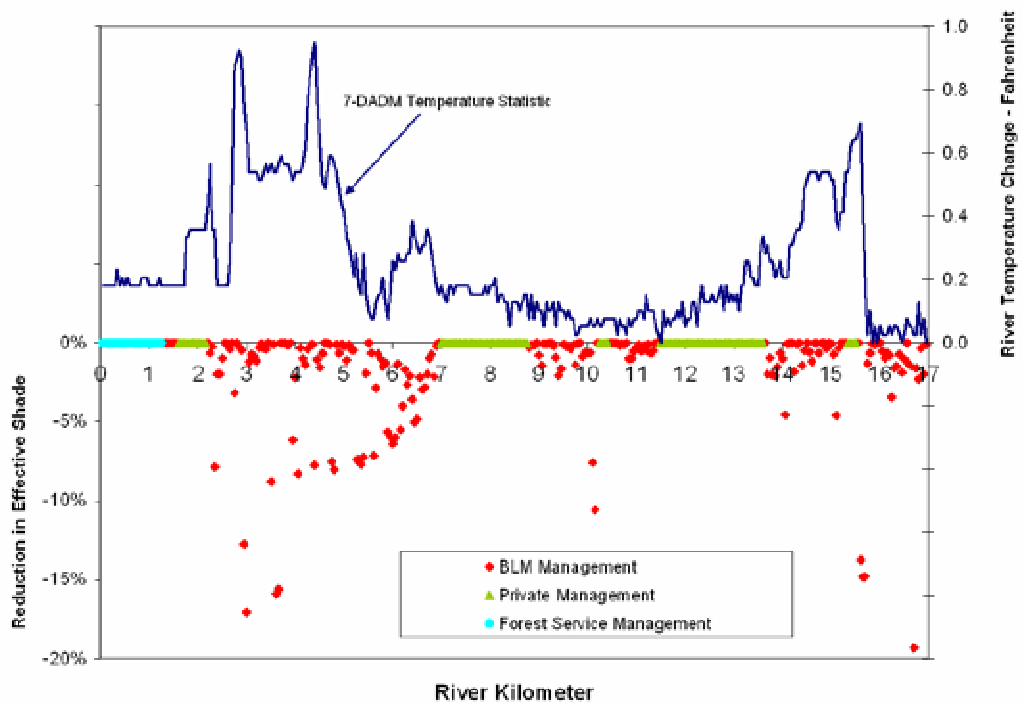
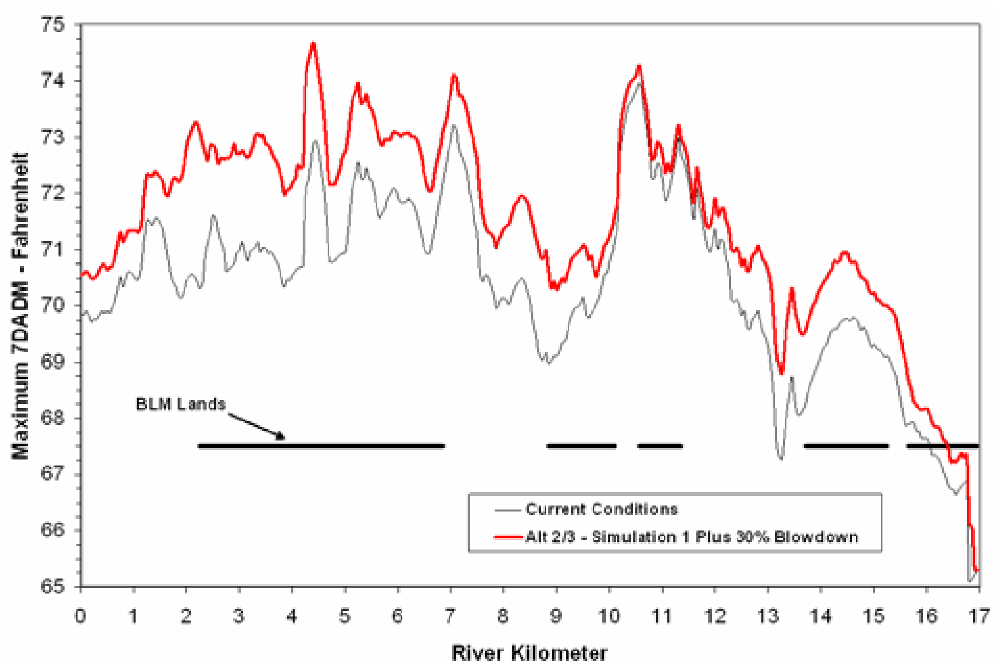


Figure A-3. Temperature change resulting from the application of WOPR Alternatives 2/3, along with 30% windthrow blowdown, to riparian buffers along Canton Creek.



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ATTACHMENT B – SHADE ANALYSIS

Analysis associated with shade target development for the draft WOPR EIS was obtained from the "Northwest Forest Plan Temperature TMDL Implementation Strategy (TMDL Strategy - USDA, USDI 2005). The "Shadow"" model was the primary tool used to develop the TMDL Strategy. Recently, BLM and the Forest Service, with support from EPA and DEQ, included the algorithms and assumptions associated with the "Shadow" into a watershed scale shade model. That model is now known as the RAPID Shade Model (available at ftp://ftp2.fs.fed.us/incoming/r6/sis/jhawkins/StreamAssessment/)

Using the RAPID Shade Model, EPA conducted an analysis of shade at the 5th field watershed scale on four watersheds in the planning area (Scappoose, Upper Alsea, Upper Siuslaw, and Rock Creek). Default model settings were used during these modeling runs. Results of this modeling can be seen in Table B-1. Figures B-1 and B-2 provide examples of model output for the Scappoose watershed. Overall, shading levels on private land are significantly lower than shade levels on BLM land. Stream shade on private land ranged between 41% and 54%, whereas shade levels on BLM land approached 80%.

Table B-1. Calculated Shade using the RAPID Shade Model for Four Oregon HUCs

	Scappoose	Upper Alsea	Upper Siuslaw	Rock
Entire Basin	47	64	61	62
BLM	79	78	75	74
Forest Service	- -	89	- -	- -
Private	41	50	51	54

Figure B-1. RAPID Shade Model output for the Scappose watershed (red signifies less shade, and green signifies more shade)

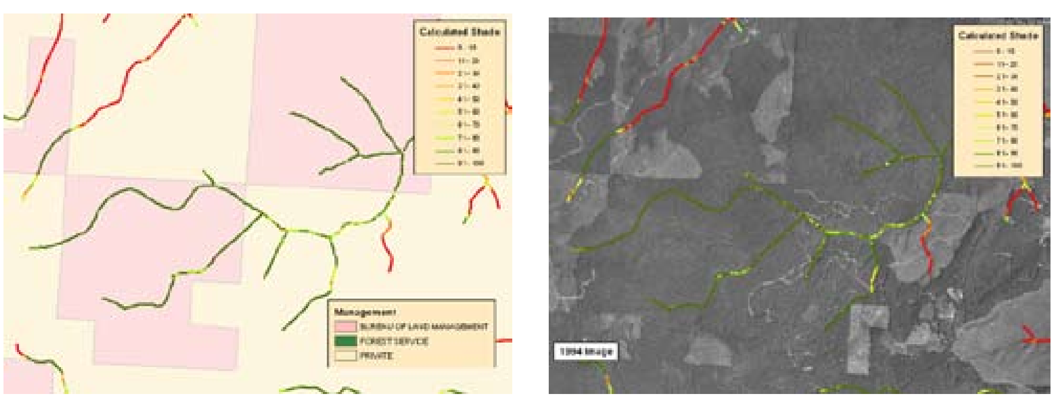

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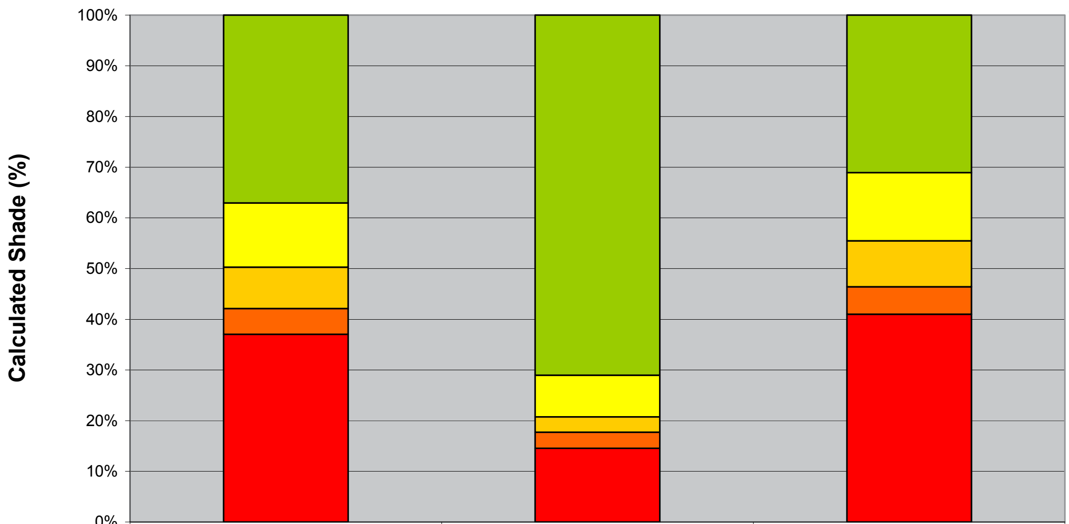
Figure B-2. Calculated Shade Distribution for the Scappoose Watershed

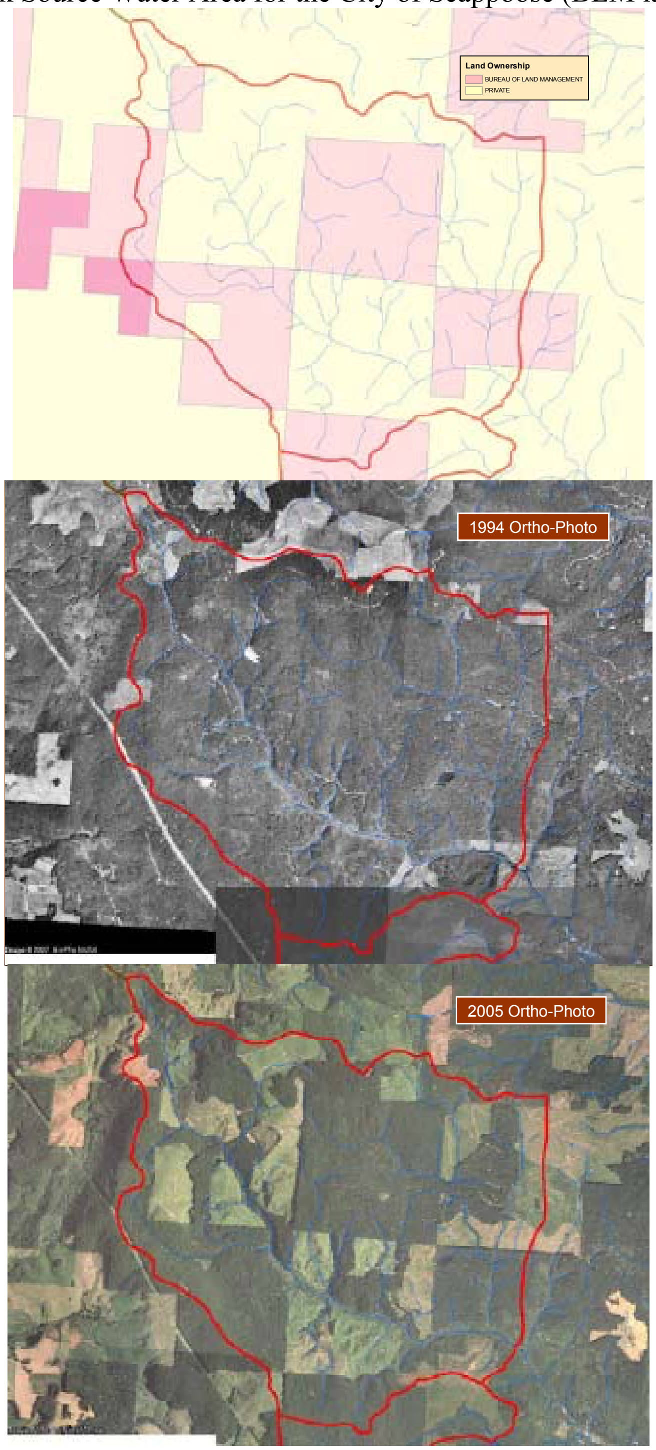


	All	BLM	Private
80 to 100	37%	71%	31%
60 to 79	13%	8%	13%
40 to 59	8%	3%	9%
20 to 39	5%	3%	5%
0 to 19	37%	15%	41%

Land Management Catagories

ATTACHMENT C – EXAMPLE SOURCE WATER WATERSHED

Figure C-1. The area indicated by the red line in the middle of the image is the S. Fork Scappoose Creek Source Water Area for the City of Scappoose (BLM lands are in pink)



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2010.2

**U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action***

<u>Environmental Impact of the Action</u>

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

<u>Adequacy of the Impact Statement</u>

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA <u>Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment</u>. February, 1987.

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1171

File Code: 1500
Route To:

RECEIVED
DEC 5 - 2007

Date: December 3, 2007

Subject: Western Oregon Plan Revision

To: Ed Shepard, State Director, Bureau of Land Management

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts (WOPR). Forest Service staff have read the document and participated in numerous meetings of your cooperator group.

Our first comment is to extend compliments to your planning team and District participants for the quality of the analyses and the process involved. Considering the scope and scale of this effort, your Draft EIS is impressive. At various work sessions and meetings, Forest Service staff have provided comments on technical aspects of the analyses directly to your planning team.

The Forest Service and Bureau of Land Management are interdependent in management of much of the federal lands in Oregon. In planning for management of ecological processes that operate across administrative boundaries, we acknowledge the complexity of developing plans for BLM managed lands that are intermingled with or in close proximity to National Forest lands.

Forest plan revisions for National Forests in western Oregon are still five to ten years in the future. For purposes of WOPR planning we suggest your analyses assume that neighboring National Forest system lands will continue to be managed under current applicable law, regulation, and land management plans.

As our agencies move forward with land management plan implementation projects, I hope both agencies will continue to seek opportunities to collaborate on project scale planning and operations.

for LINDA GOODMAN
Regional Forester

Caring for the Land and Serving People

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1874.1

THEODORE R. KULONGOSKI
Governor

January 10, 2008

RECEIVED
JAN 11 2008

Mr. Edward R. Shepard, State Director
USDOI Bureau of Land Management
PO Box 2965
Portland, OR 97208

Re: Western Oregon Plan Revisions

Dear Director Shepard:

I appreciate the opportunity afforded the State of Oregon to participate with the Bureau of Land Management (BLM) Western Oregon Plan Revision under the agreement that gives the State cooperating agency status. In keeping with that agreement I anticipate that individual agencies will continue to provide detailed, more technical input as you move further toward a final plan. Recognizing that much of that work remains, I am providing the guiding principles that will frame our ongoing cooperating agency involvement as your planning process advances.

First, the State of Oregon recognizes that the Oregon and California Lands Act of 1937 (O&C Act) places a different set of constraints and management requirements on BLM than exists on other federal forestlands. The O&C Act provides the primary legal authority for the management of most of the BLM land in Western Oregon and requires the lands be managed "... for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities ..." (43 U.S.C. §1181a).

Oregon also recognizes that BLM's decision space is bounded by the legal requirements in other laws, especially the Endangered Species Act and Clean Water Act, and to a lesser degree by requirements to be consistent with State plans, policies and programs. 43 CFR 1610.3-2(e) says that BLM's plans "shall be consistent with officially approved or adopted resource related plans, and the policies and programs contained therein..." when they are consistent with the purposes of federal statutes.

I feel it is wholly possible to produce a plan that meets all of these requirements and creates outcomes that are clearly in the best interest of national, state and local needs. Attached

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Mr. Edward R. Shepard, State Director
January 10, 2008
Page Two

is a set of coequal and linked principles that we think will lead to this result. These principles cannot be treated in isolation, but rather they should be read and addressed as an integrated whole. As I have indicated, you can expect these to frame the cooperative work of Oregon's state agencies as you move to completion.

Sincerely,

THEODORE R. KULONGOSKI
Governor

TRK:mc:jb
Enclosure

1874.2

Attachment: 08Jan10_Governor Letter
WOPR and Oregon NR Agencies Cooperating Status
12 Coequal Principles
January 10, 2008
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TWELVE COEQUAL PRINCIPLES

1. The final plan must be fully implemented through adequate leadership, and human and financial resources.

The current Northwest Forest Plan (NWFP) has not been fully implemented. In particular, adaptive management strategies and timber harvest objectives have not been met. The Bureau of Land Management (BLM) needs to have adequate resources to carry out management strategies that will be adopted in the Western Oregon Plan Revision (WOPR). Budget reductions and reallocations have led to major reductions in federal agency resources since the early 1990s, which has influenced agency capacity and created concern over whether institutional capacities are adequate. The State of Oregon (State) believes it is imperative that the final plan be fully institutionalized within BLM and supported by adequate resources both within BLM and cooperating federal agencies. The State strongly supports a plan that can and will be fully implemented.

2. A robust and detailed monitoring strategy supported by appropriate research must be implemented as a key part of BLM's plan. The monitoring strategy must examine key questions related to the implementation, effectiveness and validity of plan assumptions and objectives, land use allocations, and management actions; and must also be designed to support adaptive management.

Monitoring provides essential information about whether management actions are implemented as directed in the resource management plan, and examines their effectiveness in achieving desired outcomes. The BLM's plan must commit to adequate monitoring and research to generate and utilize new information as it becomes available, and employ an adaptive management approach to ensure that the best available knowledge and information is acquired and used efficiently and effectively. The monitoring approach outlined in the BLM plan must be adequate to provide information needed to support adaptive management.

3. The BLM's plan must produce predictable and sustainable timber harvest as well as non-timber resources and values that contribute to the economic stability of the Oregon & California Lands Act counties.

The Oregon & California Lands Act (O&C Act) states that O&C lands "Shall be managed... for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating streamflow, and contributing to the economic stability of the local communities and industries, and providing recreational facilities." Timber sale revenues from these lands are shared by the federal government and counties with the 25 percent federal share dedicated to the administration and management of O&C lands. The other 75 percent was to go to the 18 O&C counties after certain repayment obligations were satisfied.

The past obligations were satisfied by 1952 and, in 1953, the counties received their full 75 percent share. Since 1953, the counties voluntarily returned one-third of their share (25 percent of the total) to the federal government for reinvestment in infrastructure on the O&C lands. The counties' "plowback funds" were used by BLM for construction of roads and bridges,

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reforestation, the construction of campgrounds and other recreation sites, and a wide variety of other projects to enhance the economic and recreational value of the O&C lands. The counties view the plowback funds as an investment that would return both revenue and economic contributions. The plowback fund existed from 1953 to 1981.

Since 1982, Congress made the O&C appropriation a direct appropriation to BLM; 50 percent of the total timber receipts were transferred to the US Department of the Treasury as reimbursement for all or part of the direct O&C appropriation. Since 1993, Congress has provided alternative means of making payments to Oregon counties in which Federal timber sales have been restricted to protect listed species. As the authority for the temporary funding from the Secure Rural Schools Act ends, revenue to the 18 O&C counties will again be tied to harvested timber and grazing fees.

Thus, BLM's plan must support local communities through revenues generated by timber sales. The timber sales produced under the plan must be ecologically sustainable and sufficient to contribute to funding sustainable social and economic benefits for local communities. The BLM's plan must integrate the economic contributions and values of fishing, hunting, and wildlife viewing as part of the assessment for the economic values derived under the plan. Timber harvests and other economic contributions from the lands must produce a long-term stable revenue source and economic benefits that are consistent with the intent of the O&C Act.

4. The BLM's approach to managing habitat must comply with the federal Endangered Species Act, aid in the recovery of listed species, and compliment strategies for managing state-owned lands.

The purpose of the Endangered Species Act (ESA) is to protect and recover threatened and endangered (T&E) species and the ecosystems on which they depend. The BLM's management plans must protect T&E species and provide habitat for listed species that is consistent with recovery plans and aids in the recovery of listed species. Federal lands are critical to preventing future listings, ensuring recovery of listed species, and long term sustainability of species at-risk. The BLM plan must be designed to consider future listings, critical habitat determinations, and recovery plans by the USFWS and NOAA Fisheries.

Different forestland ownerships play different roles in providing the habitat conditions necessary for T&E species in Oregon's forests. Forests managed by the Board of Forestry in western Oregon and Klamath County will contribute to the recovery of listed and sensitive species by developing and sustaining a full range of habitat structures and conditions through active management, especially in areas where the amount or distribution of federal lands are not prevalent. These lands are managed to produce and maintain an array of forest stand conditions and structures across the landscape and over time in a functional arrangement supportive of the diversity of species. This approach provides valuable information about the relationship between wildlife and habitat use in landscapes that are actively managed, and will be used to adaptively modify management strategies to improve outcomes over time. The process of defining an overall landscape scale strategy for conserving T&E species is complex, and the approaches on BLM lands must compliment the approaches being taken by the State on its ownerships.

The BLM's plan must add the flexibility needed to design and implement a range of management options for T&E species that provide for the appropriate range of forest conditions and structure while addressing the risks from uncharacteristic wildfire within the fire-prone provinces. There is a need to integrate fish and wildlife objectives and habitat relationships into agency efforts to adaptively manage fuels. Adaptive management strategies must be designed and implemented to test the effectiveness of alternative management options.

5. Riparian management strategies and best management practices must maintain and restore freshwater habitat for salmonids, contribute to the conservation of other fish and wildlife habitats, and comply with the federal Clean Water Act including sustaining beneficial uses consistent with state water quality standards and by protecting source water used for drinking water.

Aquatic and riparian areas must be managed to maintain or restore high quality aquatic habitat to aid federal salmon recovery efforts and to contribute to the conservation of other species. The habitat and supporting riparian ecosystem functions needed by salmonids are believed to be very diverse, and the abundance and survival of salmonids and many other aquatic species is closely linked to the abundance of large wood in streams. The BLM's riparian management strategy must promote species diversity and enhance forest structural complexity that emulates the structure of forests shaped by natural processes that promote the recruitment of large wood. The riparian management strategy must serve to reduce the risk of extinction for many unlisted species, in particular, those that depend on riparian/wetland ecosystems or late successional forests. Riparian and aquatic habitats must be managed to maintain or restore key functions and processes of aquatic and riparian systems.

To protect water quality, BLM's riparian management strategy must be similar to, and consistent with, management strategies that have been shown to be sufficient to comply with the federal Clean Water Act and meet state water quality standards. BLM must ensure that its plan minimizes adverse impacts on water quality from pollutants including toxics, sediment, and temperature. The plan must include direction to work in partnership with the state and local communities and others. Riparian management strategies must consider the types and intervals of disturbances that would naturally be expected to occur in a watershed – including historical wildfire – and the planned treatment for the adjacent upslope areas and site conditions. The BLM's management must ensure that source water used for drinking water is protected through Best Management Practices.

6. The BLM's plan must support the Oregon Conservation Strategy.

The Oregon Conservation Strategy (OCS) should be used to help BLM make strategic decisions on conservation issues and for guidance on the types of actions most likely to benefit species and habitats. The OCS describes species and habitats of greatest conservation need, identifies key conservation issues facing those at-risk species and habitats, and provides recommendations for actions and opportunities to address them. Forested, riparian, and aquatic habitats are all priorities in the OCS, as are many aquatic and terrestrial species found in those habitats.

7. The BLM's plan must support the Oregon Coast Coho Conservation Plan, an outcome of the Oregon Plan for Salmon and Watersheds.

It is critically important for the conservation of Oregon Coast coho salmon that the ecosystem functions and processes addressed by NWFP Aquatic Conservation Strategy be maintained. Ecosystem functions and processes on federal lands contribute to the ecological health on

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adjacent and downstream private and state lands and these benefits must be considered from a landscape perspective. The BLM must continue implementation of the comprehensive watershed conservation and restoration programs to restore and maintain the ecological health of watersheds and aquatic ecosystems while protecting salmon and steelhead on federal lands. Thus, the BLM plan must include site-specific, watershed, and landscape level strategies that will recover degraded aquatic habitat and sustain watershed processes important to aquatic and riparian dependent species consistent with State and Federal salmon recovery plans. The BLM must maintain its commitment and work with the State to implement effective salmon conservation and recovery measures. Other innovative approaches, such as stewardship contracts and the Wyden amendment must also be used to support implementation of stream restoration efforts in partnership with watershed councils and others.

8. The BLM's plan must support State management plans for deer and other species that balances habitat protection with providing suitable early successional habitat.

Deer and elk, as well as other significant species with early successional habitat needs, are important to the state. Black-tailed deer populations rely on the native food sources found predominately in early successional forest stages. Timber harvest on federally managed lands has decreased significantly over the past 10-15 years, which is one of the factors contributing to declining deer populations in western Oregon. Additionally, the Coastal Landscape Analysis and Modeling Study (CLAMS) projected the area of structurally diverse older conifer forest and habitat for late successional wildlife species to strongly increase, but open, diverse, early-seral conditions are projected to decline over the next 100 years. The BLM's plan must address maintenance and restoration of biological diversity, which will contribute to providing suitable early successional habitat. Strategies for biological diversity must deal with resources at multiple temporal and spatial levels: forest stand, watershed, and broader landscape/regional. The key is a carefully crafted strategy that manages for a broad range of values, and not to the substantial detriment of any one or group of species or habitats. This work should be in context and balanced with requirements for T&E species and OCS recommendations for Late Successional mixed conifer forest and other priority habitats.

9. The BLM's plan must contain a provision to formalize easement and other right-of-way documentation with other resource agencies having management activities adjacent to or on BLM-owned land.

Formalizing right-of-way provisions with state agencies through the planning process would help to ensure recognition of, and compatibility with, BLM's management plans.

10. The BLM's lands must provide a sustainable mix of outdoor recreational opportunities.

The O&C Act specifically directs BLM to provide "recreational facilities" as part of the mix of its land uses. The BLM's recreation management must be compatible with and complimentary to the Oregon Parks and Recreation Department's Statewide Comprehensive Outdoor Recreation Plan (SCORP). The BLM's plan must also be consistent with Oregon Department of Fish and Wildlife management plans that provide for fish and wildlife based recreation.

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11. Aggressive strategies must be implemented to control existing and prevent/eradicate new invasive species on BLM lands.

Non-native invasive species are a serious threat to federal forests, as well as adjoining non-federal lands. The BLM must create and implement comprehensive invasive species detection, monitoring, and control strategies for BLM lands that also consider potential impacts to adjacent private and public lands. The strategies must include an early detection and rapid response program for new invasive species, and include the full range of tools to eradicate and/or manage invasive species.

12. The plan must address the interactions of forests and a changing climate; including forest management strategies that can help in sequestering carbon or reduce overall emissions into the atmosphere, as well as addressing the forest health risks that may occur due to global climate change.

Forests and forest products play an important role in maintaining a livable climate. Managing and conserving forests and forest products can partially influence how much human-caused carbon dioxide is added to or sequestered from the atmosphere. Management actions can be implemented to influence future forest ecosystems so that they are better able to accommodate the warmer climates they are likely to encounter. Oregon has stepped ahead of the federal government in addressing this issue. Forests contain about 75 percent of the earth's biomass, so in a state like Oregon, with its highly productive forests, the per-acre potential for carbon storage is among the highest in the world. The BLM's plan needs to include adaptive management strategies to explore options related to these issues.

1875

BENTON COUNTY
O • R • E • G • O • N

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RECEIVED
JAN 11 2008

January 9, 2008

Mr. Ed Shepard, State Director OR/WA
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Re: Western Oregon Plan Revision EIS comments

Mr. Shepard:

We appreciate the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts (WOPR). As you know, Benton County is a cooperator separate from the Association of O&C Counties (Benton County is not a member of the Association).

On behalf of Benton County, my comments will focus more on observations and general recommendations rather than a specific alternative. My colleagues and I represent diverse community interests and scientific opinion and have received considerable commentary on the WOPR DEIS.

Management focused on forest health and resiliency should be a major factor considered in any plan revisions. Management considerations must include looking at the ecosystem as a whole with focus on soil dynamics, hydrology, water function, air quality and multiple forest uses in addition to timber productivity. Healthy and resilient forests can provide for multiple values including timber harvest. There is concern that the focus on timber production greatly outweighs the functions that contribute to forest health and resiliency; that these functions do not seem to be as important.

We recognize that the Bureau's plan revisions are in response to a settlement agreement centered on the 1937 O&C Act. We have not had the luxury of an in-depth legal review or interpretations thereof. Nevertheless, we propose that an interpretation of the Act should not be so narrow; the Act focused primarily on timber production, overshadows other values so thus the difficulty in making the case that protecting watersheds and streams and providing recreational opportunities have importance. I'm not convinced that the Clean Water and Air Acts and other legislation should not be considered when interpreting the 1937 Act.

We acknowledge that harvest receipts, or county payments, are the lifeblood of several O&C Counties. Nevertheless, it is not likely that harvests would be restored to historic high levels. We have to find a way to reach a new compact with the federal government that will provide some sort of compensation for significant land acreage exemptions from tax rolls. We do not believe that timber harvest is the only answer. We also recognize that this is outside the plan revision process.

We ask the question, has enough time been given to assess the success or failure of the 1994 Northwest Forest Plan (NWFP) for managing Westside forests in Oregon? We suspect not. We know that the debate continues on whether or not O&C lands should be managed under the NWFP; however, consistent forest management of federal forests should be a goal for our federal agencies. Shared practices and current science can enhance efforts. In my years in forestry research, I learned that longitudinal data are needed to evaluate success or failure; that management prescriptions come from a combination of trial and error and good science. I personally am not convinced that the NWFP was given sufficient time. Instead it was caught in the middle of competing political interests and litigation.

Finally, we are concerned that the debate over the preferred alternative or other alternatives will not abate litigation. In fact, it may lead to more.

In the interest of cooperation we recommend:

- Plan revisions include multiple use sustained yield of forest ecosystem services, rather than management tightly directed at short-term economic return at the expense of long term productivity of the forest as a whole, which might go further in gaining support for plan revisions. In the work of the Federal Forestlands Advisory Committee (for the Oregon Board of Forestry) we have struggled with the complexities of managing the nation's federal forest lands. There appears to be some agreement, however, that restoring forest health and resiliency must be a focus and that harvest as well as restoration is an important component of that effort. Restoring forest health and resiliency will also help combat catastrophic wildfire events. Stewardship and management can be synonymous.
- Expanding economic measures of success to include other values such as those achieved by the requirements of the Clean Water and Air Acts, enhancement of fisheries, recreation, and other forest products.
- Addressing carbon storage; learning more about carbon pluses and minuses. What is the optimum carbon balance?
- Allowing more time and effort in implementing and evaluating the Northwest Forest Plan to provide coordination between federal agencies with the hopeful result of more stability and predictability regarding the management of federal forest lands (including the 2.6 million acres of BLM managed forests in Oregon).

2

- Proposing a selection of alternatives based on specific landscape features (such as on a basin or province scale).
- Considering the potential consequences of climate change over time and how forests should be managed in response to such change. Should there be some "adaptive management" strategies to consider climate change? And what might they be?
- Working to reach some agreement on the language we use in forest management. This will not be an easy task, as it became very clear to me during the most recent meeting of the Federal Forestlands Advisory Committee's discussion on how to define or characterize older forests. If industry and academic professionals, foresters and conservationists struggle over this, it is clear that the general public will be confused and struggle even more.
- Providing a public process to discuss and assign relative value to the many dimensions of our forests. Certainly, the revenue produced to support local government is important, but that dimension must be weighed and valued with others such as recreation, habitat, clean air and clean water.
- Building broader community support to reduce the polarization that has led to litigation. It is important that there be parity of information – that is communities need to hear all sides of the debate and be asked to engage in finding solutions. I don't think that we can ignore a political environment that also includes aesthetic values attached to forests. We have to find a way to manage for diverse community values.

We sincerely hope that you will find our comments useful.

Again, we thank you for the opportunity to comment. We recognize that there will be another opportunity as the Bureau refines the proposed plan.

Sincerely,

Annabelle Jaramillo
Commissioner

cc. Commissioner Jay Dixon
Commissioner Linda Modrell

3

1878.1

JACKSON COUNTY
Oregon

Board of Commissioners

Dave Gilmour, MD (541) 774-6117
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10 South Oakdale, Room 200
Medford, Oregon 97501

January 4, 2008

Ed Shepard, Director
Bureau of Land Management
Western Oregon Plan Revisions
P.O. Box 2965
Portland, OR 97208

RE: Follow up Comments from Jackson County on the Western Oregon Plan Revisions

Dear Mr. Shepard:

The Jackson County Board of Commissioners is submitting supplemental comments to those submitted on December 6, 2007. We are enclosing a complete package so there is no need to find or refer to our original submission.

Please note that the recommendations submitted on December 6th were pulled from the enclosed report *Recommendations from the Jackson County WOPR Core Group on the BLM Draft EIS Western Oregon Plan Revisions*. In retrospect, we realize it would have been more beneficial to BLM to have the complete report, rather than just the recommendations. I would like to emphasize that every recommendation contained in this report was agreed to by every member of our Core Group, a diverse group of experts and stakeholders. This report and its recommendations was adopted unanimously by the Board of Commissioners and is our official response.

Since submitting our official comments, a committee that advises the board on natural resource issues submitted their response on the DEIS to the board for their consideration. Because this report provides additional information and comments that support and adds to our recommendations, the board decided to forward this report as well.

In addition to the reports mentioned above, I have also included the December 6, 2007 cover letter from the Jackson County Board of Commissioners to complete the package.

If you should have any questions regarding any of the enclosed information, please contact Lin Bernhardt, Jackson County Natural Resources Manager at (541) 774-6086.

Sincerely,

Dennis C.W. Smith, Chair
Jackson County Board of Commissioners

c TimReuwsaat

We thank the Medford District manager, Tim Reuwsaat, and his staff for their support and assistance during this process.

Sincerely,

Jackson County Board of Commissioners

Dennis C.W. Smith, Chair

Jack Walker, Commissioner

Dave Gilmour, Commissioner

c Tim Reuwsaat

enclosures:

1) WOPR Core Group Consensus Recommendations
2) Jackson County WOPR Core Group

1878.3

Recommendations to the Jackson County Board of Commissioners (BOC)
on
The BLM's Western Oregon Plan Revision (WOPR)

INTRODUCTION

The Forest Management Subcommittee of the Natural Resources Advisory Committee (NRAC) is aware of the results of an effort supported by the NRAC to provide the BOC with recommendations on what feedback to provide the BLM on its Draft Environmental Impact Statement (DEIS) on the WOPR. This subcommittee of the NRAC has traditionally been the principle provider of recommendations regarding forestry matters of concern to the BOC. While acknowledging that the recommendations requested by the BOC from a created "Core Group" provided it a broad spectrum of opinions about the DEIS, this subcommittee believes that the BOC should also entertain information of a more focused kind that reflects the opinions of those particularly well versed in certain parts of the WOPR.

The Forest Management Subcommittee of the NRAC is composed of 5 members: Two retired professional foresters (one of whom owns and manages a small woodland property), one member, a working "professional" forester who has extensive experience in the field, one small woodland owner, and one person well versed in water quality, riparian and fisheries matters. These five members met and discussed specific recommendations that are being forwarded to the general membership of the NRAC for submission to the BOC as additional input.

We stress that this is **additional** input and is not meant to contradict or contest other input that the BOC may receive.

The BOC expressed interest in five major subjects in regard to the WOPR: **Wildfire Timber Management, Socio-Economics, Wildlife and Water.**

The Forest Management Subcommittee will comment on these same subjects and in addition will comment on the WOPR's relation to the O&C Act of 1937.

COMMENTS OF THE SUBCOMMITTEE

This subcommittee supports, and has no additions to the "Statements" contained in the Core Group's submission to the BOC with regard to **Wildfire**.

On **Timber Management** the subcommittee offers the following: Although the WOPR recognizes the uniqueness of the forests of most of the Medford District by applying different harvest methods to timber stands south of a line thru Grants Pass, most reviewers were not convinced that there is enough explanation in the DEIS as to how the harvest methods will differ. This subcommittee does not disagree with any of the statements on this subject from the Core Group. **We recommend that the BLM more fully describe how it would recognize that more partial cutting, selective cutting and thinning be done on Medford District forests, and generally, in what places; and analyze the effects on the condition of the forests and the Allowable Sale Quantity (ASQ). If that, in essence has already been done, then it needs to be better displayed.**

None of the alternatives provides information on the relationship between forest productivity (growth per acre per year) and the ASQ. Based on information obtained from a BLM specialist well versed in growth and yield on the Medford District, alternative 2. still does not harvest all the growth occurring there. (Alternative 2. produces the highest ASQ of all the alternatives). The O&C Act says that timber harvest should be based on the principle of sustained yield. Producing more fiber than is harvested leads to build up of biomass, which leads to high fire hazard, which leads to increased fires and loss of timber and habitat, and as a result, also a loss of wildlife and decrease in water quality. This can cause a net loss to human society as well as the natural environment.

This subcommittee recommends that the BLM more fully describe the relationship between the growth of harvestable timber (especially on the Medford District) and its actual planned harvest under the various alternatives.

The definition of "harvestable timber" for our purposes, and based on Medford District data, is the forested acreage in the District. By multiplying the forested acres, 788,000 X 300 board feet/acre/year = 236.40 million board feet per year. Harvest in alternative 2. = 131.0 million board feet per year, far under the sustained yield of these lands.

The subject of **Socio-economics** in this presentation is dealt with in relation to adherence to the O&C Act. The Core Group statements on this subject have been treated by this subcommittee under **Timber Management** above. The O&C Act determined that "forest production" would be dominant in managing the O&C forests. This has been upheld in a court decision. The O&C Act included "providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries…" (underlining added). (A pertinent discussion of this subject is contained in the "Critical Commentary" of the Josephine County Report of the Select Sub-Committee regarding the WOPR on page 9 of that report. The report is in the hands of the Jackson County BOC, and they are able to refer to it.)

It should be noted that even under the highest ASQ level alternative, (Alternative 2.) only 54% of the BLM land base is available for harvest.

We recommend that the BLM explain its reliance on Alternative 3. to comply with the "out of court settlement", when long rotations in that plan restrict timber growth, timber harvest and revenues to the Counties. This may be a subject where the BLM can deviate from the preferred alternative to achieve a higher level of harvest and revenues by including more acres in the forested land base.

Wildlife

This subcommittee, which is focused on forest management issues, has no specific concerns with the DEIS on wildlife issues. None of the alternatives seems to have a detrimental effect on Wildlife in general. We offer no comment on this subject. The statements from the Core Group cover any concerns we may have.

Water issues in the DEIS are not of significant concern to this subcommittee. The Core Group stated that the riparian buffers should be determined on a site-specific basis. The DEIS indicates a formulaic approach. This may be due to the difficulty of incorporating

2

in the plan an analysis that reflects site specifics. Although possible to do, it may not be cost effective to do so for planning purposes. If this is so, it would be helpful for BLM to so state in the DEIS.

Note: This same difficulty might be the reason the BLM apparently did not model a partial cut/selective cut analysis for timber management in the Medford District. It would be instructive to find that out from the BLM when it responds to input.

We agree with the Core Group recommendations.

Summary

It is hoped that the BOC will value the perspective of a more focused group whose membership is heavily weighted toward a professional approach to the subject. This group, the Forest Management Subcommittee, is part of the (NRAC) that is an official advisor to the BOC. Those professionals have spent their careers considering the very questions raised by the WOPR DEIS and have observed the results of various management actions on the ground. The other members, who are not "professional foresters" also have on the ground experience that is a cut above the perceptions on natural resource issues of the general public. It is in that spirit that we submit our recommendations to the NRAC for further submission to the BOC.

1878.2

Recommendations
From the Jackson County WOPR Core Group On the BLM Draft EIS Western Oregon Plan Revisions

December 4, 2007

Prepared for the Jackson County Board of Commissioners by Lin Bernhardt, Jackson County Natural Resources Manager

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Recommendations from the Jackson County WOPR Core Group on the BLM Draft EIS Western Oregon Plan Revisions

INTRODUCTION

Purpose

The purpose of this report is to inform the Jackson County Board of Commissioners of the results of a county process to gather local input on the Bureau of Land Management's Western Oregon Plan Revisions (WOPR). This input is provided to the board for consideration in their response to the BLM. The report contains recommendations on key areas addressed in the WOPR.

Background

The BLM released their draft environmental impact statement (DEIS) on the management of public lands in Western Oregon in August of 2007. The DEIS, also known as the WOPR, analyzes the potential impacts of existing plans and three new management alternatives that seek to better meet BLM's mandates. While the analysis takes place under one region-wide EIS, the result will be six consistent but independent resource management plans that will guide the management for the western Oregon BLM districts for the next 10 to 15 years. The deadline for comment is January 11, 2008.

The BLM is revising existing plans to replace the land use allocations and management direction proposed under the Northwest Forest Plan to better meet the agency's dual goals of providing a sustained flow of timber output and providing for habitat and conservation of federally listed fish and wildlife species. Most land in the planning area is managed under the requirements of the Oregon and California Lands Act of 1937. The Act requires that the O&C lands be managed for "permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principle of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." The BLM must also meet the requirements of other federal laws such as the Endangered Species Act and Clean Water Act.

The Resource Management Plan for the Medford District adopted as a result of this process will be of great importance to Jackson County, affecting county government and the livability of the area for county residents. This plan should be coordinated with plans the county has adopted such as the Jackson County Integrated Wildfire Protection Plan and water quality and water resource management plans. The BLM promises to address local issues in their plans, and has requested input from residents and cooperators. As cooperators, counties have significant influence in the outcome of the Resource Management Plans.

PROCESS FOR GATHERING INPUT

Developing a Strategy

Jackson County's Natural Resources Manager, Lin Bernhardt, developed a strategy for gathering local input which would help inform the board in their response to the BLM. The strategy was developed with the assistance of the BLM District Manager Tim Reuwsaat, and Ed Kupillas, a member of the Jackson County Natural Resources Advisory Committee (NRAC). The Board of Commissioners endorsed the proposed strategy at a work session on September 2, 2007.

Establishing the Core Group

A central advisory group of key experts, the "Core Group," was formed to help guide the process and provide recommendations to the board. Membership included several NRAC members as well as experts and representatives from key areas such as forest management, water quality, wildfire prevention, biology/ecology, and economics. For a complete list of members, see Appendix A. Members were chosen for their expertise as well as their demonstrated ability to collaborate. When participating, members spoke for themselves and not for any organization they're affiliated with, especially since many of those organizations will be submitting their own comments. A consultant, Dr. Jon Lange, working for the U.S. Institute of Environmental Conflict Resolution, a group that is helping the BLM with its public participation process for the WOPR, was hired to facilitate the meetings and assist with the process.

The Core Group met three times for half-day meetings and reviewed documents between meetings. The group initially met on September 5, 2007, and agreed to focus on five key areas. (Given the expansiveness of the DEIS and the timeline for comment, it was essential to limit the scope.) Those areas included timber management, wildfire, socio-economics, wildlife, and water quality.

The Core Group was briefed by BLM on the WOPR prior to beginning their discussions. On September 17, 2007 a second meeting was held to ask and discuss more in-depth, technical questions. As suggested by BLM, the group focused on the many different *elements* of the alternatives, and not on the alternatives themselves, since BLM is likely to adopt a hybrid of the alternatives listed.

Expanded NRAC Workshop
A workshop was held on September 18, 2007 immediately prior to a regularly scheduled NRAC meeting to gather additional and more widespread feedback from a an even wider variety of interests,. All NRAC members were invited, as well as Core Group members, and members of other groups who would potentially have an interest in – or be affected by – the resource management plan. This included the chairs of relevant county advisory committees as well as others from industry, conservation/environmental organizations and community groups. Of the more than 80 invitations sent, 32 people attended. See Appendix B for the list of participants.

The meeting began with a background presentation by BLM staff. This was followed by a question and answer session. Because of limited time available, we guided participants to provide feedback on a preprinted form asking five questions.

Based on comments and questions during the meeting, as well as from the written comments, the overriding concern was **wildfire**. Concerns that the WOPR did not adequately address this topic came from both industry representatives as well as environmentalists. Other concerns were raised under the topics of forest management, jobs and economy, wildlife and water quality. Copies of all written comments from the meeting are attached in Appendix C.

Developing Recommendations
Incorporating many of the comments from the workshop described above, the Core group met for a third and final time on October 1, 2007 to develop a set of statements/recommendations for each of the five key areas. While members had very different perspectives, representing very different points of view, they worked diligently advocating their different values and beliefs while accommodating and respecting those of other committee members. After the recommendations were developed, subsequent to the meeting, members reviewed them for accuracy. **All members confirmed the necessary changes and final list. This diverse group has agreed, by consensus, to the recommendations below**. A short summary of the concepts discussed precedes each set of recommendations.

CORE GROUP RECOMMENDATIONS

Wildfire
The group expressed deep concern that wildfire was not modeled in the analysis for the alternatives. This is especially important in the Medford District where the threat of wildfire is extremely high. This omission is a serious flaw since the results of the analysis could be very different from what is described in the DEIS, particularly for harvest levels. Neither the extent nor location of fire can be predicted, however historical fire data can and should be incorporated.

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Since wildfire has the potential to seriously affect harvest levels as well as other values, it was agreed that harvest should be linked to fuels reduction for economic, forest health, and forest resiliency throughout the district. This should take into account the different forest types in the Medford District.

- **The management plan should reflect the fact that there is more fire risk in the Medford District than elsewhere in the planning area.**
- **The analysis should account for the likelihood of wildfire and its effects on future harvest levels and other values.**
- **The management plan should focus to a greater extent on linking timber harvest to the reduction of fire risk with the goal of improving the fire resiliency of the forest and maintaining or improving forest health.**
- **The plan should describe possible prescriptions, management schemes and methods to reduce fire risk and increase forest and stand resiliency for the typical forest types in the Medford District.**

Timber Management

The group generally agreed that the Medford district has forest types that don't fit the alternatives and should be managed differently than forests in other parts of the planning area. This area has more mixed stands and uneven aged forests that don't fit the one-size-fits-all approach. Forest types should be identified where partial harvest, thinning and regeneration harvests would be appropriate. Therefore, the management of special forest types should be based on a unique management prescription that would determine the harvest type and how to meet objectives such as fire resiliency. The group recognized that this might reduce the Allowable Sale Quantity (ASQ). However, other recommendations from the group would increase the ASQ, although it is unknown to what degree this would occur.

Emphasizing management for objectives would allow a larger portion of the landscape to be managed for timber production while maintaining habitat and/or non-timber values. More volume could be cut in reserves while managing for forest health and fire resiliency.

- **The management plan should recognize the distinct forest types and ecology of the Medford District as compared to other parts of the western Oregon planning area. The management plan for the Medford District should rely more on thinning and partial cuts.**
- **Where regeneration harvests are appropriate, there should be retention of snags, woody debris and live trees, including hardwoods and representative species.**
- **More volume could be cut in reserves with prescriptions that emphasize forest and ecosystem health and fire resiliency.**

Page 4 of 7

- **Emphasize management for objectives allowing broader integrated management. This would allow a larger portion of the landscape – and individual areas within the landscape – to be managed for timber production while maintaining habitat and/or other non-timber values.**

Socio-Economics

There was considerable debate on this topic. It was noted that much more biomass is being grown than proposed to be cut in Alternative 2, and that the cut should be significantly increased. One member suggested that the BLM should consider how much is merchantable and accessible without destroying the ecological base. Another favored looking at site specific characteristics and managing it for habitat, resiliency, or stocking, and letting the ASQ fall out as a result while maximizing economic return. The group generally favored site-specific prescriptions versus a one-size-fits-all approach.

It was also noted that merchantable small diameter could help pay the way, and the DEIS should do more to address small diameter and biomass. The committee agreed that BLM must generate revenue from forests, provide jobs, and do it in an ecologically sound manner. One member suggested BLM should be more aggressive in the reserves. It was suggested that some areas within the Late Successional Management Areas (LSMAs) could be treated while preserving ecological health.

- **More attention should be given to site-specific management and making sales economically viable while providing jobs.**
- **A sustainable, predictable BLM timber harvest is important for job creation, county revenues and continued private sector investment in mill infrastructure. The ASQ can be increased from present levels with sustained yield while still meeting other objectives such as fire resiliency and forest health.**
- **The management plan should promote the supply and utilization of small diameter trees and biomass with the goal of economic viability. The plan should address the importance of collaboration and incorporate language that enables and encourages the districts to participate in such collaboratives.**

Wildlife

One member expressed concern about the amount of closed canopy in some alternatives. An open canopy has varied understory and supports a wide variety of species. More open canopy would help restore under-represented habitat. There was discussion about the need for legacy trees and snags for wildlife, as well as the need to maintain adequate representation of all structural seral stages, including open and closed canopy old growth, especially at low elevation since there is poor representation of old growth. The group agreed that habitat fragmentation was of concern, and should be linked to timber management solutions.

Page 5 of 7

The concern was raised over the issue of managing species to prevent new listings and additional set asides, with the obvious potential to impact future ASQ. Conifer associated Agency Special-Status Species Programs (SSSP) species will need some sort of protection to prevent future ESA listings.

- **The management plan must recognize the importance of legacy trees/green trees (including both conifer and hardwoods), snags and coarse woody debris.**
- **There should be adequate representation of forest seral stages, including open and closed canopy old growth at lower elevations.**
- **There should be an analysis on the effects of habitat fragmentation that the alternatives would create, especially as a result of reduced riparian reserves and lack of green tree retention in some alternatives.**
- **Sensitive species should be managed on a landscape scale to prevent new ESA listings and additional set asides, and should include a safety net for conifer-associated rare species based on reliable data.**

Water

The committee expressed concern about setting uniform buffer distances from streams in all areas, rather than looking at site-specific characteristics to determine the distance that would be protective of the stream. These characteristics would include topography, width of canyon, vegetation, soils, slope, and aspect. Setting uniform setback distances has the potential to remove some land from the timber harvest base that would not create an impact if it were included within the setback, while not including areas outside the setback could cause an impact if the area were logged. While many members felt buffers should be set by experts based on site characteristics on a case-by-case basis, they also acknowledged it may not be practical. In any case, predetermined criteria should be established.

While it was agreed that there should be no significant impairment of water quality, including a reduction of shade and increased warming of the water, one member noted that he isn't too concerned about impacts to water quality using the example of the logging that took place at Big Butte. In general, the group noted the importance of clean water, abundant fish and wildlife, coupled with the need to manage for jobs and timber harvest.

One member felt that buffers should be protective not just of established fish bearing streams, but streams that have the potential for fish presence even though fish have not been observed. If stream conditions could be altered that would allow fish in the future, such as replacing a culvert, it was agreed that those streams should receive equal protection.

The impacts of roads on water quality, the need for better road design, addressing deferred maintenance, and restoring/mitigating existing roads to reduce impacts on sedimentation, were also mentioned as concerns.

- **Riparian buffers should be determined by specialists on a site-specific basis when necessary, based on predetermined criteria for proper functioning conditions. The resulting buffers should be sufficient to avoid significant impacts to water quality or fish habitat, including increases in temperature and sediment, or reductions in large wood recruitment and current and future shade.**
- **Streams with the potential for fish (salmonid) presence should be afforded equal protection to similar streams with fish presence.**
- **Potential impacts from new and existing roads should be minimized. BMPs should be deployed and monitored and deferred maintenance made a high priority.**

FINAL REMARKS

All members of the Core Group stayed at the table throughout the process. This does not mean that every member attended every meeting, however, every member reviewed and agreed to the final recommendations.

The group determined that none of the alternatives were acceptable as written and a new alternative should be developed that incorporates the above recommendations. The management plan for the Medford District must take into account the high fire risk and different forest types in this area. The group supported maximizing harvest levels to support jobs and the economy while managing for fire resiliency, forest health, and ecological values.

The members were appreciative of the BLM staff that made themselves available for presentations and questions throughout the process.

APPENDIX A

Jackson County WOPR Core Group

Ed Kupillas (*NRAC, Society of Professional Foresters*)

Craig Harper (*NRAC, RVCOG*)

Paul Kangas (*NRAC, Society of Professional Foresters*)

Kathleen Donham (*NRAC, League of Women Voters*)

Frank Lang (*NRAC, biologist*)

Ron Fox (*SOREDI*)

Darren Borgias (*The Nature Conservancy*)

Max Bennett (*OSU Extension forester*)

Brett Fillis (*Rogue Valley Fire Chiefs Assoc., J. C. Fire Plan Executive Com.*)

Jude Wait (*Lomakatsi*)

George McKinley (*Jefferson Sustainable Development Initiative*)

Bob Jones (*Medford Water Commission*)

1802

KLAMATH COUNTY
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Al Switzer, Commissioner
Position One

John Elliott, Commissioner
Position Two

Bill Brown, Commissioner
Position Three

January 4, 2008

RECEIVED
JAN 09 2008

Mr. Edward W. Shepard, State Director
USDI Bureau of Land Management
Western Oregon Plan Revisions
PO Box 2965
Portland, OR 97208

Dear Mr. Shepard:

The Klamath County Board of Commissioners provided comment on your Western Oregon Plan Revisions on October 30, 2007. Since that date we have become aware of the possible implications of the United States Supreme Court's decision in "National Association of Homebuilders v. Defenders of Wildlife" of June 25, 2007. This decision states that Section 7 of the Endangered Species Act's "...no jeopardy duty covers only discretionary agency actions and does not attach to actions that an agency is required by statute to undertake once certain specific triggering events have occurred..."

In our October 30 comment we encouraged a larger allocation of acres to timber production than the 48 percent your Alternative Two indicated while generally supporting your selection of Alternative Two as your Preferred Alternative. The recent Supreme Court decision now reinforces the requirements of the original O&C Act to manage the O&C lands primarily for timber production for economic benefit of the counties in which the O&C lands lie.

We continue to encourage timber management and production on a far larger acreage than suggested in your Alternative Two and perhaps a larger acreage than the 66 percent indicated in your Alternative Three. We maintain that land may be managed under the rotation age regime (90/140 years) you suggest in such a manner that essential habitat for listed and other species is protected, if not enhanced, while a large volume of valuable forest products is produced. The ten-year allowable sale quantity indicated in Alternative Two, 7,270 MMBF, could be safely exceeded if more acres were available for wood harvest, keeping growth and cut in balance over the span of the decadal planning period.

Page 2 – DEIS letter

As always, it's essential that all resources and species be considered as land management plans are written and executed. We believe it is entirely possible to engage in careful, long-rotation timber management on the largest land-base possible that protects and enhances all resources without excluding commercial use from large portions of public land.

We are very interested in your response to our comments and others that consider the effects of the Supreme Court's decision. We encourage the production of a new Preferred Alternative that takes this decision into consideration and includes far more economic timber production in Oregon's timber-dependent counties.

We very much appreciate this opportunity to comment on your Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts.

Very truly yours,

Al Switzer, Chairman

William K. Brown

Bill Brown, Commissioner

John Elliott

John Elliott, Commissioner

Tillamook County

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RECEIVED
JAN 4 2008

201 Laurel Avenue
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Land of Cheese, Trees and Ocean Breeze

Tillamook County Commissioners
Charles Hurliman. Tim Josi. Mark Labhart
503-842-3403
FAX 842-1384
TTY Oregon Relay Service

Received in OR/WA
JAN 03 2008
State Director's Office

January 2, 2008

Ed Shepard, State Director OR/WA
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97207

Re: Western Oregon Plan Revision draft EIS

Dear Mr. Shepard:

We have reviewed the Association of O&C Counties' December 20, 2007 letter to the Bureau of Land Management (BLM) and the comments made therein on the draft EIS in BLM's Western Oregon Plan Revision process. We agree with the comments provided within that letter and fully support the position of the Association of O&C Counties in this regard.

Charles J. Hurliman, Chair

Tim Josi, Vice-Chair

Mark Labhart, Commissioner

AN EQUAL OPPORTUNITY EMPLOYER

ASSOCIATION OF O & C COUNTIES

1512

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State Director's Office

Ed Shepard, State Director OR/WA.
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Re: Western Oregon Plan Revision EIS comments

Mr. Shepard:

The Association of O&C Counties represents the interests of Counties in Western Oregon within which lie the BLM managed O&C lands and Coos Bay Wagon Road ("CWBR") lands, including the 16 Counties which are formal cooperating agencies in the BLM's Western Oregon Plan Revision ("WOPR") process. This Association has represented County interests in the management of these lands for over 80 years. We have reviewed the WOPR draft EIS and provide the following comments:

BACKGROUND:

The O&C Act requires that O&C Lands "which have heretofore or may hereafter been classified as timberlands, and power site lands valuable for timber, shall be managed . . . for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield . . . ." 43 USC §1181a. The Act identifies two mandatory actions over which the BLM has no discretion: (1) If it is timberland, it must be included in the "timber base"; and (2) if it is in the timber base, it must be managed for sustained yield timber production. There remains, of course, at least some discretion in how the BLM implements the second of these requirements - - - there are a variety of ways to satisfy the requirement for sustained yield timber production.

When the WOPR process began, it was presumed that the Endangered Species Act ("ESA") "trumped" the O&C Act in some respects. Specifically, it was presumed that the O&C Act mandate to manage all timberlands for sustained yield had to stand aside if such management was inconsistent with the ESA's section 7(a)(2) requirement that "each Federal Agency shall, in consultation with . . . [the Secretary of Interior or Commerce] insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or

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threatened species or result in the destruction or adverse modification of habitat of such species which is determined . . . to be critical . . . ." 16 USC §1536(a)(2). It was presumed that the creation of reserves from which timber was not harvested, otherwise impermissible under the O&C Act, was permitted if necessary to avoid jeopardy to a listed species. The corollary presumption was that O&C lands, if designated as critical habitat under the ESA, could be withdrawn from timber production and placed in reserves for the benefit of listed wildlife species. All of these presumptions were wrong.

In June 2007, the United States Supreme Court reversed the 9th Circuit Court of Appeals in a case that limits the scope of the ESA. The case did not involve the O&C Act, but its holding directly affects the extent to which the BLM may respond to the "no jeopardy" and "no adverse modification" requirements of the ESA. The key holding in the case is as follows:

> "§7(a)(2)'s no-jeopardy duty covers only discretionary agency actions and does not attach to actions . . . that an agency is required by statute to undertake once certain specific triggering events have occurred. This reading not only is reasonable, inasmuch as it gives effect to the ESA's provision, but also comports with the canon against implied repeals [of other, earlier, conflicting legislation] because it stays §7(a)(2)'s mandate where it would override otherwise mandatory statutory duties." Natl. Ass. of Homebuilders v. Defenders of Wildlife, No. 06-340 (June 25, 2007). (Emphasis in original.)

This holding specifically controls the scope of the ESA's "no jeopardy" requirement, but it should also be read to control the scope of the "no adverse modification" requirement, since both requirements are in the same sentence of ESA §7(a)(2).

This new Supreme Court decision alters the legal framework for the development and selection of alternatives in WOPR. Since the O&C Act says all timberlands must be managed for sustained yield timber production, the BLM may not create reserves on O&C or CBWR lands to avoid jeopardizing a listed species, or to avoid adversely modifying critical habitat, since section 7(a)(2) of the ESA does not impliedly repeal the O&C Act's nondiscretionary mandate to implement sustained yield forestry on all timberlands. What remains subject to §7(a)(2)'s "no jeopardy/no adverse modification" requirement is the BLM's exercise of discretion in choosing the particulars of the sustained yield timber management it will employ. The BLM can and must seek to avoid jeopardy and adverse modification, but its effort in that regard must be consistent with the discretion allowed it under the O&C Act. This occasion is also a useful reminder that the BLM may only use its discretionary authority in contributing to the recovery of listed species pursuant to §7(a)(1) of the ESA. Thus, the limitations on the BLM are the same

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for both contributing to recovery and avoiding jeopardy under the ESA---the scope of discretion under the O&C Act limits and defines the BLM's obligations under the ESA.

The 9th Circuit Court of Appeals decision in Headwaters v. BLM, 914 F.2d 1174 (9th Cir. 1990) is the controlling interpretation of the O&C Act and the BLM must follow it. The opinion in that case identifies the purposes and goals of the O&C Act, which are the guideposts for identifying the extent of the BLM's management discretion. The opinion in that case at pages 1183-84 provides as follows:

> 1. The term "forest production" in the O&C Act means "timber production." Timber production is the "dominant use" for O&C lands.
>
> 2. "Exempting certain timber resources from harvesting to serve as wildlife habitat is inconsistent with the principle of sustained yield." (Emphasis added.)
>
> 3. "The purposes of the O&C Act were two-fold. First, the O&C Act was intended to provide the counties with the stream of revenue which had been promised but not delivered . . . Second, the O&C Act intended to halt previous practices of clear-cutting without reforestation, which was leading to a depletion of forest resources." * * * "Nowhere does the legislative history suggest that wildlife habitat conservation or conservation of old growth forest is a goal on a par with timber production, or indeed that it is a goal of the O&C Act at all." (Emphasis added.)

The O&C Act says that timber on the O&C lands shall be managed with the timber thereon sold, cut and removed on a sustained yield basis "for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." The Headwaters decision makes clear, through reference to the legislative history, that protecting watersheds, regulating stream flows, and providing recreation facilities were the expected outcomes from sustained yield timber management rather than separate goals that could compete with sustained yield timber management. Nevertheless, these projected outcomes are clues to the kind of management that BLM was expected to undertake to implement the sustained yield mandate of the O&C Act.

The limits of BLM's discretion are ascertained by reference to the terms of the O&C Act, on its face and as interpreted in the Headwaters decision, as well as by historic interpretations given the O&C Act by the BLM itself. For example, in a 1939 press release, less than two years after the O&C Act became the management mandate, the BLM's predecessor agency had a Chief O&C Forester, the equivalent of the BLM State Director, who described the newly adopted sustained yield forestry program in these words:

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"This assures the continuous production of timber for the employment of Oregon industries without the danger of exhausting the timber supply and without the danger of destroying the tax base of the counties." Press Release, March 31, 1939, W. H. Horning, O&C Chief Forester.

In 1940 the O&C Chief Forester elaborated, saying that "[a]ll the lands best suited for the growing of timber will be retained in public ownership and kept at work producing crops of timber. Continuous production of timber of commercial quality in the largest possible amount is the goal." W. H. Horning, The O&C Lands and their Management, an Important Advance in Forest Conservation (1940).

All of these indications suggest that the BLM's discretion when implementing sustained yield is narrowly bounded. The limited discretion under the O&C Act was preserved by Congress as recently as 1976, when Congress passed the Federal Land Policy and Management Act ("FLPMA"), which redefined the management direction for nearly all lands in the United States under the jurisdiction of the BLM, with the telling exception of lands managed under the O&C Act. FLPMA, P.L. 94-579, is a multiple use statute under which all uses for the land are given equal consideration, and the BLM has broad discretion to choosing the mix of uses it will adopt for lands managed under FLPMA. But Congress specifically preserved the dominance of timber production on the O&C lands by adopting section 701(b) of FLPMA, which says that "[n]otwithstanding any provision of this Act [FLPMA], in the event of conflict with or inconsistency between this Act and the . . .[O&C Act and Coos Bay Wagon Road Acts], insofar as they relate to management of timber resources, and the disposition of revenues from lands and resources, the latter Acts shall prevail."

In 1986 the Interior Solicitor was asked if the BLM had authority to implement a plan for the protection of spotted owls. The legal opinion differentiated between lands managed by the BLM pursuant to FLPMA, and lands managed pursuant to the O&C Act. The Solicitor's opinion describes the difference as follows:

"The freedom conferred on the Secretary under FLPMA is limited in one important way on certain federally-owned timberlands in western Oregon. There, any decision about managing northern spotted owls must be measured against the dominant use of timber production. * * * In deciding whether to establish a program for managing northern spotted owls on O&C timberlands, the Secretary, then, must decide if it is possible to do so without creating a conflict with the dominant use there—timber production. If the Secretary can manage northern spotted owls and still produce timber on a sustained yield basis in the O&C timberlands, the O&C Act in no way will preclude him from making that choice. * * * The converse, of course, also obtains. If a program for managing northern spotted owls conflicts with producing timber on a sustained yield basis in O&C

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> timberlands, the O&C Act will preclude the program's application to that realty." Gale Norton and Constance Harriman, Associate Solicitors, Memorandum to James Cason, Deputy Assistant Secretary for Land and Minerals Management (October 28, 1986).

The Association of O&C Counties does not, in these comments, offer a convenient description of the exact range of discretion we believe is consistent with the O&C Act, now that the constraints of the ESA cannot be viewed as a separate, modifying source of management authority by the BLM. It is clear that creation of reserves in which sustained yield timber production is not practiced is not allowed, but otherwise the boundary lines defining the BLM's discretion are not brightly drawn. Our comments below are guided by the purposes and goals of the O&C Act, as they are described in the paragraphs above. The BLM's discretion is defined by these same purposes and goals.

Minimum Harvest Levels

There is a continuing debate about whether the O&C Act specifies a minimum harvest level, and if so, what the minimum harvest level is. The O&C Act, 43 U.S.C. §1181a says the following:

> "The annual productive capacity for such lands shall be determined and declared as promptly as possible after August 28, 1937, but until such determination and declaration are made the average annual cut therefrom shall not exceed one-half billion feet board measure: *Provided*, That timber from said lands in an amount not less than one-half billion feet board measure, or not less than the annual sustained yield capacity when the same has been determined and declared, shall be sold annually, or so much thereof as can be sold at reasonable prices on a normal market." (Italics in original, underlining added.)

This language equates the "sustained yield" with the "annual productive capacity"---the two terms refer to the same thing. This strongly suggests that "sustained yield" is not something that is administratively determined by application of policy decisions from a wide range of discretionary options. Rather, it appears that that "sustained yield"---the annual productive capacity---is determined primarily by reference to biological factors associated with tree growth and mortality.

In Portland Audubon v. Babbitt, 998 F.2d 705 (9th Cir. 1993), one question presented was whether an injunction on timber sales pending compliance with NEPA was appropriate. The BLM argued that an injunction would prevent it from achieving a harvest level of 500 mmbf, which it argued was compelled by statute. The 9th Circuit said that the O&C Act "has not deprived the BLM of all discretion with regard to either the volume requirements of the Act or the management of the lands entrusted to its care." The Court rejected the BLMs argument that NEPA did not apply, based on the Court's understanding that NEPA "applies to all government actions having significant environmental impacts, even though the actions may be authorized by other legislation." Id. at 709. This interpretation of NEPA is no longer correct with regard to nondiscretionary actions. See Dept. of Transportation v. Public Citizen, 541 U.S. 752 (2004). Moreover, the 9th Circuit's statement in Portland Audubon about the BLM having at least some discretion under the O&C Act does not answer the question about how much discretion exists, nor does it definitively answer the question about minimum harvest levels that the BLM must attempt to achieve under the Act.

The 2003 Settlement

In August, 2003, a settlement agreement was reached in American Forest Resource Council v. Clarke that requires the BLM to revise six resource management plans in Western Oregon that are associated with the Northwest Forest Plan. The settlement agreement requires that at least one alternative be considered for each plan that does not utilize any reserves except as required to avoid jeopardy under the ESA. In addition, all new plans must be consistent with the O&C Act as interpreted by the 9th Circuit of Appeals in the Headwaters decision. The U.S. Supreme Court's Homebuilders decision establishing that section 7(a)(2) of the ESA does not modify or amend other, nondiscretionary statutory mandates, supercedes the settlement agreement in certain respects. To the extent that the settlement agreement can be read as suggesting that reserves are permissible on O&C lands to avoid jeopardizing listed species under the ESA, the settlement agreement is no longer consistent with applicable law. The second requirement of the settlement---that all plan revisions be consistent with the O&C Act as interpreted in the Headwaters decision---remains effective as a matter of contract, as well as a matter of statutory law.

EIS GENERAL COMMENTS:

None of the alternatives as presently written in the draft EIS meet the statutory requirements of the O&C Act. Management that would occur in LSMAs under Alternatives 1 and 2, and in LSRs in the No Action Alternative, would not provide timber production on a sustained yield basis. Instead, significant amounts of O&C and CBWR land would be set aside and reserved for the conservation and recovery of species listed under the ESA. Alternative 3 contains no wildlife reserves, but is designed to maintain and promote a mature and structurally complex forest on BLM lands across the landscape. The rotation ages proposed under Alternative 3 were selected, not by reference to the goals and purposes of the O&C Act, but for the purpose of benefiting wildlife, which is not a goal of the O&C Act at all. Under Alternative 3, timber production on a sustained yield basis would be significantly limited to achieve the overall goal of an old growth forest. While extended rotation ages might be permissible on some parcels, their widespread application under Alternative 3 is out of compliance with the

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purposes of the O&C Act. Viewing the landscape as a whole, one cannot say that timber production would be the "dominant use" under Alternative 3.

We believe that deficiencies in the alternatives and the draft EIS can be corrected in the final RMP/EIS without doing a supplemental EIS. This can be achieved by modifying Alternative 2 to incorporate the U.S. Supreme Court's limitations on the reach of the ESA, and correcting certain other existing inconsistencies with the O&C Act. All information and data necessary for final EIS analysis is currently available in the draft EIS. The following are suggested changes for Alternative 2:

1. Maintain existing LSMA allocation boundaries identified in Alternative 2, but do not withdraw or reserve these lands from sustained timber production. Instead, develop long term rotation age strategies within the LSMA boundaries that would contribute to the conservation and recovery of federally listed species, while also providing for regeneration harvesting on a sustained yield basis. We suggest using the long rotation ages contained in Alternative 3 within the areas currently identified as LSMAs, and using landscape targets for regeneration harvest within LSMA boundaries similar to requirements in Alternative 3.

2. Develop timber management objectives within LSMA boundaries that maintain and promote the development of suitable habitat for federally listed ESA species. Examples include thinnings and partial harvests that would hasten development of structurally complex forests within the LSMA boundaries. All timber harvested within the LSMAs is in the timber harvest base and the volume should be included in ASQ calculations.

3. The Secretary, apart from the WOPR process, should eliminate critical habitat designations on O&C and CBWR lands. The BLM cannot participate in a system of reserves on O&C and CBWR lands. USF&W, at the direction of the Secretary, should revise its proposed critical habitat designation to account for the BLM's non-discretionary mandates under the O&C Act.

4. Allow for green tree retention (legacy) trees within LSMA boundaries.

5. Establish continuous field survey and monitoring systems within LSMAs for all federally listed species. Determine whether a location is "actually occupied" based on confirmation of the physical presence of species using the site for nesting, roosting, or foraging (owls) or nesting (murrelets), but excluding locations where there are sightings of transient, dispersing birds.

6. Protect all sites (inside and outside of LSMAs) that are actually occupied by listed species by delaying regeneration harvest of sites for so long as sites are actually occupied. See definition of "actually occupied" in comment 5.

7. Allow salvaging in LSMAs for economic purposes with retention of legacy trees.

8. In areas south of Grants Pass and in the Klamath Falls resource area of the Lakeview District, apply uneven aged timber management principles where feasible to all BLM lands. This practice would reduce fire hazard and the acres of high severity fire when wildfires occur in these areas. It could also benefit suitable habitat conditions for ESA listed species.

9. Include in the sustained yield timber management base all Congressionally designated Wild and Scenic Rivers that have a scenic or recreation classification. Exclude only those rivers with a Congressional wild classification from the timber base. Include in the timber management base all rivers that have not been Congressionally designated. Any protections for riparian areas along Wild and Scenic rivers included within the timber base would be those riparian protections generally applicable for the land use allocation of the surrounding lands.

10. Withdraw O&C and CBWR lands located in the National Landscape System from sustained yield timber management only if they have a Congressional designation requiring protection.

11. Include all lands adjacent to the Coquille Tribal Forest in the sustained yield timber management base.

12. Maintain all other features for Alternative 2

13. Develop a sub-alternative for Alternative 2 that eliminates LSMA boundaries and establishes the maximum harvest that can be maintained in these areas without exceeding the amount of new growth.

SPECIFIC DRAFT EIS COMMENTS:

SUMMARY:

1. P. XLIV---Add a footnote regarding the Homebuilders decision by the U.S. Supreme Court, and explain that the ESA's requirements under section 7(a)(2) are not applicable to agency actions over which the BLM has no discretion under the O&C Act.

2. P. XLVI---Rewrite Alternative 2 summary consistent with the recommendations described above in these comments under the heading EIS General Comments.

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3. P. XLIX---Rewrite Figure 1 and Table 1 as they apply to Alternative 2, so that they reflect the revisions to Alternative 2 recommended above.

4. PP. L-LXVI---The summary of environmental consequences should be rewritten to reflect changes recommended for Alternative 2. In addition, the Marbled Murrelet section (p. LVIII) should be totally rewritten based on detailed comments presented below for Chapters 3 and 4.

5. P. LIII---Reconsider whether environmental justice considerations should be more extensively discussed. For example, Douglas County experiences very high levels of impacts depending on which alternative is selected by the BLM. At the same time, Douglas County has high levels of poverty, so that impacts from the BLM decisions will be experienced disproportionately by low income populations. While the median income in Douglas County rose 4.5 percent in 2006, the number of people living in poverty in Douglas County also rose at the same time, from 11.8 percent to 16 percent of the total population. There was a corresponding increase in the number of children living in poverty, so that currently more than 25 percent of all children in Douglas live in poverty, a shocking and disturbing statistic that might be sufficient to require a fuller environmental justice analysis.

CHAPTER 1---PURPOSE AND NEED

1. PP. 3-6---The purpose and need for the plan revisions should be revised to accurately reflect the law following the Supreme Court's Homebuilders decision. For example, on page 6, the current text states: "The statutory requirements of the O&C Act are limited by other statutes providing for the need to conserve listed species and the habitat they depend on, not jeopardizing listed species and not adversely modifying critical habitat . . . ." This is no longer an accurate statement of the law and must be revised. Other, similar statements should be modified as well.

2. P. 10---The last sentence of the 4th full paragraph states as follows with regard to the O&C Act: "Nor does it establish a minimum level of harvest or a minimum level of receipts." We agree that the O&C Act does not mandate a minimum level of receipts, but it does mandate a minimum harvest level. We request that you quote in full the second full paragraph of 43 U.S.C. §1181a. We recognize that the decision in Portland Audubon v. Babbitt, 998 F.2d 705 (9th Cir. 1993) states that the BLM does not completely lack discretion with regard to harvest levels, and that therefore an injunction to compel compliance with a procedural statute was not precluded by the O&C Act. But that is a limited holding (see discussion above) that cannot be said to eliminate the minimum harvest level requirements stated in the Act as they are applicable to the BLM.

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2. P. 11---The section describing the ESA must be corrected to reflect the Supreme Court's ruling in the Homebuilder's case. It is no longer true that section 7(a)(2) requires the BLM to take actions that are inconsistent with the O&C Act's nondiscretionary mandates. As with obligations under section 7(a)(1), the BLM may only respond to section 7(a)(2) in ways that are consistent with the requirements of the O&C Act.

3. P. 23---The section titled "Endangered Species Act Section 7 Consultation" must be rewritten to reflect the Supreme Court decision distinguishing between discretionary and non-discretionary actions proposed by an action agency.

CHAPTER 2---ALTERNATIVES:

1. PP. 43-44---National Landscape Conservation System section should be re-written to include only those management actions that are consistent with the O&C Act or specific Congressional designation. For example, on Congressionally designated Wild and Scenic rivers with a scenic or recreation classification, timber harvest is allowed, and lands with such classifications should be a part of the timber base for sustained yield calculations. Only sections of rivers with Congressional wild classifications are properly withdrawn from timber harvest. The BLM lacks authority to withdraw O&C and CBWR lands from timber production on an interim basis while Congress is considering eligibility of candidate areas for inclusion in Wild and Scenic system.

2. P. 45---Management actions associated with the Mt. Hood Corridor need to be re-examined for consistency with the O&C Act. Unless Congressionally designated, timber harvest should not be excluded.

3. PP. 46-47---Management objectives and management actions associated with federal and state listed plant species should be rewritten to reflect the Supreme Court decision regarding Section 7 of the ESA. The BLM should consider strategically placed green tree retention as a means of protecting localized plant populations in harvest units.

4. PP. 60-61---Management objectives and management actions associated with listed wildlife species must be rewritten to reflect the limitation on the ESA in light of the Homebuilders decision.

5. PP. 65-75---The discussion regarding the No Action Alternative and Alternative 1 should make clear that excluding the LSRs from sustained yield timber production can no longer be justified as being necessary to comply with the ESA.

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6. PP. 76-89---Alternative 2 discussion needs to be modified and rewritten to incorporate the Supreme Court's ruling in the Homebuilders case. The discussion must distinguish between the Agency's non-discretionary and discretionary actions. (See the 13 specific suggestions discussed above for Alternative 2 in the section labeled "EIS General Comments.")

CHAPTER 3---MARBLED MURRELET, AFFECTED ENVIRONMENT, PAGES 297-308

1. Table 90 identifies 890,000 habitat capable acres of BLM land within the planning area that could potentially become nesting habitat for Marbled Murrelets. Additionally, 373,000 acres are identified as nesting habitat available today. Table 90 fails to accurately portray the effected environment from a landscape perspective within the planning area for the species and should be modified to include the following information:

    a. Add a column that identifies total federal and state habitat capable acres within the planning area that could potentially become nesting habitat for the species. Show percentage of total habitat under BLM administration.

    b. Add columns that break down total federal and state capable acres by zone 1 and zone 2, and show percentage of acres under BLM.

    c. Add columns that break down total available habitat by ownership within the planning area by zone, distinguishing between mature and structurally complex forest, and showing percentage of BLM acres in each.

2. All BLM forest acres capable of growing trees within zone 1 and 2 are included as habitat capable acres for Marbled Murrelets. No other factors were included for determining suitable habitat for nesting other than growing a mature and structurally complex forest on BLM lands in proximity to a marine environment. The EIS fails to adequately describe the many other factors that must be considered in determining the capability of O&C lands to support nesting by the species. The effected environment section for Marbled Murrelets needs to be rewritten to include the following information:

    a. The Marbled Murrelet recovery plan and proposed critical habitat rule have identified that the species requires large contiguous blocks of mature and structurally complex forest habitat with low amounts of edge and fragmentation and located far from human activity for successful nesting and fledging of young. BLM's checkerboard and fragmented land ownership is a significant constraint on the ability of BLM lands to contribute to the recovery of the species by providing nesting habitat meeting these criteria. Large patches of structurally complex forest habitat with low amounts of edge do not exist on these lands.

b. O&C and CBWR lands are located across the landscape in a checkerboard pattern with mostly private industrial lands in zones 1 and 2. Most mature and structurally complex forest habitat has been eliminated on private lands. In addition, regenerated forests on most private lands are planned for timber harvest prior to obtaining the forest characteristics of an older forest. Suitable habitat loss on private lands must, therefore, be considered permanent.

c. Large contiguous blocks of forests within zone 1 and 2 are located on the National Forest lands and on the Tillamook and Elliott State Forests

d. Marbled Murrelets are very sensitive to fragmentation and reproductive success is adversely affected by fragmentation. Large amounts of edge and fragmentation also result in increased populations of nest predators; increased visibility and vulnerability of flying or nesting adults to potential predators; and changes in microclimate regimes that stress the species.

e. The EIS (page 302) states that Marbled Murrelets nest in landscapes with large stands with less edge and farther from logged areas. It further states that patches of suitable nesting trees of only a few acres with only a few nesting trees are thought to be capable of supporting Marbled Murrelet nesting which is contrary to the large contiguous block requirement stated above. Is this a conclusion based on scientific evidence or is it just an opinion based on little to no evidence? The EIS should provide support for this statement.

3. The EIS does not adequately describe occupancy and actual use by the species on BLM lands in zones 1 and 2. Occupancy is determined by survey protocol that is based on the behavior of the species, but there is no discussion about actual use. Questions need to be answered about what nesting activities have actually been confirmed on the BLM lands. A source of information on this subject can be found on page 52 in the Marbled Murrelet recovery plan. For areas of known occupancy and use, the EIS should provide a detailed description of suitable habitat that includes size of stand, amounts of fragmentation, stand and nest tree characteristics and the occupied parcel's relationship to these criteria. Also, the EIS should describe whether nesting and fledging of young was successful or, if not, what caused failure. As an example, the recovery plan identified the "Valley of the Giants" (BLM) as an active but failed nesting area. This is an old growth parcel laying in a fragmented checkerboard ownership that contains some of the

oldest Douglas Fir trees in the Coast Range. Nest failure occurred because of egg predation.

4. In areas determined to be occupied by survey, what protocol was used for making a determination? Provide information in the form of a table and narrative showing occupied acres determined by different protocols. For example, the Coos Bay district had identified 19,775 acres as occupied by original protocol used until 2003. 1,447 acres have subsequently been added with a new protocol through 2006. Are acres identified under the old protocol still valid? If so, why? In addition, what documented follow-up studies based on field examination have been conducted on occupied lands that confirm that these areas are actually being used for nesting or have stand and nest tree characteristics that allows the parcel to be suitable for nesting.

CHAPTER 3--- EFFECTED ENVIRONMENT (Miscellaneous Comments)

1. P. 262---Neither Bureau Sensitive Species, Bureau Assessment Species nor federal candidate species on O&C and CBWR lands can receive management protections that are inconsistent with sustained yield timber management..

2. P. 317---Bureau Sensitive Species on O&C and CBWR must be managed consistent with sustained yield timber production under the O&C Act.

3. PP. 422-424---The section concerning the National Landscape Conservation System should be revised to make clear that management within these lands will include sustained yield timber production under the O&C Act unless specific areas have received a Congressional designation that precludes such timber management.

4. Add a discussion of environmental justice for rural counties. The discussion should focus on levels of poverty and economic impacts on those at or near the poverty line that would result from each of the alternatives.

CHAPTER 4---ENVIRONMENTAL CONSEQUENCES, PAGES 473-793

All sections in this chapter need to be revised to disclose environmental consequences resulting from addressing the Homebuilders decision by the Supreme Court as described above and other recommended changes identified above for Chapters 1 through 3. Significant modifications need to occur in sections on Socio-economics, Timber, Botany, Wildlife, Fire and Fuels, and the National Landscape Conservation System. The section on Environmental Justice should be updated with statistics more current than the 2000 census data used in the draft EIS. There should be additional discussion of how those living at or near the poverty line are affected by the employment prospects associated with each alternative, and how those populations are affected by the level of county services that would be available or not, depending on the shared timber receipts associated with each alternative.

CHAPTER 4---MARBLED MURRELET PAGES, PAGES 674-682

The environmental consequences analysis is deficient and its conclusions are not supported by existing scientific data that can be found in the recovery plan or the critical habitat rule. The results described in the draft EIS are based on the growing of trees into mature and structurally complex forests on 891,000 acres of BLM lands within zones 1 and 2. Suitable nesting habitat, quality and quantity, cannot be based solely on this one factor. This analysis needs to be rewritten to reflect a more accurate depiction of the BLM lands' physical and biological capabilities to provide suitable nesting habitat for the species. (See comments above for Chapter 3, Marbled Murrelets.) The analysis in the EIS must address the affects of each of the nesting habitat issues listed below. Analysis of these issues must examine effects from a landscape perspective, as well as from the more limited BLM ownership perspective:

1. BLM's checkerboard ownership pattern and its ability to provide large contiguous blocks of mature and structurally complex forest habitat for nesting is limited. Use as a foundation data described on pages 13, 17, 68 and 183-191 of the draft EIS. For example, page 189 states that BLM's ability to influence resource outcomes often depends upon the amount and location of its land ownership in relation to a particular resource. In addition, page 191 states that most of the BLM lands comprise less than one-third of a 5th field watershed. By contrast, most of the lands managed by the Forest Service are in large contiguous blocks.

2. The BLM's ability to provide habitat with low amounts of edge and fragmentation, far away from human activity that has suitable nesting characteristics is limited.

3. Marbled Murrelets are very sensitive to fragmentation and reproductive success is adversely affected by fragmentation. Given BLM's scattered ownership in zones 1 and 2, how does this affect BLM's ability contribute to conservation and recovery of the species? Conversely, given the large contiguous blocks managed by the Forest Service, how does this affect its contribution to recovery?

4. Environmental consequences associated with reserving occupied sites based solely on survey needs to be addressed. Are these occupied sites being actually used for nesting or does the area really offer potential based on the above factors and requirements for suitable nesting habitat?

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5. Increases/decreases in Marbled Murrelet nesting habitat for any alternative must be based on the habitat requirements of the species and not just on the capability of growing trees overtime. Tables for zone 1 and 2 should be developed to show suitable nesting habitat (quality and quantity) overtime by ownership at the landscape level.

VOLUME 3

1. PP. A930-A932---Add a complete discussion of the Homebuilders decision by the U.S. Supreme Court and how it affects nondiscretionary actions by the BLM.

2. PP. A933-A934--- Add a discussion of the savings provision in FLPMA preserving the dominance of the O&C Act with regard to management of timber resources.

3. P. A931---The discussion of Portland Audubon includes the following statement: "The Court also found that the O&C Act did not establish a minimum volume that must be offered every year notwithstanding any other law." What the court actually said was the O&C Act "has not deprived the BLM of all discretion with regard to either the volume requirements of the Act or the management of the lands entrusted to its care."

Thank you for considering our comments.

THE ASSOCIATION OF O&C COUNTIES

By:____________________
Kevin Q. Davis, Attorney for the Association

cc: Dick Prather

1520

RECEIVED

JAN 0 2 2008

CLACKAMAS COUNTY

Martha Schrader
Chair

Lynn Peterson
Commissioner

Bill Kennemer
Commissioner

BOARD OF COUNTY COMMISSIONERS

PUBLIC SERVICES BUILDING
2051 KAEN ROAD | OREGON CITY, OR 97045

December 20, 2007

Edward Shepard
OR/WA State Director
Western Oregon Plan Revisions
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

Re: Western Oregon Plan Revisions

Dear OR/WA State Director Shepard:

We, the Clackamas County Commissioners, have reviewed the Draft Environmental Impact Statement (DEIS) for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts. We appreciate the work that has gone into the WOPR process over the past few years, including scoping, development of alternatives, and the detailed analysis of effects described in the DEIS. The workshops, open houses, and web site information available since the release of the DEIS and the extended comment period are evidence of your commitment to informing the public and cooperating agencies while giving adequate time for thoughtful commentary.

After review and consideration of anticipated effects of each proposed alternative, we would like to lend our support to Alternative 2. Of the proposed alternatives, we believe that Alternative 2 best meets the intent of the O&C Lands Act of 1937 for these lands to be managed in permanent forest production under the principles of sustained yield providing economic benefit to local communities. We believe that Alternative 2 proposes a management scheme that will grow and produce forest products in a sustainable manner while protecting other resource values such as wildlife, fish, and clean water. The income to Clackamas County via payments from timber receipts is important for providing some local county services in our county as well as the other O&C counties. We have adopted a resolution in support of Alternative 2, a copy of which is included and which has been transmitted to the Association of O&C Counties.

While we support the selection of Alternative 2, we would like to point out some particular concerns we have identified through discussion with County staff and citizens.

Concern 1: Identification of revenue replacement for the Secure Rural Schools and Community Self Determination Act safety net payments is important. Clackamas County is supportive of identifying revenues to replace the anticipated loss of Secure Rural Schools funding, but it is also important that projects be implemented in a way sustainable to both the timber harvest and the other resources the forest provides. We would ask the BLM to encourage all of the O&C counties to continue to look at other potential sources of revenue including revenue generated through tourism and recreation.

Concern 2: Revenues from the timber harvest on BLM land could be processed under "Stewardship Contracts" and would not be returned to the Counties.

P. 503.655.8581 | F. 503.742.5919 | WWW.CO.CLACKAMAS.OR.US

While we recognize that stewardship contracting is a good tool in the right situation, we are concerned that it would reduce the revenue generated from timber harvest and thus reduce the portion of revenue returned to the Counties. If stewardship contracting is used to implement some resource management projects, the Counties should still receive an equal amount of revenue as they would have with a traditional timber sale.

Concern 3: Protection of endangered species habitat and improving forest health is critical.
Clackamas County supports harvesting of timber when it is balanced with science-based protection of endangered species. Managing of public forests should be conducted in a sustainable and ecologically sound manner. We strongly support and encourage focusing on thinning of plantation stands, which would help to address fuel reduction concerns in fire-prone and over-stocked plantation areas.

Concern 4: Adequate riparian buffer areas are important for protection of fish, water, wildlife, and soil resources.
While we support Alternative 2, we are concerned that the minimum riparian widths may be applied to all projects. Each forest management project should be reviewed on an individual basis so that the appropriate riparian corridor width is applied to each site. We have particular concern in areas of unstable slopes and soils. It is important that the minimum protection width is not relied upon as the standard, but instead the appropriate protection be applied on a site-by-site basis.

Concern 5: Timber harvest on properties adjacent to small private landowners can be controversial.
Some of the BLM-managed lands in Clackamas County are in smaller tracts scattered in the western foothills of the Cascades. Many of these tracts border properties owned by private, rural landowners. As you know, these neighbors can be very sensitive to management activities, especially timber harvest. An article in the August 16, 2007 Clackamas County Weekly section of *The Oregonian* titled "Living – for now – in paradise" described some of the issues arising from management of small BLM parcels in the rural landscape of eastern Clackamas County. Our Clackamas County Forest Program has made it a point to contact and work with neighboring landowners when proposing timber harvest on our county-owned forest lands. This has been a successful strategy for several years. We suggest that Salem District planners employ this strategy when proposing timber harvest on BLM-managed lands adjacent to smaller, private landowners. We would be happy to provide contact information for those adjacent landowners in Clackamas County to Salem District planners.

Thank you for extending the public comment period and giving us the opportunity to comment on the DEIS. We look forward to finalization of the western Oregon resource management plan revisions and subsequent implementation of the selected alternative.

Sincerely,

Martha Schrader, Chair
Clackamas County Board of Commissioners

BEFORE THE BOARD OF COUNTY COMMISSIONERS

1520.2

OF CLACKAMAS COUNTY, STATE OF OREGON

In re: New BLM Resource Management Plans for O&C and Related Lands in Western Oregon

Resolution No.: 2007-622
Page 1 of 3

WHEREAS, The BLM is revising its land management plans for western Oregon, updating plans for an area that comprises about 10 percent of the area covered by the Northwest Forest Plan, and

WHEREAS, most of the planning area is governed by the O&C Act of 1937, which requires the BLM to manage for permanent forest production to provide economic benefit to local communities, while protecting watersheds, regulating streamflows, and providing recreation facilities. The draft plan analyzes the potential impacts of three management alternatives, and

WHEREAS, the BLM's Alternative 2 would produce about 727 million board feet of harvest annually, in perpetuity. Receipts from sales of this timber would replace about 94 percent of the revenue that will be lost when the current Secure Rural Schools and Community Self Determination Act safety net payments terminate in the near future, and

WHEREAS, the O&C lands were once in private ownership, but were taken back by the federal government, and thus removed from county tax rolls. To compensate, fifty percent of timber receipts go directly to the 18 western Oregon Counties, to be used as discretionary funds for services such as libraries, law enforcement, corrections, public health services, and recreation. O&C revenues provide a substantial and irreplaceable part of the discretionary budget for this County, and

WHEREAS, the BLM's proposed plans are the result of the most detailed and comprehensive analysis ever completed on federal lands in western Oregon. The analysis is supported by the latest biological studies, updated resource data, and new modeling tools, and

WHEREAS, the BLM and U.S. Fish and Wildlife Service have ensured that the BLM's draft plans, the Northern Spotted Owl Recovery Plan, and the draft Critical Habitat Rule are consistent. At least 46 percent of the forested BLM lands would be reserved to perpetuate forests with old growth characteristics, and the remaining 54 percent would provide substantial additional acreage of mature and structurally complex forest, while being managed with care to insure no more is harvested than is replaced by new growth Alternative 2 meets all the requirements of the Endangered Species Act to protect and help recover all listed species of fish and wildlife, as well as complying with all other environmental laws such as the Clean Water Act and Clean Air Act, and protecting recreational opportunities and facilities.

WHEREAS, Clackamas County has asked the BLM to consider and address the following concerns during the course of finalization of the western Oregon resource management plans.

CCP-PW25 (3/94)

BEFORE THE BOARD OF COUNTY COMMISSIONERS

OF CLACKAMAS COUNTY, STATE OF OREGON

In re: New BLM Resource Management Plans for O&C and Related Lands in Western Oregon

Resolution No.: 2007-622

Concern 1: Identification of revenue replacement for the Secure Rural Schools and Community Self Determination Act safety net payments is important.
Clackamas County is supportive of identifying revenues to replace the anticipated loss of Secure Rural Schools funding, but it is also important that projects be implemented in a way sustainable to both the timber harvest and the other resources the forest provides. We would ask the BLM to encourage all of the O&C counties to continue to look at other potential sources of revenue including revenue generated through tourism and recreation.

Concern 2: Revenues from the timber harvest on BLM land could be processed under "Stewardship Contracts" and would not be returned to the Counties.
While we recognize that stewardship contracting is a good tool in the right situation, we are concerned that it would reduce the revenue generated from timber harvest and thus reduce the portion of revenue returned to the Counties. If stewardship contracting is used to implement some resource management projects, the Counties should still receive an equal amount of revenue as they would have with a traditional timber sale.

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Clackamas County supports harvesting of timber when it is balanced with science-based protection of endangered species. Managing of public forests should be conducted in a sustainable and ecologically sound manner. We strongly support and encourage focusing on thinning of plantation stands, which would help to address fuel reduction concerns in fire-prone and over-stocked plantation areas.

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While we support Alternative 2, we are concerned that the minimum riparian widths may be applied to all projects. Each forest management project should be reviewed on an individual basis so that the appropriate riparian corridor width is applied to each site. We have particular concern in areas of unstable slopes and soils. It is important that the minimum protection width is not relied upon as the standard, but instead the appropriate protection be applied on a site-by-site basis.

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CCP-PW25 (3/94)

BEFORE THE BOARD OF COUNTY COMMISSIONERS
OF CLACKAMAS COUNTY, STATE OF OREGON

In re: New BLM Resource Management Plans for O&C and Related Lands in Western Oregon

Resolution No.: 2007-622
Page 3 of 3

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NOW, THEREFORE, be it resolved that:

Clackamas County supports Alternative 2 in the BLM's draft plans, and urges the BLM to select Alternative 2 as the BLM's final plan, and to proceed as expeditiously as possible in the completion and implementation of its plan revisions. A copy of this Resolution shall be transmitted to the Association of O&C Counties for submission to the BLM.

ADOPTED this 20th day of December, 2007.

CLACKAMAS COUNTY BOARD OF COMMISSIONERS

Chair

Mary Raethke
Recording Secretary

CCP-PW25 (3/94)

881

KLAMATH COUNTY
Home of Crater Lake
Klamath County Commissioners
305 Main Street, Klamath Falls, Oregon 97601
Phone: 541.883-5100 Fax: 541.883-5163
Email: bocc@co.klamath.or.us

881

Al Switzer, Commissioner
Position One

John Elliott, Chairman
Position Two

Bill Brown, Commissioner
Position Three

Received
NOV 02 2007
State Director's Office

October 30, 2007

RECEIVED
NOV 05 2007

Mr. Edward W. Shepard, State Director
USDI Bureau of Land Management
Western Oregon Plan Revisions
PO Box 2965
Portland, OR 97208

Dear Mr. Shepard:

The Klamath County Board of Commissioners strongly supports your selection of Alternative Two from the array of four alternatives presented in your Draft Environ-mental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts.

We appreciate your extensive social-economic analysis and wish to comment on the economic impact of federal forest management decisions.

Historically, the western Oregon counties, including the O&C Counties, derived a large percentage of their economic well being from the wood products industry. That is what we do here. The temperate forests of Oregon are among the most productive in the world and still have the potential to provide large volumes of commercial wood to meet local, regional and world wood needs. At present, federal forests support nearly half of the nation's standing softwood inventory but supply less than two percent of the nation's wood needs. The "wood famine" predicted at the end of the 19th and beginning of the 20th centuries has not occurred, nor is it likely to. Globally, there is plenty of wood. The United States has found it easy to satisfy its wood needs from non-federal domestic forests and, increasingly, from foreign sources. About a third of our softwood use is now sourced from outside the country.

Your proposed alternative would be a small but very positive step in a return to U.S. wood self-sufficiency while at the same time securing economic stability for the large part of rural Oregon that is uniquely situated to produce high value wood products.

BLM DEIS Response-page 2

The BLM manages 16% of the saw timber in western Oregon and as recently as the 1970s supplied a similar fraction of the area's timber harvest. That harvest has now fallen to just over three percent of the total harvest

from the western Oregon planning area, with predictable effects on local economies. The Secure Rural Schools Act funded the timber-dependant counties on an interim basis but the rest of the nation hasn't, nor should it have, the patience to continue to fund rural western counties within whose boundaries exists the huge wealth of the federal forests, including the O&C lands.

We strongly support a resumption of intelligent, productive timber management and production on all of the federal forestlands and certainly on those administered by the BLM in western Oregon. We also encourage wood production on a far larger portion than the 48% land use allocation under Alternative Two. Regeneration cutting should be prescribed only on those forest types that require such management and a more diameter-diverse regime prescribed elsewhere, and outside the 48% allocated to timber manage-ment, to maintain visual values, habitat for the largest number of native species and to produce the most fire resistant landscape possible.

We appreciate that the BLM has not used nor has it proposed artificial diameter-limit cutting and can remove trees of all values across the diameter spectrum to meet the needs of the forest and economic realities as well. It's time to do much more of that.

We believe that the American people, and Oregonians in particular, would be displeased if they were fully aware of the asset value of the federal forests and the actual economic return they provide the taxpayers. Currently, the economic return from the federal lands is negative. Costs exceed returns while the counties in which the federal lands lie curtail or eliminate services to their citizens while the huge value of potential federal timber production and sale remains generally untapped. It didn't use to be this way and doesn't need to be now or in the future. We are approaching a time when the rest of the planet will tire of the U.S. sitting on its timber wealth while other nations supply our needs.

Absent a sustained and productive timber management and sale program on the O&C and other western Oregon BLM lands, we strongly encourage sale of at least half of the O&C lands to the private sector as described in the proposed National Forest and Schools Stabilization Act written by the boards of commissioners of the Oregon O&C counties and published on December 8, 2006 (copy attached).

We appreciate this opportunity to comment on the DEIS and request that our remarks be included in your comment record.

Very truly yours,

John Elliott, Chairman

Al Switzer, Commissioner

Bill Brown, Commissioner

881.2

NATIONAL FOREST COUNTIES AND SCHOOLS STABILIZATION ACT

A Proposed Safety Net Solution

December 8, 2006

The expiration of the county and schools safety net, PL 106-393, is a source of grave and growing concern among counties and school districts not only in Oregon, but in 39 other states representing 780 counties and over 4,000 school districts. There has been considerable bi-partisan effort over the last two years to find an acceptable budget offset for an extension of PL 106-393, but no solution has been found, and there appears to be none on the horizon. Counties and school districts nationwide are beginning to implement budget cuts that will eliminate thousands of jobs and reduce services and classrooms dramatically.

Conventional thinking has proven inadequate. It is clearly time for creativity and leadership to identify a bold but reasonable solution to this problem on a long-term basis. The Association of Oregon and California Railroad Land Grant (O&C) Counties Board of Directors offers this proposal for your consideration. Not only is there a pending crisis for schools and counties, but there is also a new effort to recover the spotted owl and the marbled murrelet. Timing is extremely important for all efforts of this kind, and our proposal takes these events and circumstances into account.

The proposal must be viewed in the unique historical context of the O&C lands. The revested O&C Railroad grant lands and related BLM lands in Oregon contain approximately 2.4 million acres, and approximately 80 billion board feet of standing timber. The revested O&C Railroad grant lands were originally all in private ownership for many years, having been conveyed to the O&C Railroad Company in exchange for construction of a railroad. But the lands were not re-sold by the Railroad Company to actual settlers as Congress intended, so after decades of ownership by the Railroad they were taken back ("revested") into federal ownership, with the intent the federal government would sell the lands in small parcels so that they could again be returned to the private sector. That resale program was eventually converted to a retention and management program, but unlike national forest lands, Congress mandated that the O&C lands be managed for timber production on a sustained yield basis for the benefit of local communities.

While solutions are scarce, the problems are easy to state: Counties and schools nationwide need a permanent source of funding to replace decades of reliance on shared timber receipts. Oregon's schools, in particular, need funding assistance. Oregon Counties in the region of the O&C lands are in a particularly dire situation, as they have depended on shared timber receipts from national forest lands for road funds, and separately they have relied on shared receipts from the O&C lands to support general county services of all kinds. Over the last 15 years these historic programs have been undercut by drastically declining timber receipts, while battles continue to rage over the associated environmental issues and proposals to insure permanent protection for forested wildlife habitats. The proposal offered by the O&C Board addresses each of these problems, including solutions to problems on both a local and a national scale.

The proposal is to permanently protect approximately 1.2 million acres of O&C and related lands as wildlife habitat, and to sell the remaining O&C lands to generate funds for the creation of four permanent trust funds. Approximately 1.2 million acres would be permanently set aside and managed for recovery of the spotted owl and marbled murrelet and other environmentally sensitive species, far in excess of the amount of O&C land currently designated as late successional reserves under the Northwest Forest Plan. This would create one of the largest single additions to protected lands status within the Untied States in the last 30 years. These protected lands would remain under the jurisdiction of the BLM and a trust fund would be established to ensure resources for management of these protected lands.

The remaining O&C lands would be sold into the private sector in an orderly fashion over a period of time. There are approximately 80 billion board feet of timber on the 2.4 million acres. In rough terms, one-half of that volume (40 billion board feet) at $300 per thousand board feet (which is a very conservative estimate of value) would produce approximately $12.0 billion. The lands returning to private ownership would retain public access for hunting, fishing, and other recreational pursuits, and would remain in a permanent timber production status.

The revenues from the sale of O&C land and timber would be used to create a trust fund (Fund A) of approximately $4.0 billion for a permanent extension of a safety net similar to PL 106-393, benefiting all states, counties and school districts that have national forests within their boundaries. Payments to counties based on historic shared receipts from the O&C lands would be removed from the safety net and treated separately. The investment earnings of Fund A combined with ongoing Forest Service receipts would produce about the same amount of revenues for national forest schools and counties as have been provided in recent years by PL 106-393. A separate trust fund (Fund B) of approximately $4.0 billion would be created to provide on-going revenues for the general funds of the O&C counties, with investment earnings generating annual payments approximately equal to amounts currently being provided by PL 106-393 to the O&C Counties. In addition, a third trust fund (Fund C) of approximately $3.0 billion would be created and specifically dedicated to education in the state of Oregon to be managed and administered by the state legislature and Governor. A fourth trust fund (Fund D) would produce investment income for the BLM's continued management of the 1.2 million acres of preservation lands. Fund D would be funded with the balance of the land sale proceeds in excess of the amounts necessary for Funds A, B and C. Fund D would likely be capitalized with not less than $1.0 billion.

This proposal is not the first of it kind. The BLM has sold many parcels into the private sector over the years. Indeed, most of the western two-thirds of the country that is in private ownership is land that was once owned by the federal government. In fact---as described above, these very lands proposed for sale were themselves once in private ownership and would have remained that way but for unique twists of history. Currently, there are two separate but similar proposals in congress (S 3772, and S 3636/HR5769) that are the inspiration and model for this proposal, albeit on a smaller scale. The pending bills would result in BLM land sales in Utah and Nevada and expansion of wilderness areas in both states. The Washington County Utah Growth and Conservation Act of 2006, HR 5769 and S 3636, and the White Pine County Nevada Conservation, Recreation and Development Act of 2006, S 3772, are just two examples in along history of federal land sales and consolidation of federal ownerships to achieve preservation goals.

This proposal, if implemented, would produce several very desirable results. First, of course, it would produce the resources to capitalize the trust funds. This would create stability for schools and counties in our resource dependent communities all across the country, with particular emphasis on support for schools in Oregon. It would also lead to a predictable source of timber for a healthy, viable industry in western Oregon. Job growth in the industry in Oregon would be substantial. And although it would make use of only one-half of the current O&C land base, at least those lands would fulfill the intent of the O&C Act. At the same time, the endless battle over management of the O&C lands would end, with substantially more acres in a permanently protected status than are currently protected as late successional reserves. Funding would be readily available to insure that the BLM's ongoing management of the preserved O&C lands could accomplish the recovery of threatened and endangered species as rapidly as science, technology and nature would permit.

To restate the proposal in simplified form:

<u>THE PROSPOSAL</u>

1.2 million BLM acres in the O&C region placed into a reserve and managed by BLM under FLPMA excluding Sec. 701(b), the O&C Act savings provision. The O&C Act would be repealed.

1.2 million BLM acres in the O&C region sold to the private sector for permanent timber production with public access retained at the current level.

The 1.2 million acres retained by the federal government would provide recovery for the spotted owl and its habitat as required, as well as protecting other high value environmentally sensitive areas including stands of old growth timber.

The 1.2 million acres sold to the private sector for permanent timber production would capitalize four trust funds.

Trust Fund A equal to 33.3% of the total sale of the 1.2 million acres returned to the private sector would go to an irreducible Secure Rural Schools and Communities Self-Determination Act (National Forest counties and schools) trust fund.

Trust Fund B equal to 33.3% of the total sale of the 1.2 million acres returned to the private sector would go to an irreducible O&C Land Grant Counties trust fund.

Trust Fund C equal to 25% of the total sale of the 1.2 million acres returned to the private sector would go to an irreducible Oregon school trust fund managed by the legislature and Governor.

Trust Fund D equal to 8.4 % of the total sale of the 1.2 million acres returned to the private sector would go to an irreducible trust fund in favor of BLM to manage the 1.2 million acres of lands retained in a federal reserve for the benefit of the spotted owl and high value areas including old growth.

A commission or council similar to the Congressional authorized "Forest Counties Payment Committee" or the "Military Base Closure Commission" would be created to identify the O&C RR grant lands to be sold and returned to private ownership within one year of authorization, with the recommendations implemented by congressional action.

CITY OF Salem
AT YOUR SERVICE
PUBLIC WORKS FIELD OFFICE
1410 20th Street SE, Bldg #2 • Salem, OR 97302-1200 • (503) 588-6063 • Fax (503) 588-6480

1761

January 8, 2008

RECEIVED
JAN 0 9 2008

Western Oregon Plan Revisions

P.O. Box 2965

Portland, OR 97208

SUBJECT: **COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)**

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

This letter shall serve as the City of Salem's formal comment on the U.S. Department of the Interior Bureau of Land Management's (BLM) Draft Environmental Impact Statement (EIS) for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts.

The City of Salem provides drinking water to over 180,000 customers and relies on the predictable high quality source water from the North Santiam River as its primary source. Therefore, the City's primary concern with any management plan affecting land within the North Santiam River watershed is the resulting impact on downstream water quality. The City has generally been in support of the current Northwest Forest Plan management techniques and believes that the work being conducted by BLM staff in the Cascade Resource Region follows the guidelines and meets the goals of the current plan. However, the City is concerned that the Draft EIS for the revised Resource Management Plan deviates from previous water quality protection goals of the Northwest Forest Plan. The United States Department of Agriculture Forest Service (USFS) has published the "First-Decade Results of the Northwest Forest Plan"[1], which found that watershed conditions overall did improve slightly in this short period by adhering to the current plan.

Research published in the Draft EIS suggests that if there is more than 25-100 feet of filtering strip between unprotected soil surfaces, there is usually not a risk of transporting sediment to streams[2]. The City believes a greater stream buffer width is needed to ensure that sediment is trapped in the forest floor duff and vegetation. Belt et. al. (1992) reported that filter strips on

[1] First-Decade Results of the Northwest Forest Plan. www.fs.fed.us/pnw/publications/gtr720/pnw-gtr720.pdf
[2] Oregon State Office, 2007. Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts. Volume 1. Pg 373.

❖ ADA Acommodations Will Be Provided Upon Request ❖

the order of 200-300 feet are generally effective in controlling sediment that is not channelized[3]. In addition, the City is concerned about the potential impact on sediment load on watershed streams by increasing the number of acres of regeneration harvest. The No Action Alternative would continue regeneration harvest at 60,500 acres, where Alternative 2 increases regeneration harvest to 143,400 acres. A portion of these cuts would disturb previously protected stream filter strips and potentially adversely affect stream water quality. Stream bank erosion has been shown to increase 250% over pre-harvest levels after clear-cutting, but only 32% over pre-harvest levels where buffer strips were utilized (Belt et.al., 1992).

The City of Salem is concerned that this revised plan proposal reduces the protection of water quality in the North Santiam River watershed. The City believes the revised plan fails to adequately protect water quality for Salem's drinking water source by reducing stream buffer widths and increasing regeneration harvesting volumes. The City would prefer that BLM continue to use current stream filter strips similar to the distances in the No Action Alternative. The findings in the USFS Northwest Forest Plan report are encouraging, but it will take BLM's current forest management and more time for the forest to gain complex structure to see the full potential of benefits to water quality and habitat.

Sincerely,

Sophia Hobet

Water Services Manager

KMD/SCM:G:\FILES\CHRONO\2008\SH 010808 Comments on Draft Environmental Impact Statement.docx

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[3] Belt, G., O'Laughlin, and Merrill, T., 1992. Design of Forest Riparian Buffer Strips for the Protection of Water Quality: Analysis of Scientific Literature. University of Idaho. www.uidaho.edu/cfwr/pag/pagr8.html

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NOV 21 2007

CITY OF NORTH BEND

City of North Bend

Post Office Box B • North Bend, OR 97459-0014 • Phone: (541) 756-8500 • FAX: (541) 756-8527

November 13, 2007

Edward W. Shepard, State Director—BLM
P.O. Box 2965
Portland, OR 97208

RE: DEIS Western Oregon Resource Management Plan Revisions

Dear Mr. Shepard:

The North Bend City Council met in regular session on November 13, 2007 to formally discuss the Draft Environmental Impact Statement (DEIS) for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts. We are writing at this time to express our support of Alternative 2 which is described in the DEIS. City of North Bend representatives have taken the opportunity to review the DEIS summary, attend local forums and tour BLM lands. It is our understanding that The DEIS provides for four management options ranging from "no action" to three specific alternatives. It is clear that Alternative 2 would have the most favorable impact on the local economy and would result in revenues equal to approximately 94% of the lost O & C revenues to counties. Alternative 2 provides for protection of fish, wildlife and the environment while allowing for restoration of our timber economy. Cutting timber reduces the need for federal subsidies and Alternative 2 , simply put, makes sense.

For decades, timber has been the backbone of our economy and growing trees is one of the things Oregon does best. This is one of the most important issues facing our communities today and we urge the adoption of Alternative 2. We appreciate all that has been done to present this information to our community so that we remain informed. Thank you for the opportunity to comment.

Sincerely,

Rick Wetherell, Mayor
City of North Bend
cc: Senator Gordon Smith
Senator Ron Wyden
Congressman Peter DeFazio
Senator Joanne Verger
Representative Arnie Roblan

City of CENTRAL POINT Oregon

207 ✓

RECEIVED

SEP 06 2007

August 30, 2007

OFFICE OF THE MAYOR

Department of the Interior
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

The City of Central Point, Oregon supports active forest management that returns at least 90 to 95% of receipts to Jackson County Government for the following reasons and supports Alternative 2 of the EIS four alternatives:

- Central Point is directly and indirectly affected by whether the county can maintain a level of services that provide public safety, libraries and critical human services. In Jackson County, without a safety net or adequate timber harvest, our County Sheriff's Deputies will be reduced, our libraries remain closed and critical health services reduced or eliminated.
- Alternative 2 proposes to harvest only 60% of the annual growth of about half of the land, yet will provide 94% of the revenue needed which is about $16.9 million each year.
- I consider myself to be an environmentalist and am concerned about livability in Jackson County because many of our businesses depend on tourism. Option 2 still has full protections of the Endangered Species Act, the Clean Water Act, the Clean Air Act and the National Environmental Policy Act. Only 48% of the 2.5 million acres of O & C lands have active management and the rest is restricted management or environmentally protected. It also provides for restoration of forests after catastrophic events.
- Alternative 2 restores numerous wood products industry jobs which pay good wages and help the economy in small rural towns, like Central Point.
- It is for these reasons that the City of Central Point supports the Alternative that restores at least 90% of funding for the counties and protects the environment and that appears to Alternative 2.

Sincerely,

Hank Williams

Hank Williams, Mayor of Central Point, Oregon

155 South Second Street • Central Point, OR 97502 • 541.664.3321 • Fax 541.664.6384

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

WESTERN OREGON PLAN REVISIONS

BLM/OR/WA/PL-08/096+1792

United States Department of the Interior
Bureau of Land Management
Oregon State Office
333 S.W. 1st Avenue
Portland, Oregon 97204

OFFICIAL BUSINESS
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Final Environmental Impact Statement

for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management - Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District

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